General Directorate of Environmental Impact Assessment, Permit and Inspection

REPUBLIC OF TURKEY
MINISTRY OF ENVIRONMENT
AND URBANISATION

STATE OF THE ENVIRONMENT REPORT FOR REPUBLIC OF TURKEY

ANKARA - 2016

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GENERAL DIRECTORATE OF ENVIRONMENTAL IMPACT ASSESSMENT, PERMIT AND INSPECTION
DEPARTMENT OF ENVIRONMENTAL INVENTORY AND INFORMATION MANAGEMENT

ANKARA-2016
www.csb.gov.tr

STATE OF THE ENVIRONMENT REPORT FOR REPUBLIC OF TURKEY

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ISBN : 978-605-5294-53-3

Publication Number : 30-2

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ANKARA - 2016

“PREVENTIVE MEASURES SHOULD BE TAKEN BEFORE THE DISASTERS; THERE IS NO USE IN BEWAILING AFTER GETTING INTO TROUBLE.”

Mustafa Kemal ATATÜRK

Both the state and individuals are collectively responsible for combating environmental problems that threaten humanity globally.

Our country has been pulling its own weight in line with international agreements by being sensitive to bringing solutions to environmental problems and considering national priorities; and it actively participate in actions to be taken for the future of humanity.

Implementation of environmental policies require awareness of each individual of the society, education and awareness-raising campaigns, individual measures, long-term planning and integration of sustainable development policies. This is only possible through obtaining accurate and reliable information and data. The developed environmental policies nowadays have a decisive effects on urbanisation, economy, energy and many other areas.

We have been working very hard in pursuit of handing down the next generations a country where biological diversity is conserved, natural resources are managed through sustainable development approach, environmental pollution is prevented, environmental friendly, the vision of planned urbanisation and branded cities dominated.

I believe that the “State of the Environment Report for Republic of Turkey”, which has been prepared by the Ministry of Environment and Urbanisation by evaluating the latest data and information, will contribute to increase necessary environmental awareness and sensitivity for sustainability of a viable environment, as well as presenting the developments about the environmental state of our country.

Recep Tayyip ERDOĞAN
The President

Our government aspire after human-oriented sustainable development and with an inclusive development approach, it aims to reach each individual and region of the country, mobilize all energy of the country and accomplish our vision for 2023 and beyond by acting collectively.

The right to a healthy environment is one of the basic human rights. Thus, each step and action towards protecting of the environment will be taken for welfare of the humanity. It is clear that a healthy society is possible only through solving the environmental problems. Accordingly, we aspire to solve these common problems and we develop policies that will enable us to work collectively with educational institutions, non-governmental organizations, written and visual media and all individuals of the society and foster international cooperation.

We regard the environment as a kind of deposit and carry out environmental management with responsibility to future generations. On the other hand, it is our fundamental priority to create viable cities when we consider that most of the population lives in urban areas in the world and culture and welfare fosters in cities.

The main focus in solving the environmental problem is on being aware of the problems and identifying them. Thus, we attach importance to works that present current conditions and guide us in process of taking measures.

Within this purpose; State of the Environment Report for Republic of Turkey is prepared by the Ministry of Environment and Urbanisation every four years. This report is of great importance to us since it presents all environmental values of our country and helps us in being aware of the present condition and in developing environmental problems with a view to protect the environment and prevent environmental pollutions from the source before they spread.

I wish that the State of the Environment Report for Republic of Turkey will be effective all over the country and I would like to express my thanks to all those who have contributed to this report.

Binali YILDIRIM
The Prime Minister

Our Ministry aspires to carry out necessary works and activities, within the frame of sustainable development principles, to protect the environment and prevent pollution in the source through an inspection, participation and solution oriented approach by adopting a vision of viable environment and branded cities. We assume the obligation of contributing to resolution of globally experienced environmental problems, protecting the nature and handing down a more viable environment to the next generations.

It is essential to present current conditions first and make situation assessment in order to tackle environmental problems more effectively. “State of the Environment Report for Republic of Turkey” has been prepared to evaluate all environmental assets of Turkey with a view to protect the environment and solve the environmental problems. This work is of great importance since it shows the relationship between the environment and related sectors, presents an overview of current situation, and acts as a formal source for academic studies and related institutions and organizations.

“State of the Environment Report for Republic of Turkey” has been prepared under the light of up-to-date data collected at the end of hard works and I would like to congratulate every contributors, especially the staff of the General Directorate of Environmental Impact Assessment, Permit and Inspection and I would like to express my thanks to all public institutions and organizations that contributed to this work by providing data and information.

I wish this report to be helpful in raising environmental awareness for protecting the environment and sustainability of a viable environment as well as meeting the need of our people for data and information.

Mehmet ÖZHASEKİ
Minister of Environment and Urbanisation

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ABBREVIATIONS

WTP	Wastewater Treatment Plant
EU	European Union
EEA	European Environment Agency
LULUCF	Land Use, Land Use Change and Forestry
VTSP	Vehicle Tracking Service Providers
BEKRA	Reducing the Risks of Major Insdustrial Accidents
PPP	Plant Protection Products
UN-UNECE	United Nations – Economic Commision for Europe
UNFCCC	United Nations Framework Convention on Climate Change
GIS	Geographical Information Systems
TP	Territorial Plans
EIA	Environmental Impact Assessment
GDoCDE	General Directorate of Combating Desertification and Erosion
REIA	Regulation on Environmental Impact Assessment
EOP	Environment Operational Programme
MoEU	Ministry of Environment and Urbanisation
PDEU	Provincial Directorate of Environment and Urbanisation
SHW	General Directorate of State Hydraulic Works
MSFD	Marine Strategy Framework Directive
GDO	Genetically Modified Organism
GCMA	Gene Conservation and Management Area
POC	Provisional Operation Certificate

GNP	Gross National Product
IUCN	International Union for Conservation of Nature and Natural Resources
IPA	The Instrument For Pre-Accessıon Assıstance
IPCC	Intergovernmental Panel on Climate Change
APCC	National Action Plan for Climate Change
IMO	International Maritime Organization
POP	Persistent Organic Pollutants
KP	Kyoto Protocol
OECD	Organization for Economic Co-operation and Development
MSI	Market Surveillance and Inspection
RAMSAR	The Convention on Wetlands of International Importance, especially as Waterfowl Habitat
REC	Regional Environment Center
OG	Official Gazette
NCAMS	Natural Conservation Areas Management System
WFD	Water Framework Directive
CEMS	Emission Measurement System
SOER-2015	The European Environment State and Outlook- 2015 Synthesis Report
TÜBİTAK	The Scientific and Technological Research Council of Turkey
TURKSTAT	Turkish Statistical Institute
NES	National Environment Strategy
UNCCD	United Nations Convention to Combat Desertification
TAEK	Turkish Atomic Energy Authority
TAGEM	General Directorate of Agricultural Research And Policy

IAT	Informatics Association of Turkey
TEP	Ton Equivalent Petroleum
TÜBİTAK-MAM	The Scientific and Technological Research Council of Turkey - Marmara Research Center
RER	Renewable Energy Resource
GTIP	Customs Tariff Statistics Positions

INTRODUCTION

INTRODUCTION

1. General View

The issue of environment has gained different dimensions since the environmental problems were discussed for the first time on an international scale at "The Conference on Human Environment" in Stockholm on 5-16 June, 1972.

In the past, only specific and local environmental issues were tackled through single aim policies and only specific problems were handled such as disposal of wastes and conservation of species. Today, it has been understood that environmental problems are interrelated with economic, social, political, technical and cultural issues. Thus, it is necessary to consider the complicated interrelations between environmental factors and human health and welfare within a broader spatial (global), socio-economic and cultural context.

Moreover, due to the belief that environmental problems were present in a limited area, the policymakers in 1970s and early 1980s focused on point sources of local pollutions by enacting directives and by-laws. It has been realized that the environmental impairment increasing in the last 20 years due to pollution sources has been causing global environmental troubles. For instance, it was only at the end of 1980s that it was understood that such environmental problems as 'depletion of the natural capital', 'depletion of ozone layer', 'desertification', 'climate change' and 'drought' are serious problems to be handled immediately. All these factors show that environmental problems have no bounds and they are effective on a global scale.

Environment has a vital role on physical, mental and social welfare of humans. The environmental impairment resulting from environmental pollution, climate change, and loss of biodiversity, depletion of natural resources, drought and floods leads to impaired quality of human life. Therefore, ensuring an integration between environmental, economic and social policies and maintaining it has become compulsory. In this way, environmental policies will contribute to transition to a green economy in which the policies and innovations will enable effective use of resources, and within this policy of economy people will enjoy a wealthy and abundant life style while maintaining the natural systems that provides life to us.

As a result, the environmental sector has been included in national programs as a part of the development plans since the 5th Five-year Development Plan for 1985-1989. In the Development Plans after 1985-1989, issues of biodiversity in environmental and agricultural sectors have been included, policies that concern conservation and development of biodiversity in a sustainable way and enable to gain economic value have been developed, and necessary measures have been determined. Similarly, the issue of environment has also been integrated with the sectors of transportation, energy, agriculture and tourism.

Important progress has been made in Turkey in waste management, noise control, pollution control and risk management, forest and erosion control, and water and air quality has improved. Besides these, legal and institutional By Law works on nature conservation, management of water and chemicals and climate change have been carried out.

High cost and extensive infrastructure investment is required for developing administrative and institutional capacity, approximation to EU environmental acquis, environmental inspection and reporting activities. Turkey aims to integrate environmental protection and social affairs into economic growth plan. 10th Development Plan (2014-2018) of Turkey focuses on sustainability during the process of development. Additionally, the plan encourages eco-activity and clean technologies in production period and service sector. Turkey is diversifying its energy types by increasing the use of renewable energy.

Turkey is a party to all important international environmental conventions that provide regional and national cooperation and coordination and appropriate policy frameworks in handling environmental problems.

Regional conventions on Black Sea and Mediterranean Sea are important political tools for Turkey in the attempts of protecting marine and coastal ecosystem environments. Turkey has developed and implemented many strategy documents on various matters such as adaptation to climate change, reduction, conservation and sustainable use of biodiversity, erosion control and combating with desertification and afforestation. (EEA,SOER-2015, Chapter on Turkey)

During this process, the aims of Turkey will focus on preventing environmental pollution and promotion of resource-efficient and low carbon economy in the country preservation of natural capital with a view to preserve, maintain and improve natural capital.

Paragraph (h) of the Article 9 of the "**Decree Law No. 644 on Organization and Duties of the Ministry of Environment and Urbanisation**" published in the Official Gazette No. 27984 (repeated) dated 4 July 2011, which designate duties and responsibilities of the General Directorate of Environmental Impact Assessment, Permit and Inspection includes a provision of "Preparing the environmental inventory and state of the environment reports". Within this scope, a State of the Environment Report for Republic of Turkey is prepared every four years in coordination of the General Directorate of Environmental Impact Assessment, Permit and Inspection with contributions of related institutions and organizations. The State of the Environment Report for Republic of Turkey book prepared by the Ministry of Environment and Urbanisation covers the years between 2011 and 2015.

2. Geography

Turkey is situated between 36-42° north latitude and between 26-45° east longitude. There is a time difference of 76 minutes between its easternmost and westernmost tips. It roughly resembles a rectangle and has a width of 1.660 kilometers. The real land occupied by Turkey is 814.578 km² including lakes and islands and it has a projected area of 779.578 km². Total length of the land borders is 2.875 km and has a coast line of 8.333 km.

Geographical regions of Turkey are Mediterranean Region, Eastern Anatolia Region, Aegean Region, Southeastern Anatolia Region, Central Anatolia Region, Black Sea Region and Marmara Region.

Turkey borders on Bulgaria and Greece on the west, Georgia, Armenia, Azerbaijan and Iran on the east and Iraq and Syria on the south.

Projected surface areas of the regions are provided below.

- Eastern Anatolia Region (171.000 km^2)
- Central Anatolia Region (162.000 km^2)
- Black Sea Region (146.000 km^2)
- Mediterranean Region (122.000 km^2)
- Aegean Region (85.000 km^2)
- Marmara Region (67.000 km^2)
- Southeastern Anatolia Region (27.000 km^2)

Half of the surface of Turkey consists of areas higher than 1.000 meters, one third of it consists of medium height plains, plateaus and mountains, and lower areas makes up 10%. It is a rough country with North Anatolian Mountains on the north and Toros Mountains on the south, east and southeast part of Turkey. The highest point in Turkey is the top of Mount Ağrı with a height of 5.166 meters. And its major plains are Çukurova, Konya Plain and Harran Plain.

Mountains of Turkey: Mount Ağrı (5.137 m), Mount Buzul (Cilo) (4.116 m), Mount Cudi (5.000 m), Mount Süphan (4.058 m), Mount Kaçkar (3.932 m), Mount Erciyes (3.917 m), Uludağ (2.543 m).

Rivers of Turkey: The longest one of the rivers which both rise and flow into the sea within national borders is Kızılırmak with a length of 1.355 kilometers. Other rivers are Yeşilırmak (519 km), Sakarya (824 km), Fırat (2.800 km), Dicle (1.900 km), Büyük Menderes (584 km), Seyhan (560 km), Ceyhan (509 km), Meriç (590 km), Küçük Menderes (450 km), Göksu and Çoruh.

Map 1 – The geographical regions of Turkey

Natural Lakes: The biggest natural lake in Turkey is Lake Van with a surface area of 3.713 km². And the biggest artificial lake is Atatürk Dam Lake with a surface area of 817 km². Other lakes are Salt Lake 1.500 km², Lake Beyşehir 656 km², Lake Eğridir 468 km², Lake Akşehir 353 km², Lake İznik 298 km², Lake Burdur, Lake Salda, Lake Eymir.

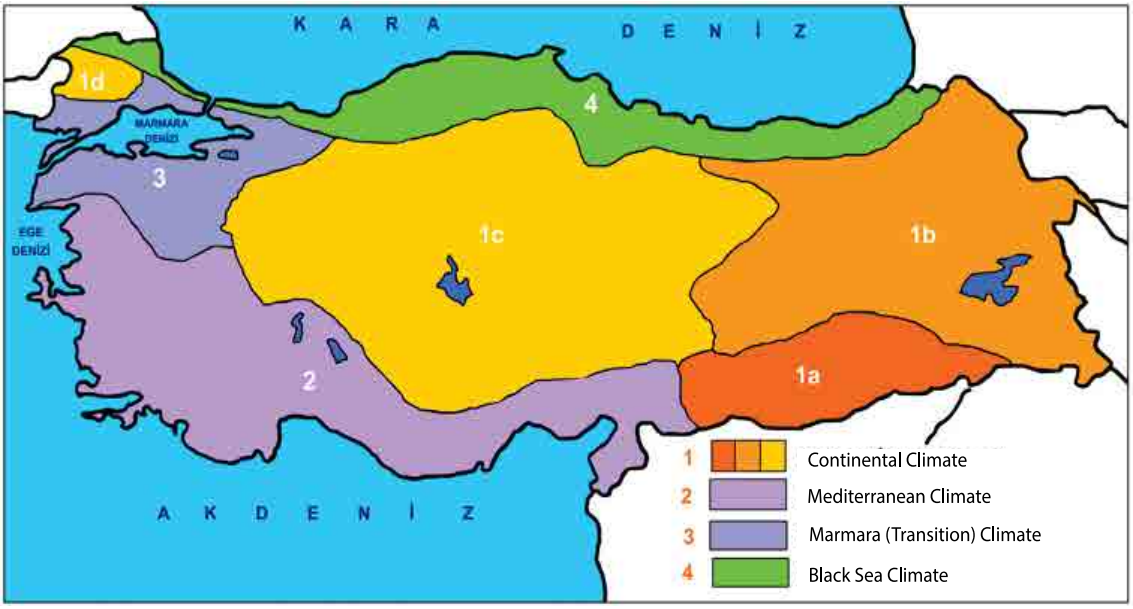
Islands: The biggest island is Gökçeada with a surface area of 279 km². Other major islands are: Balıkesir Marmara Island 117 km², Bozcaada 36 km², Uzunada 25 km², Balıkesir Alibey Island 23 km², Balıkesir Paşalimanı Island 21 km², Balıkesir Avşa Island 21 km².

3. Climate

Turkey is located between temperate and semi-tropical zones. As it is surrounded on three sides by the sea with a mountainous and varied geography, Turkey enjoys different types of climate in different regions. It has a more temperate climate in the coastal regions due to the seas around. The North Anatolian Mountains and Taurus Mountains prevent the impact of seas from entering into the interior part of the country. Thus, continental climate dominates the interior regions. The following climatic types can be specified for Turkey by grounding on the criteria used in global climatic classificatio

1. Continental Climate (a, b, c, d)
2. Black Sea Climate
3. Mediterranean Climate
4. Marmara (Transition) Climate

Map 2 illustrates the climatic regions (types) in Turkey.



Map 2 – Present climatic zones (types) in Turkey (Atalay, İ., 1997)

Although the annual areal precipitation of Turkey is 574 mm (1981-2010), it differs with regard to the seasons and regions. The total amount of annual precipitation varies between 200- 3.000 mm according to different areas. The country receives most precipitation in winter season. Annual areal precipitation by region is 698 mm in Black Sea Region, 664 mm in Mediterranean Region, 595mm in Aegean Region, 659 mm in Marmara Region, 565 mm in Eastern Anatolian Region, 549 mm in Southeast Anatolia Region and 408 mm in Central Anatolia Region.

Due to the topography of Turkey, there isn't much temperature difference between the regions in summer season. However, there are differences in temperature between the regions in winter season. In terms of mean and highest temperatures, there are differences not only between the regions but between the provinces in the same region as well. The winter temperature is often below -20°C in Central Anatolia and below -30°C in Eastern Anatolia. In winter Southeastern Region of Anatolia enjoys mild temperatures but in summer season, the temperature reaches to highest values (around 35–40°C) in the country in this region.

4. Population

Population growth is the major cause of human activities that induce environmental pressures. Thus, population growth takes an important place in environment management and environmental strategy development and planning. Population growth and population growth rate are among the basic indicators in international "Environmental Performance Assessment" and "Environmental Sustainability Index".

Table 1 – Population of Turkey (TURKSTAT, 2016)

	2010	2011	2012	2013	2014	2015
MALE	37.043.182	37.532.954	37.956.168	38.473.360	38.984.302	39.511.191
FEMALE	36.679.806	37.191.315	37.671.216	38.194.504	38.711.602	39.229.862
TOTAL	**73.722.988**	**74.724.269**	**75.627.384**	**76.667.864**	**77.695.904**	**78.741.053**

Economic factors lies on the base of the origin of the relationship between population and environment. As in many countries, the main reasons for internal migration in Turkey are economic, social, cultural, geographic, demographic and political reasons. The main reasons behind rapid population growth and migration to big cities are the conditions created by economic development.

The population of Turkey has been on the increase, but since 1990, there has been a decrease in population growth rate. As can be seen in Table 2, there was a 1,32% decrease in population growth rate between 2010-2015.

Table 2 – Population growth rate in Turkey (TURKSTAT, 2016)

YEAR	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
POPULATON GROWTH RATE (%)	1,35	1,20	1,37	1,33	1,34

As a result of the "Law on Amendments to Metropolitan Municipality Law and to Some Laws and Decree-laws" N. 6360, enacted on 12.11.2012 and published on 6.12.2012, metropolitan municipalities were established in 14 more provinces and the borders of 30 metropolitan municipalities were expanded to comprise the whole provinces. Because of this, the number of population living in cities (in the centers of provinces and sub-provinces) has increased dramatically.

Table 3- Population in cities (city/province centers) and villages (towns/villages of Turkey (TURKSTAT, 2016)

	CITIES	VILLAGES
2010	56.222.356	17.500.632
2011	57.385.706	17.338.563
2012	58.448.431	17.178.953
2013	70.034.413	6.633.451
2014	71.286.182	6.409.722
2015	72.523.134	6.217.919

5. Natural Resources

5.1. Petroleum

When present energy resources in the nature are evaluated in terms of proved reserves and their annual amount of production, it is seen that the reserve life is limited and it was calculated in 2014 that present reserves would be exhausted 53 years later.

Petroleum is the major energy source all over the world and it has met 32,6 of the global energy need according to the statistics of 2014. 57% of the producible petroleum and natural gas reserves of the world is located within the regions of Eurasia and Middle East, which are on a close geography with Turkey. As Turkey share borders with the countries which holds three quarters of the proved petroleum and natural gas reserves due to its geopolitical location, it acts as an "Energy Corridor" between energy rich Caspian, Middle Eastern and Central Asian countries and consumer markets in Europe. And Turkey also takes part in many important projects and supports such projects. It is envisaged that an essential part of the major energy demand over the world, which is expected to increase by 40% by 2030, will be satisfied through the sources in our region.

A total number of 63 oil wells (total 136.429 meters) including 31 exploratory wells, 7 appraisal wells and 25 production wells were drilled in 2015. Moreover, crude oil production was carried out with 1.333 production wells in 134 production areas in 2015. 17.5 million barrels of crude oil was produced within the country and 12, 9 million barrels of crude oil was produced outside national borders in 2015.

The more our industry and economy grows, the more the demand for petroleum products increases in Turkey. While 2, 5 million tons of crude oil was produced in 2015, 25, 1 million tons of crude oil was imported. At the same time, 14, 6 million tons of petroleum products were imported and 10, 8 million tons of petroleum products were exported.

5.2. Natural Gas

In 2014, the Turkish Petroleum Corporation produced a total amount of 251, 8 million sm^3 natural gas in natural gas fields. 96% of this yield was from Trakya and 4% was from Batman Region. Crude oil equivalent of this yield is 1,5 million barrels.

In winter times, when there is a heavy demand for natural gas, disruption in source countries or in the countries on the route may lead to seasonal demand and supply gaps. As the demand for natural gas has increased in Turkey, the Turkish Petroleum Corporation has decided to increase the present storage and reproduction capacities in three stages (Stage I, II, and III) and

the present storage capacity of 2,661 billion sm^3 has been planned to increase to 4,287 billion sm^3 and the present backward invention capacity of 17 billion sm^3/day has been planned to increase to 75 million sm^3/day.

Table 4 - Amount of domestic natural gas sales (%) (Ministry of Energy and Natural Resources, 2015)

Year	Electricity	Housing	Industry	Wholesale
2011	53,54	25,68	20,78	0,00
2012	51,62	24,13	24,25	0,00
2013	51,73	23,92	21,25	3,10
2014	54,08	21,80	21,31	2,81

5.3. Coal

Coal is the most common type of fuel used for electricity generation and it is estimated that this situation is not likely to change in near future.

Lignite is commonly used in thermal power plants due to its low calorific value and high ash and humidity level. On the other hand, it is a common type of energy raw material as it is found in abundance under the ground. However, anthracite is among the types of coal with high calorific value. In accordance with the policy of the Ministry of Energy and Natural Resources which aims at using domestic resources for the purpose of reducing foreign dependency, a work of information sharing started between the public enterprises in 2014 and new additional drilling activities have been carried out. With this project, known lignite reserves were increased from 8,2 billion tons in 2014 to 15,5 billion tons in 2015, with an increase of 7,3 billion tons. Besides this, there is a hard coal reserve of 1,3 billion tons in Turkey.

Table 5 - Amounts of raw coal production between 2011-2014 (ton), (Ministry of Energy and Natural Resources, 2015)

	RUN-OF-MINE COAL PRODUCTION (ton)		
	OPEN PIT	UNDERGROUND	TOTAL
2011	32.469.590	11.227.110	43.700.000
2012	31.695.494	11.068.815	42.750.000
2013	17.561.406	12.975.198	30.500.000
2014	11.900.000	9.800.000	21.700.000

In terms of reserves and production amounts, Turkey can be ranked at medium-level in lignite and low level in hard coal. Almost 1,6% of world total lignite reserves is located in Turkey.

Lignite fields are found in all regions of Turkey and calorific value of lignite in these fields is between 1.000-5.000 kcal/kg. Hard coal is consumed mostly in industry sector (cement plants, sugar factories and other industrial facilities) and coking plants (iron and steel plants) in Turkey.

Turkish Coal Enterprise produces around 30-35 million tons of coal annually; but, due to the privatization of institutes, about 22 million tons of coal was produced in 2014. All of the produced raw coal is processed in in screening-sorting/lavvar plants and made ready for consumption as good quality and marketable coal.

Table 6- Lignite selling places in Turkey (1.000 ton) (Ministry of Energy and Natural Resources, 2015)

YEARS	Thermal Power Plants	Heating	Industry
2011	27.693	3.801	3.820
2012	26.005	3.976	3.676

In its lignite production and coal explorations, the General Directorate of Turkish Coal Enterprises gives importance to advanced coal production, coal preparation and other clean coal technologies in order to ensure environmental friendly consumption of

coal and increase the quality of coal by adopting economy, efficiency and innovativeness principles in concordance with environmental legislations and policies of harmonization with EU, by considering changing and developing conditions of today's world. In line with this, it has been conducting research and development projects in cooperation with various universities and institutions. These activities include:

- Coal Gasification,
- Liquid Fuel Production from Biomass and Coal Mixtures,
- Coal Characterization and Investigation of Burning Behaviors,
- Enrichment and Recovery of Lavvar Slime Waste
- Increasing Lavvar Performance,
- Coal Cleaning Works.

5.4. Geothermal

Geothermal energy is the heat energy obtained from the hot water, steam, dry steam and hot dry rocks, which have gathered within rocks in the depths underneath the soil, and have moved and were stored by the fluid heat, by artificial methods. Geothermal sources are mostly formed around active fault systems and volcanic and magmatic units.

Modern geothermal plants which use geothermal energy emit very low amounts of CO_2, NO_x and SO_x gases, and therefore, it is evaluated as a renewable source of energy. Geothermal energy includes all types of direct or indirect benefit derived from geothermal sources.

Low temperature (20-70 °C) fields are used for heating in particular, as well as in industry, for the production of chemicals. Medium temperature (70-150 °C) and high temperature (above 150 °C) fields can be used for the generation of electricity as well as in heating applications, in an integrated manner, subject to the re-injection conditions.

As Turkey is situated on the Alpine – Himalayas belt, it is a country with quite a high geothermal potential. The geothermal capacity of Turkey is 31.500 MW. The areas with a potential in Turkey are situated in Western Anatolia (79,9%). So far, 16% (5.000 MWt) of the country's geothermal potential has been operationalized by General Directorate of Mineral Research and Exploration (MTA).

55% of the geothermal fields in Turkey is suitable for heating practices. In the country, 3130 decares of green houses and 90.000 houses in 19 residential areas are heated by geothermal energy.

Geothermal energy exploration works accelerated in 2004 and thanks to this mobilization, our usable geothermal heat capacity reached to 3100 MWt by the end of the year 2004. Our potential for electricity production from geothermal energy is 750 MW by the end of 2015 as apparent technical capacity. And it is also envisaged that this capacity might reach to 1.000 MW at the end of the additional development works of all fields. Additionally, the aim to increase the country's installed geothermal capacity to 600 MW until 2023 as stated on the Document of Electric Energy Market and Supply Security Strategy has been achieved by the end of 2015 and installed geothermal capacity is 624 MW at present. In theory, the country's energy potential is around 2.000 MWe.

5.5. Solar Energy

According to the Solar Energy Map (SEM) of Turkey prepared by the General Directorate of Renewable Energy , it has been determined that the total annual sunshine duration is 2.737 hours (a total of 7,5 hours per day), and the total solar energy derived per year is 1.527 kWh/m^2 per year (total 4,2 kWh/m^2 per day).

The total established solar collector area in Turkey as of 2012 was calculated as being close to 18.640.000 m^2. The annual production of planary solar collectors was calculated as 1.164.000 m^2, while that of vacuum-tube collectors was 57.600 m^2. 50% of the planary collectors, and all of the vacuum-tube collectors which are produced are known to be used within the country. In 2012, close to 768.000 TEP (Tones Equivalent to Petrol) heat energy was produced using solar collectors. The use of this heat energy in 2012 was calculated as 500.000 TEP in homes, and 268.000 TEP for industrial purposes.

The legal ground has been prepared for solar energy investments, and appraisal phase of license application for 496 Solar Power Plants (SPP) with an installed capacity of over 9.000 MW is in progress. For the areas where the appraisal process was completed, some competitions were hold under the "Competition By Law on Pre-License Applications for Building a Power Plant Based on Wind and Solar Energy". At the end of the competitions, a capacity of 581,9 MW was allocated to 49 project. Accordingly, 5 projects was granted with pre-license for a capacity of 40MW, and 2 companies which fulfilled the pre-license obligations were granted with licenses for 13,3 MW installed capacity.

The Law on Renewable Energy Resources numbered 5346, which is necessary in order for the use of photovoltaic systems to become more widespread, was revised on 29.12.2010, and the studies concerning the Legislation were completed in 2013. It is expected that there will be more widespread use as a result of the costs of photovoltaic systems falling, and productivity rising in recent years.

5.6. Mines

With regard to diversity and reserves of mines, Turkey ranks as the 28th among the 132 countries dealing with mining in terms of total amount of mine production and ranks as the 10th in terms of diversity of mine production.

Turkey enjoys significant amount of reserves for mines such as marble, trona, barite, chrome and magnesite as well as lignite and boron. However, it is not self-sufficient in terms of energy raw materials especially, such as petroleum, natural gas and hard coal. Besides this, as present iron ores are low-grade and thus they cannot be utilized properly, dependence on foreign sources have been increasing.

Table 7 –Amount of some mine reserves in Turkey (Ministry of Energy and Natural Resources, 2015)

Mineral	Reserve (ton)
Chrome	510.000.000
Bentonite	250.000.000
Copper	123.000.000
Iron	5.380.000.000
Zinc	600.000.000
Coal	12.400.000.000
Feldspath	250.000.000
Kaolin	200.000.000
Clay	1.000.000.000
Aluminum	104.000.000
Nickel	56.000.000
Trona	850.000.000

The country holds 72% of boron reserves, feldspath reserves and 20% of bentonite reserves of the world. The Beypazarı Trona Plant, established to process Beypazarı trona deposit which is the second largest soda ash reserve, meet 2,5% of global demand by producing 100 thousand tons of sodium carbonate annually.

Researches in Turkey shows that there are approximately 650 different color and texture types of marble in Turkey. According to current data, Turkey holds 7,495 million m^3 natural stone reserves in total, including 43,8 billion m^3 of exploitable marble, 2,7 billion m^3 of exploitable travertine, and 995 million m^3 of granite reserves.

Based on the gold formation models in the world, it is calculated that the gold potential in Turkey is 6.500 tons within 267 gold deposits. As a result of the researches carried out on the fields licensed by General Directorate of Mining Affairs, it has been understood that there is 800 tons of apparent gold reserve and 1.926 tons of silver reserve. However, when the reserves identified as a result of the search operations on the fields with exploration and pre-operating license and the reserves within the complex Cu+Pb+Zn mineralization in Turkey is taken into account, it is understood that the country holds 1.340 tons of apparent and probable gold reserves.

5.7. Forest Wealth

Almost all of Turkey's forest wealth is in the possession and under the command of the government and it is managed by the General Directorate of Forestry by grounding on the principle of sustainability. Pursuant to the 26th Article of the Forestry Law numbered 6831, all of the country's forests are operated within forest management plans.

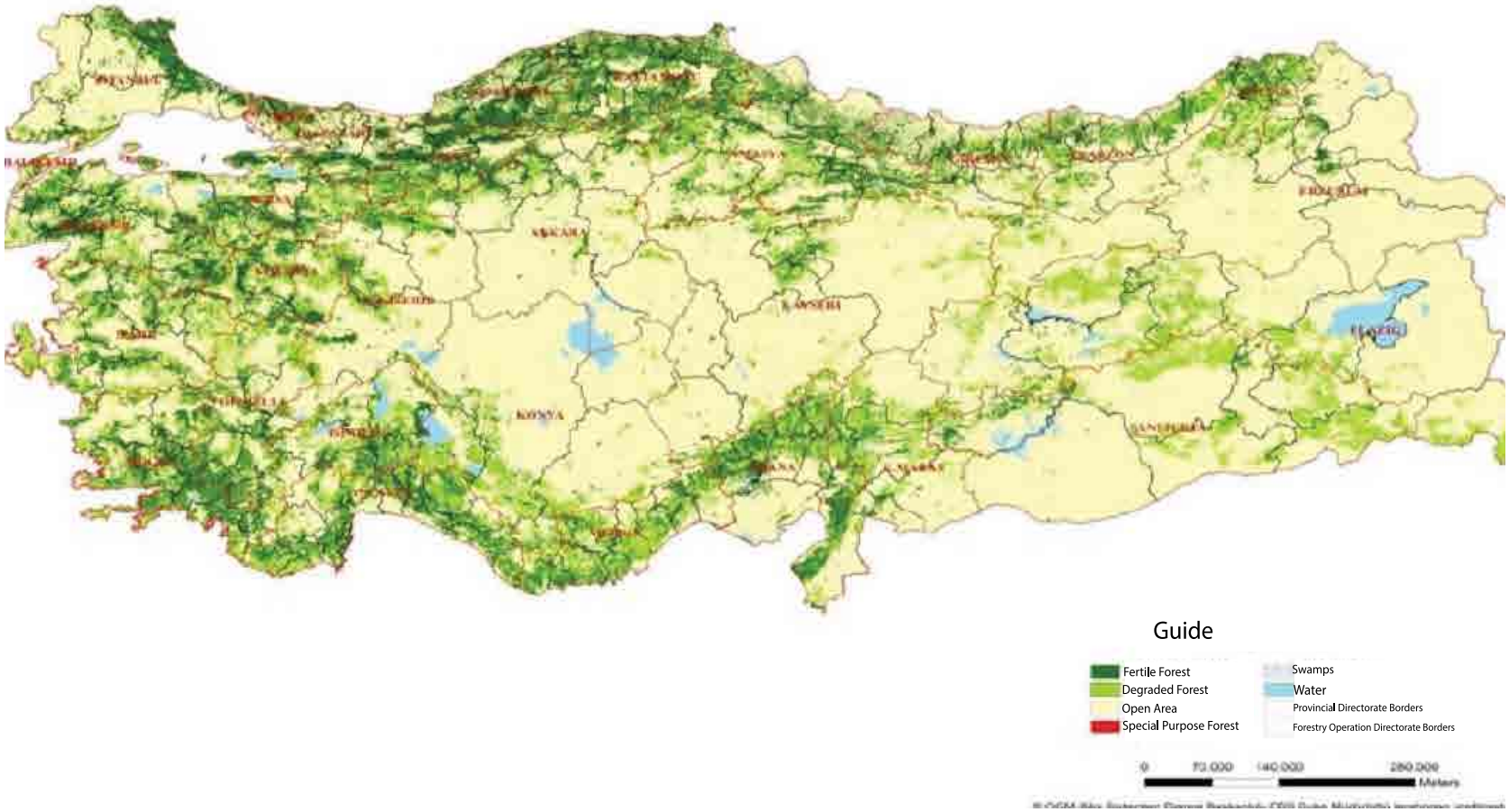
According to assessment results of inventory on size of forest areas and change in their size until today, general area of forests in Turkey was 20,2 million hectares (26,1%) according to inventory of 1963-1972 period, and this number increased to 22,3 million hectares (28,6%) according to inventory of 2015. According to these inventory results, there has been an increase of around 2,1 million hectares in forest areas for the last 40 years.

Table 8 – Distribution of forest areas (General Directorate of Forestry, 2016)

Forest Type	1963-1972	2004	2015
	20.199.296	**21.188.747**	**22.342.935**
High forest (hectares)	10.934.607	15.439.595	19.619.718
Marsh (hectares)	9.264.689	5.749.152	2.723.217

While Turkey's forest stock was 935,5 million m^3 in first inventory period, it was determined as 1,6 billion m^3 for the last inventory period and there was nearly 700 million m^3 increase in forest stock of the country in 1973-2015 period.

MAP ON TURKEY'S FOREST WEALTH



Map 3 – Turkey's forest wealth (General Directorate of Forestry, 2015)

Table 9 –Forest Stock of Turkey (planted barked trunk volume) (General Directorate of Forestry, 2016)

Quality	High Forest	Coppice Forest	Total
	m^3	m^3	m^3
Normal	1.506.131.410	33.692.118	1.539.823.528
Degraded	59.996.731	11.953.934	71.950.665
TOTAL	**1.566.128.141**	**45.646.052**	**1.611.774.193**

5.8. Pastures, Grasslands, Grazing Lands, Summer Pastures, Winter Pastures

27% of Turkey's surface area consists of pastures, grasslands, grazing lands, summer pastures, winter pastures. This situation enriches fauna and flora of the country. Mountainous geography of the country limits the agricultural area. When considered from this aspect, 24% of the area of Turkey is arable.

Table 10 - Amounts of land identification, allocation and limitation under the Law on Pastures, by years (Ministry of Food, Agriculture and Livestock, 2016)

YEARS	Identification (ha)	Limitation (ha)	Allocation (ha)
2011	205.621	211.471	662.679
2012	771.184	816.499	786.033
2013	659.950	617.519	483.989
2014	202.683	222.712	345.172
2015	414.637	288.368	64.280

Through the Pasture Law, it is aimed to determine and delimit the pastures, summer pastures and winter pastures and allocate them to municipal or village legal entities. It is also aimed to ensure that these areas are used, maintained and improved properly to increase their efficiency and controlled and conserved by the Ministry of Food, Agriculture and Livestock. Within this scope, 10.348.169 ha area has been determined, 5.983.101 ha delimited and 3.660.635 ha allocated so far. Moreover, 5.065.601 da determined and delimited area has been improved. Pastures, summer pastures and winter pastures are among the natural resources that are crucial for development of livestock production, soil conservation and improvement of the basins.

Table 11– Pastures in Turkey in 2015, by regions (Ministry of Food, Agriculture and Livestock, 2016)

REGION	TOTAL IDENTIFICATION (ha)	TOTAL LIMITATION (ha)	TOTAL ALLOCATION (ha)
MEDITERRANEAN	526.724	337.276	159.970
EASTERN ANATOLIA	4.030.792	2.025.217	1.277.002
AEGEAN	388.952	230.593	147.958
SOUTH-EASTERN	555.188	277.997	84.920
CENTRAL ANATOLIA	3.907.804	2.534.314	1.759.841
BLACK SEA	1.068.141	626.187	104.637
MARMARA	285.206	239.885	190.587
TOTAL	**10.762.806**	**6.271.469**	**3.724.915**

Table 12–Pastures in Turkey between 1998-2015, by province (Ministry of Food, Agriculture and Livestock, 2016)

PROVINCE-CODE	PROVINCE	PASTURES (TURKSTAT)	TOTAL IDENTIFICATION (ha)	TOTAL LIMITATION (ha)	TOTAL ALLOCATION (ha)
01	ADANA	49.837	48.628	44.957	30.565
02	ADIYAMAN	87.990	60.959	44.847	12.575
03	AFYONKARAHİSAR	331.766	148.044	91.603	69.525
04	AĞRI	542.731	80.802	51.105	
05	AMASYA	51.940	66.212	17.952	3.021
06	ANKARA	461.947	372.818	26.063	31.153
07	ANTALYA	81.637	167.813	51.129	7.847
08	ARTVİN	169.473	126.630	83.805	5.208
09	AYDIN	30.330	31.750	14.358	9.236
10	BALIKESİR	132.230	78.323	58.135	39.766
11	BİLECİK	21.397	5.736	5.737	2.054
12	BİNGÖL	313.771	179.577	180.133	149.688
13	BİTLİS	219.840	128.015	70.955	40.274
14	BOLU	90.716	29.621	3.354	424
15	BURDUR	66.717	8.588	8.877	2.298
16	BURSA	78.012	24.341	21.438	19.661
17	ÇANAKKALE	66.626	36.167	25.061	18.291
18	ÇANKIRI	232.689	149.761	127.114	50.771
19	ÇORUM	180.666	63.471	18.425	15.233
20	DENİZLİ	68.057	24.281	11.915	2.525
21	DİYARBAKIR	181.803	146.751	84.299	51.232
22	EDİRNE	88.087	61.606	57.572	57.105
23	ELAZIĞ	268.912	209.129	36.899	45.014
24	ERZİNCAN	449.432	436.849	94.004	
25	ERZURUM	1.448.466	831.500	762.219	669.363
26	ESKİŞEHİR	343.880	386.306	93.096	1.529
27	GAZİANTEP	86.683	53.466	48.068	1.790
28	GİRESUN	120.086	98.672	97.690	17.658
29	GÜMÜŞHANE	167.947	167.724	139.906	3.275
30	HAKKARİ	166.559	39.952	33.053	
31	HATAY	11.564	15.851	13.559	8.747
32	ISPARTA	54.557	17.236	12.728	5.564
33	MERSİN	98.342	68.497	59.580	58.510
34	İSTANBUL	26.207	12.294	8.973	6.200
35	İZMİR	109.722	71.406	36.039	32.442
36	KARS	312.898	260.884	229.508	13.687
37	KASTAMONU	89.965	27.753	23.624	12.949
38	KAYSERİ	539.818	573.547	521.936	320.868
39	KIRKLARELİ	64.809	33.590	30.868	18.587
40	KIRŞEHİR	129.220	127.551	42.164	7.130
41	KOCAELİ	8.234	1.993	1.190	57
42	KONYA	736.852	687.061	476.200	453.761
43	KÜTAHYA	92.447	37.902	26.850	6.132
44	MALATYA	363.449	213.223	76.306	33.844
45	MANİSA	93.375	30.599	12.556	663
46	K.MANMARAŞ	285.846	195.166	143.158	46.336

Table 12–Pastures in Turkey between 1998-2015, by province (Ministry of Food, Agriculture and Livestock, 2016) (Cont.)

PROVINCE-CODE	PROVINCE	PASTURES (TURKSTAT)	TOTAL IDENTIFICATION (ha)	TOTAL LIMITATION (ha)	TOTAL ALLOCATION (ha)
47	MARDİN	75.682	28.519	13.834	1.194
48	MUĞLA	17.878	16.645	10.982	98
49	MUŞ	371.635	278.938	34.032	22.171
50	NEVŞEHİR	56.821	63.298	66.407	67.506
51	NİĞDE	289.115	202.935	71.489	20.283
52	ORDU	69.728	62.549	55.718	9.298
53	RİZE	76.403	97.794	31.391	
54	SAKARYA	16.972	8.705	6.321	927
55	SAMSUN	46.773	16.677	10.044	8.133
56	SİİRT	119.228	102.432	25.721	5.884
57	SİNOP	21.445	2.283	1.497	1.619
58	SİVAS	1.114.998	775.556	773.918	734.615
59	TEKİRDAĞ	63.984	30.416	30.357	28.866
60	TOKAT	126.020	46.967	33.791	12.618
61	TRABZON	154.630	123.358	8.704	9.760
62	TUNCELİ	126.741	109.998	57.223	
63	ŞANLIURFA	88.292	99.827	13.514	
64	UŞAK	59.305	28.326	26.290	27.337
65	VAN	532.862	1.040.689	336.190	294.501
66	YOZGAT	162.762	152.197	66.378	
67	ZONGULDAK	7.856	1.670	999	276
68	AKSARAY	213.459	188.843	138.305	5.377
69	BAYBURT	110.708	118.798	86.002	
70	KARAMAN	216.740	185.292	88.624	66.449
71	KIRIKKALE	71.881	42.638	42.620	399
72	BATMAN	41.896	36.686	18.025	3.930
73	ŞIRNAK	314.656	16.519	20.980	
74	BARTIN	5.425	1.372	839	802
75	ARDAHAN	245.823	131.682	23.141	
76	IĞDIR	122.331	89.554	40.447	8.460
77	YALOVA	3.076	741	554	
78	KARABÜK	19.478	5.797	4.037	2.820
79	KİLİS	16.346	10.027	8.710	8.315
80	OSMANİYE	10.834	4.945	3.289	103
81	DÜZCE	7.372	2.089	2.088	616
TOTAL (ha)		**14.616.687**	**10.762.806**	**6.271.469**	**3.724.915**

Projects for Pastures Improvement and Management have been carried out by the Ministry of Food, Agriculture and Livestock to increase the grazing capacity by improving the pastures, summer pastures and winter pastures, to improve grass quality and to prevent erosion by taking soil protection measures. 1.083 pasture improvement and management projects have been implemented in an area of 5.065.601 da so far.

6. Energy

6.1. Renewable Energy Resources

Demand for energy and natural resources in the world is growing day by day because of population growth, Urbanisation, industrialization and growth in trade due to globalization. Turkey has had the highest growth in demand for energy among the OECD countries for the last 10 years. Similarly Turkey has been the second country in terms of growth in demand for electricity and natural gas after China since 2002. Projections made by the Ministry of Energy and Natural Resources shows that this trend will continue for medium and long terms

Strategy and policies of the Ministry of Energy and Natural Resources focuses on energy supply security, alternative energy resources, resource diversity, utilization of national resources, sustainability, liberalization in energy market and energy efficiency.

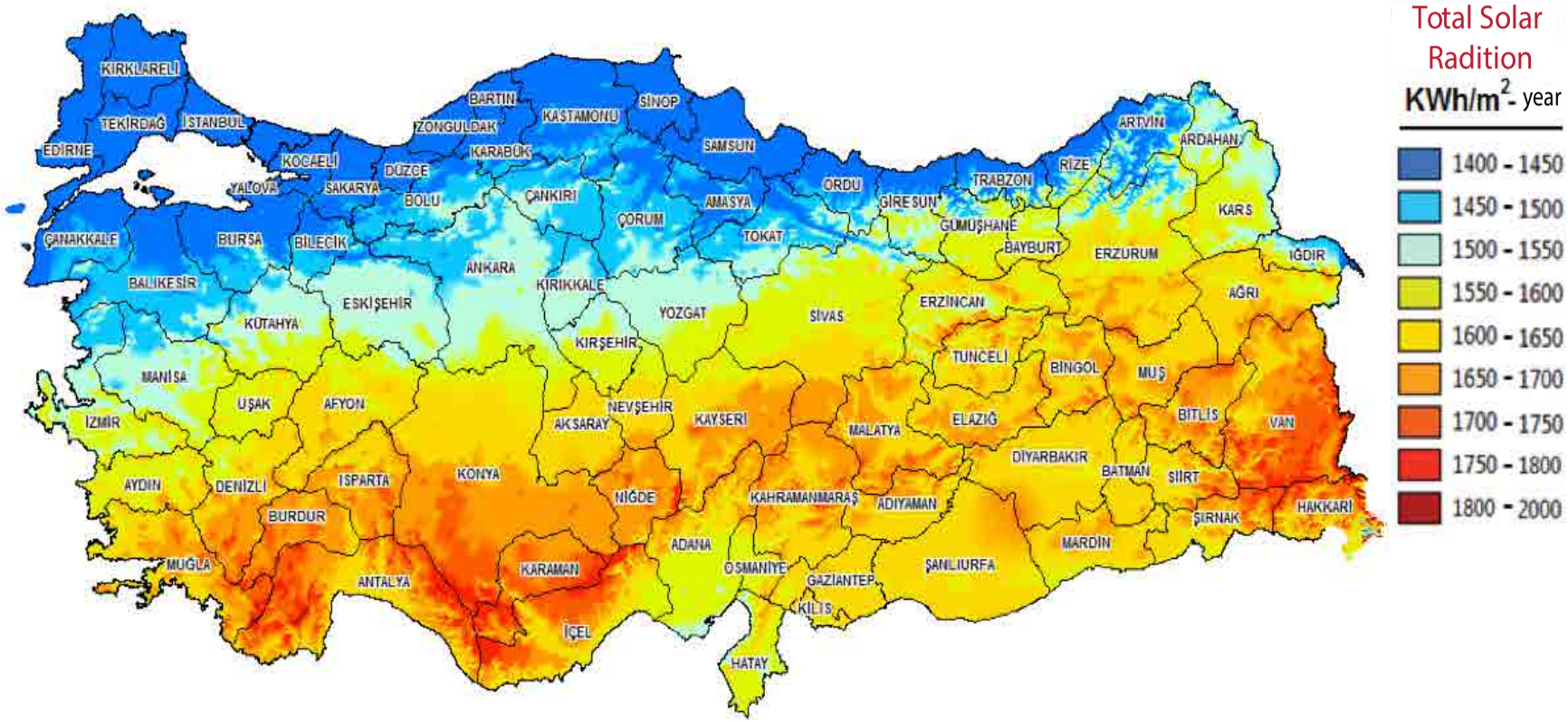
Renewable energy resources (RER) potential of Turkey is as follows according to various resources.

- 140.000 GWh/year economic hydraulic capacity,
- 48.000 MW wind power capacity,
- 1.500 kWh/m^2-year average sunshine,
- 31.500 MWt geothermal capacity,
- 8.6 MTOE biomass potential,
- 1.5-2 MTOE biogas potential.

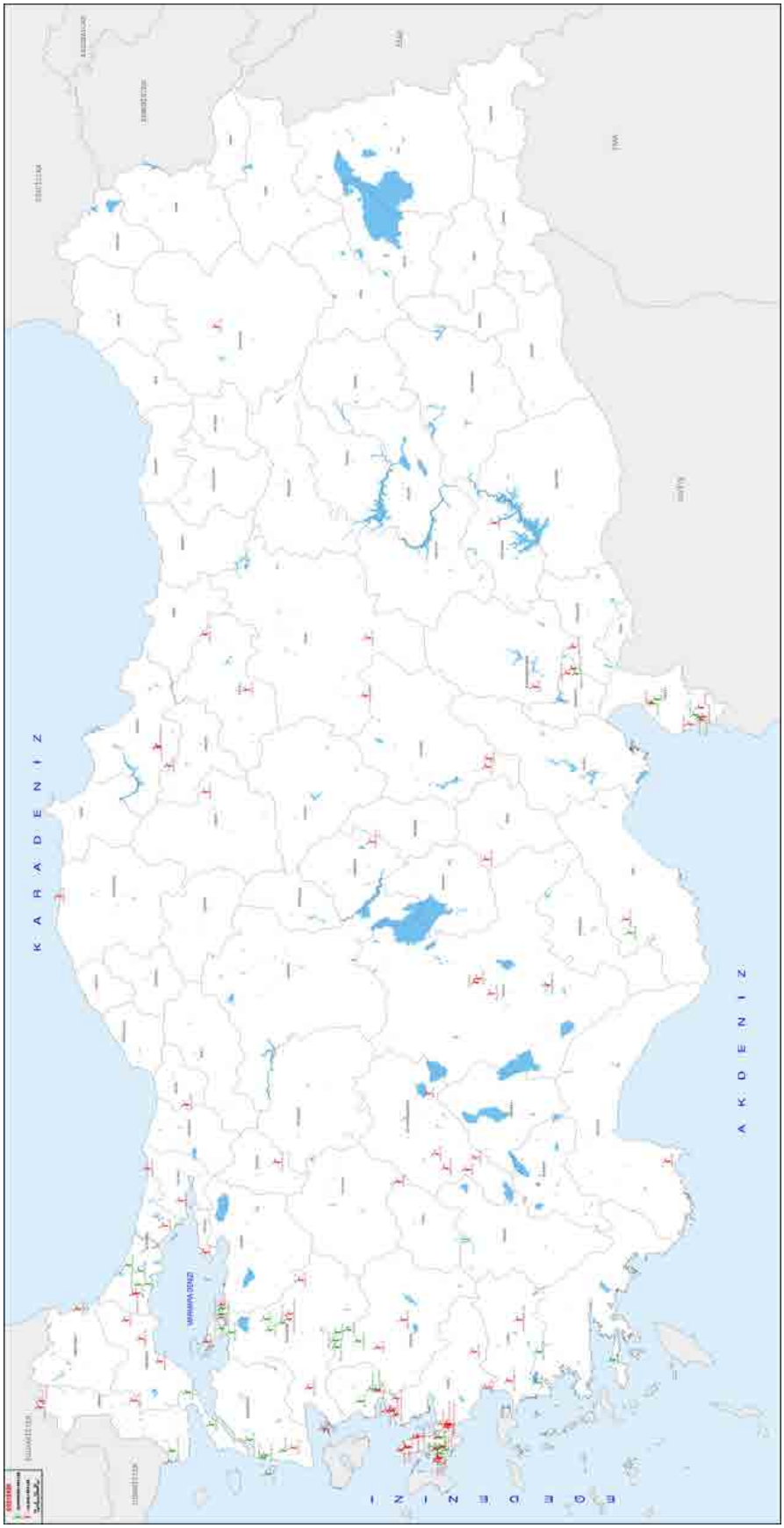
As of the end of 2015, installed power capacity of Turkey has reached to 73.148 MW. Thanks to incentives provided regarding renewable energy resources, share of renewable energy resources such as hydraulic, wind, solar and geothermal powers in total installed power capacity has increased in recent years. According to calculations of 2015, total installed power capacity of Turkey consists of 43,2% renewable energy and 56,8 other energy resources.

Turkey especially works on getting maximum benefit from hydraulic energy which is the most important renewable energy resource of the country. Within the scope of these works, installed hydraulic power capacity of Turkey reached to 25.868 MW in 2015.

260 TWh of electricity was produced in 2015 in Turkey and while share of natural gas in electricity production was 47,9% in 2014 this rate reduced to 37,9% in 2015 and total electricity production was provided 25,8% from hydroelectric power plants, 12% from lignite, 15,2% from imported coal, 4,4% from wind farms and 1,3% was from geothermal resources.



Map 4– Solar power potential
(http://www.eie.gov.tr/MyCalculator/Default.aspx)



Map 5 – Places of wind farms in Turkey (http://www.eie.gov.tr/images/res_haritasi.png)

Paper of Electric Energy Market and Supply Security Strategy was prepared in May 2009 and implemented. The main aim of the country is to increase the rate of renewable energy in electricity production to 30% by 2023. Changes may be made concerning this target by considering potential developments in technology, market and potential of the resources. Within this context, future activities will focus on the following aims.

a) Hydroelectricity: It is planned to use all available technical and economical hydroelectricity potential for electricity production and increase the installed renewable energy production capacity to 34.000 MW until 2023.

b) Wind: It is aimed to increase installed wind power capacity to 20.000 MW until 2023.

c) Geothermal: It has been identified that there is a geothermal potential of 1.000 MW and it is planned to put all this potential into use until 2023.

d) Solar: The main aim is to promote use of solar power in electricity production and obtain maximum benefit from national solar power potential. Technological developments in use of solar power in electricity production will be followed closely and changes will be implemented. Within this context, it is planned to increase installed solar power capacity of 2023 to minimum 5.000 MW (except non-licensed projects).

e) Biomass: Regarding biomass energy, it is targeted to increase an installed power capacity of 1.000 MW until 2023.

f) Other Renewable Energy Resources: Production plans will be prepared by considering technological developments, legislative regulations and potential use.

Table 13 –Gross energy production from renewable resources in Turkey (thousand TEP) (General Directorate of Renewable Energy)

	2009	2010	2011	2012	2013	2014
Wood	3.530	3.392	2.446	2.350	2.707	2.162
Animal and Plant Wastes	1.136	1.166	1.091	1.115	1.616	1.007
Hydraulic	3.092	4.454	4.501	4.976	5.110	3.495
Geothermal	375	575	597	773	1.173	3.524
Biofuel	9	12	18	23	51	77
Wind	129	251	406	504	650	733
Geothermal heat, Other Heat	1.250	1.391	1.463	1.463	1.173	3.534
Solar power	429	432	630	768	795	803

“National Action Plan for Renewable Energy” that was made public on 9 February 2015 acts as a guide for an effective planning of renewable energy development during the period until 2023. The plan was prepared in concordance with the European Parliament European Council Directive No. 2009/28/EC dated 23 April 2009 concerning promotion of using renewable energy resources.

6.1.1. Works on producing energy from waste.

Works on “Action Plan for Increasing Electric Energy Production in Organized Solid Waste Storage Facilities” for 2013-2014 are carried out by the Coordination Council for the Improvement of Investment Environment (YOİKK). Within the scope of the action plan, it is intended to increase electric energy production by establishing biogas and biomass facilities in organized solid waste storage facilities and to benefit from waste vapor as well through cogeneration method.

Installed power generation capacity from biomass reached to 315 MW as of June 2015 and 432,6 GW of electric energy was produced from biomass as of 2014. There are 81 solid waste landfill facilities over the country and electric energy has been produced in 22 of these facilities.

More detailed information and data on the topic is provided in chapter “D.4 Hazardous Wastes”.

6.2. Electricity Production

Data on distribution of electric energy production by facilities in 2015 is provided on Table 14. According to temporary data from Turkish Electricity Transmission Company (TETC), total amount of electricity production in 2015 was around 260 TWh.

Table 14 – Electric energy production by resources and their shares.(TEİAŞ, 2016)

	2015 YEAR	CONTRIBUTION %
EÜAŞ+EÜAŞ PARTNERSHIP	55.368,8	21,3
TRANSFER OF OPERATING RIGHTS	4.233,2	1,6
AUTOPRODUCER POWER PLANTS	144,0	0,1
AUTONOMOUS POWER COMPANIES	144.837,3	55,8
BUILD OPERATE PLANTS	42.772,6	16,5
BUILD OPERATE TRANSFER PLANTS	12.334,4	4,7
TOTAL	**259.690,3**	**100,0**

Electricity production in 2015 was 259.690,3 GWh and consumption was 264.136,8 GWh. 7.411,1 GWh of energy was imported and 2.946,6 GWh of energy was exported as of 2015.

Table 15– Distribution of electricity production by resources. (TEİAŞ, 2016)

		UNIT:GWh
RESOURCES	**2015 YILI**	**CONTRIBUTION**
COAL (Hard Coal+Imported+Lignite+Asphaltite)	73.872,6	28,4
NATURAL GAS+LNG	98.193,4	37,8
HYDRAULIC	66.903,2	25,8
WIND	11.552,1	4,4
RENEWABLE WASTE + GEO	4.831,8	1,9
OTHER-1-(Fueloil+Motorin+Naphtha)	4.243,2	1,6
OTHER-2-(Multifuel+Solid+Liquid)	94,1	0,0
TOTAL	**259.690,3**	**100,0**

6.3. Total Primary Energy Supply

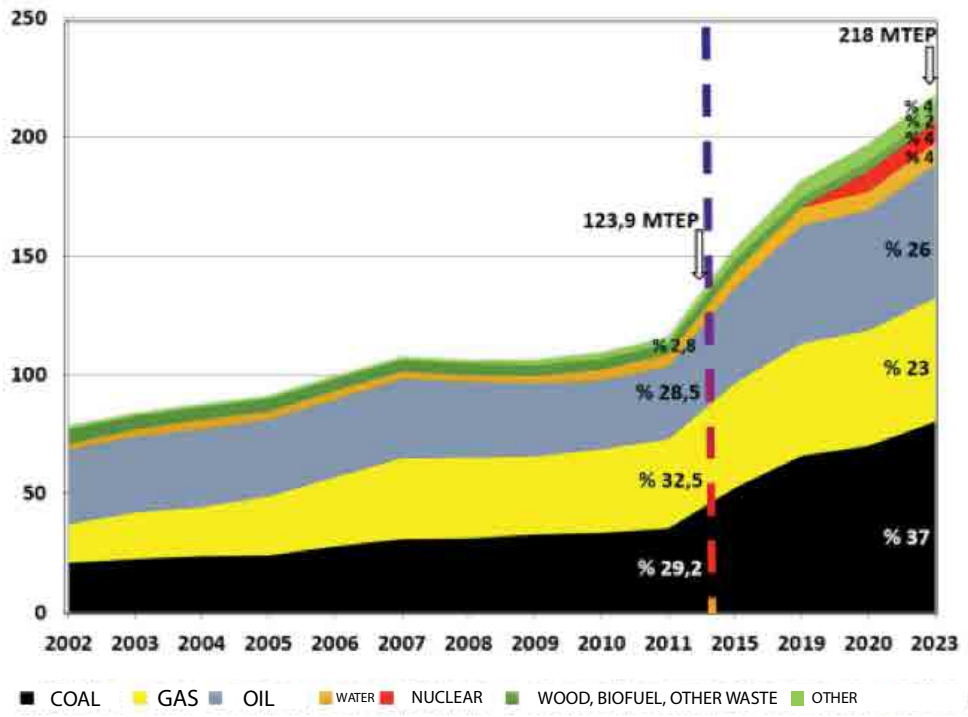
Primary energy demand of Turkey was 123,9 million TEP in 2014. Demand for primary energy consisted of 32,5% natural gas, 29,2% coal, 28,5% oil, 2,8% hydraulic energy, 6,7% non-hydraulic renewable energy resources and 0,3% other resources.

Our demand for primary energy is expected to increase by 76% and reach to 218 million TEP in 2023. It is predicted that share of coal will be 37%, natural gas 23%, oil 26%, hydraulic energy 4%, nuclear energy 4%, renewable and other energy resources 6%.

6.4. Sectoral Energy Consumption

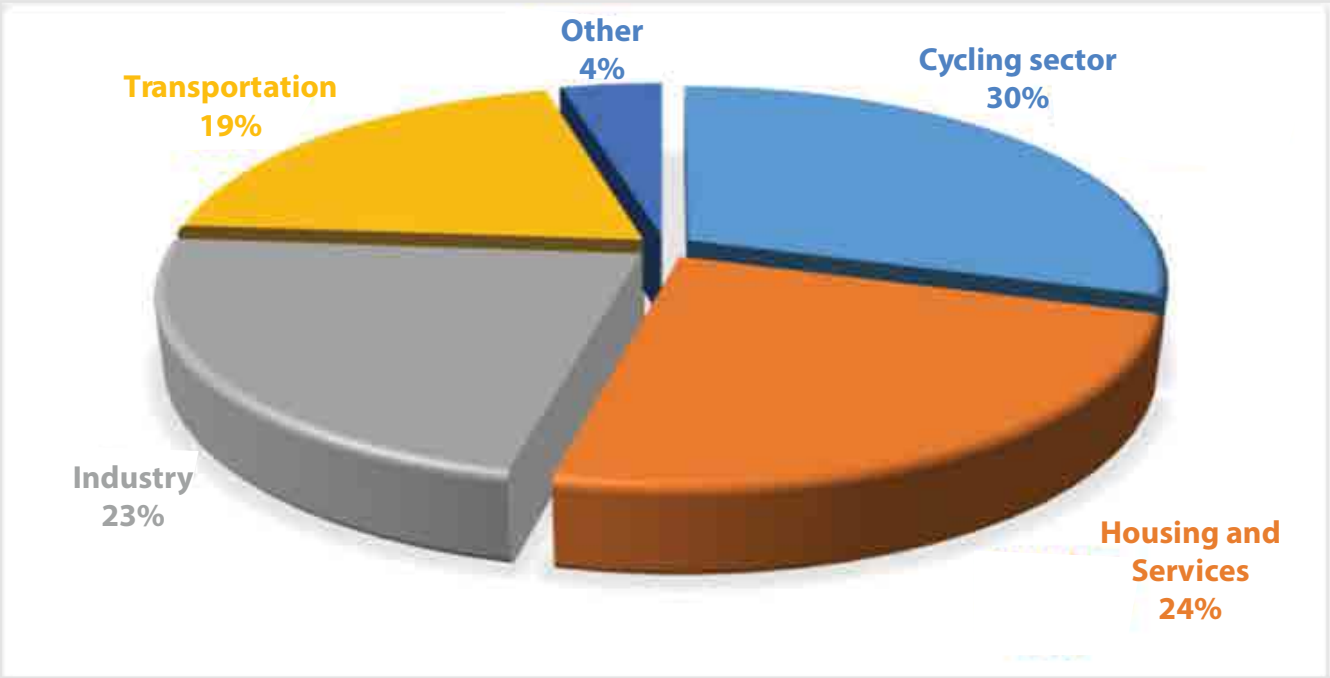
Graph 1 provides projection on Turkey's primary energy demand in 2023. Considering these projections on primary energy demand, it is expected that share of oil in energy production will not change much and will be around 26%. On the other hand, although natural gas consumption is expected to increase, it is predicted that its share in primery energy supply will reduce to 23%.

Graph 2 provides information on distribution of primary energy demand by sectors. When the graph is analyzed, it is observed that primary energy was consumed 23% by industry, 24% by housing and service sector, 19% in transportation and 30% in conversion sectors.



Graph 1 - Primary energy demand in Turkey in 2023 (Ministry of Energy and Natural Resources, 2016)

27,5% of primary energy demand was supplied by domestic production. In other words foreign-source dependency of Turkey in energy is around 72,5%. This rate showed a remarkable increase after the beginning of 1990s due to growth in natural gas consumption and this rate was held around 70% after the beginning of 2000s.



Graph 2 - Distribution of energy consumption in 2014 by sectors. (Ministry of Energy and Natural Resources, 2016)

Table 16 –Sectoral distribution of electricity production in Turkey (Ministry of Energy and Natural Resources, 2016)

Year	Total	Houses	Business	Government Agency	Industry	Lighting	Other(*)
	(GWh)			(%)			
2009	**156.894**	25,0	15,9	4,5	44,9	2,5	7,3
2010	**172.051**	24,1	16,1	4,1	46,1	2,2	7,4
2011	**186.100**	23,8	16,4	3,9	47,3	2,1	6,5
2012	**194.923**	23,3	16,3	4,5	47,4	2,0	6,5
2013	**198.045**	22,7	18,9	4,1	47,1	1,9	5,2
2014	**207.375**	22,3	19,2	3,9	47,2	1,9	5,5

(*) Includes consumptions of agriculture, livestock raising, fisheries, domestic water pumping facilities, public services etc.

6.5. Works on Energy Efficiency

Primary energy intensity index of Turkey for 2000-2014 period decreased by 0,8% on annual basis and final energy density index decreased by 1,1%. When compared to year 2000, there was a 12,7% improvement in primary energy intensity index and 15,4% improvement in final energy intensity index.

During the process from energy production to consumption, it is of great importance to increase efficiency, prevent wastage, reduce pressure of energy costs on the economy, protect environment and decrease energy intensity which is high compared to developed countries and necessary activities have been conducted within this context.

Turkey has different dynamics due to its increasing production and developing technological infrastructure. Energy consumption is increasing at a higher level than European averages due to increase in population, welfare and industry.

In Turkey, energy efficiency is regarded as one of the most important components of national strategies such as ensuring energy supply security, reducing dependence on foreign resources, reducing pressure of energy costs on economy, protecting the environment and increasing efficiency in combating with climate change.

7. Transportation

According to data of 2015, cargo and passenger transportation in Turkey is provided mostly through road transport.

Table 17 –Domestic cargo and passenger transport by transportation type in 2015 [(1)KGM, (2)TCDD, (3)DHMİ, (4)DTGM, 2016]

	CARGO		PASSENGER	
	TonxKm (million)	Per Cent	PassengerxKm (million)	Per Cent
Road[1]	244.329	89,8	290.734	89,2
Railway[2]	10.474	3,9	3.708	1,1
Air[3]	17.204	6,3	1.836	0,6
Sea[4]	25	0,0	29.790	9,1
TOTAL	**272.032**	**100,0**	**326.068**	**100,0**

[1]Cargo/passenger transport on road network that is under responsibility of General Directorate of Highways (KGM).

[2]Cargo/passenger transport on railway network that is under responsibility of General Directorate of State Railways of The Republic of Turkey. Suburbs are excluded from passenger transport.

[3]Domestic cargo/passenger transport between airports under responsibility of General Directorate of State Airports Authority (DHMİ) (except luggage and posts).

[4]Cabotage cargo and passenger transport by General Directorate of Maritime Trade (DTGM). Passengerxmile and tonxmile values are converted to km.

7.1. Highway Transport

Length of highway network of Turkey has reached to 65.909 km as of 01.01.2015. 2.155 km of this is motorway, 31.280 km is state road and 32.474 km is provincial way.

7.2. Railway, Sea and Air Transport

Srategies towards supporting railway construction in Development Plans, there was an important increase in improvement and development works of railways by 2000s in Turkey. According to data at the end of 2014, length of conventional railway is 11.272 km, high speed train railway is 1.213 km and total length is 12.485. In 2014, 28,7 million ton cargo and 23 million passengers were carried on this conventional and high speed railway network.

There are 65 airports as of 2014 and 53 of them is used for active passenger transport. In 2014, 85,4 million passengers were carried through domestic airline and 80,3 million passengers through international airline and 165 million passengers were carried in total at available airports.

As of 2014, there are 198 operation certified ports, marinas, port-sides and pipe line facilities and 180 of them are open to international transportation. Many ports in Turkey serve in a confined area in the center of cities or neighborhoods.

“Green Port” project have been launched by the General Directorate of Marine Trade operating under the Ministry of Transport, Maritime Affairs and Communications since it is believed that environmental friendly port facilities should be provided in order to eliminate and prevent existing and possible environmental problems. Within the scope of the project, port facilities that fulfil necessary requirements and submit related documents to the administration will be granted with a “Green Port” title.

It is aimed within the scope of the Green Port Project to determine environmental policies and targets, increase environmental awareness, prevent possible occupational accidents by applying risk management in port facilities, invest in environmental efficiency projects, prepare waste management plans, promote use of environment friendly vehicles, take measures against water and soil pollution, carry out greenhouse gas emission measurements and management plans, conduct measures concerning environmental noise and take necessary measures on this matter.

Within the scope of works on preventing pollution from ships, Turkey became a party to the Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships which is a Protocol under the MARPOL 73/78 International Convention for the Prevention of Pollution from Ships that was approved by the International Maritime Organization in 1997 and took effect on 19 May 2005. It became a party to this protocol with the Law No. 6438 published in the Official Gazette No. 28588 dated 15 March 2013. Thanks to the Protocol, in addition to designating technical and operational measures towards reducing air pollution and emission from ships, also some rules on improving fuel quality was established and started to be applied.

Turkey’s application to become a party to the International Convention for the Control and Management of Ships′ Ballast Water and Sediments (BWM Convention-2004) was pronounced to IMO during the 67th meeting of Marine Environment Protection Committee (MEPC). The convention hasn’t been put into effect yet because total fleet capacity of the parties of the convention is not sufficient yet (it should be 35% or more of the world tonnage) and the convention will take effect 12 months after the capacity reaches 35% threshold

The “Project for Establishing Emergency Response Centers” was carried out by TUBİTAK Marmara Research Center (MAM) between 2006-2009 and detailed information on the project is provided under the topic C.1.3.1.4. Risk Management and Emergency Action towards Pollution from Marine Accidents.

The EU Twinning Project for Control of Emissions from Ships in Turkey” started on 25 May 2012 and completed on 23 June 2014. The project was conducted between the Ministry of Transport, Maritime Affairs and Communication and Spanish Ministry of Transport and Public Works with a view to ensuring that necessary measures are taken towards reducing emissions from ships and providing accumulation of knowledge on level and distribution of emissions from ships in Turkey by developing continuous and secure monitoring systems.

Within the scope of the project, an inventory of emission from ships within the maritime jurisdiction of Turkey was prepared by use of modelling software and Automatic Identification System and monitoring and control of the emissions was targeted.

Necessary works have been conducted by the General Directorate of Civil Aviation (GDCA) in order to prevent and eliminate existing and possible harms by facilities in airports on environment and human health systematically.

Within this context, the facilities are expected to; create, implement, document and maintain an Environment Management system that is in conformity with valid version of TS EN ISO 14001 Standard and with the sectoral criteria designated by GDCA and complete TS EN ISO 14001 "Environmental Management System Documentation" by TSE; prepare a Greenhouse Gas Inventory Report in concordance with the greenhouse gas criteria and valid version of TS EN ISO 14064-1 standard for each calendar year and submit it to TSE in order to get it approved according to TS EN ISO 14064-3 standards. Those facilities which fulfill the requirements are granted with "Green Facility Certificate". When all the facilities in an airport obtain "Green Facility Certificate", the airport will also be granted with a "Green Airport Certificate".

While none of the airports in Turkey has obtained green airport title, 147 facilities obtained green facility certificates within the scope of the project.

7.3. Number of Vehicles in Turkey

Since exhaust emission from motor land vehicles is a major cause of air pollution especially in big city centers, the issue comes front as a pressure on the environment. Table 18 provides information on the number of vehicles in Turkey by years.

Table 18 - Number of motor vehicles by years (TURKSTAT, 2016)

	2011	2012	2013	2014	2015
Automobile	8.113.111	8.648.875	9.283.923	9.857.915	10.589.337
Minibus	389.435	396.119	421.848	427.264	449.213
Autobus	219.906	235.949	219.885	211.200	217.056
Light truck	2.611.104	2.794.606	2.933.050	3.062.479	3.255.299
Truck	728.458	751.650	755.950	773.728	804.319
Motorcycle	2.527.190	2.657.722	2.722.826	2.828.466	2.938.364
Special purpose vehicles	34.116	33.071	36.148	40.731	45.732
Tractor	1.466.208	1.515.421	1.565.817	1.626.938	1.695.152
Total	**16.089.528**	**17.033.413**	**17.939.447**	**18.828.721**	**19.994.472**

8. Tourism

According to the data from World Tourism Organization, Turkey was on the 6th rank in the world in 2014 in terms of the number of visitors and it has kept its rank. Also it continued to be on the 12th rank among the world countries in terms of tourism revenue.

Table 19 - Distribution of number of foreign tourist coming to Turkey by years and months (Ministry of Culture and Tourism, 2016)

MONTHS	YEARS			
	2012	2013	2014	2015*
JANUARY	981.611	1.104.754	1.146.815	1.250.941
FEBRUARY	997.571	1.268.440	1.352.184	1.383.343
MARCH	1.460.563	1.841.154	1.851.980	1.895.940
APRIL	2.168.715	2.451.031	2.652.071	2.437.263
MAY	3.232.926	3.810.236	3.900.096	3.804.158
JUNE	3.882.592	4.073.906	4.335.075	4.123.109
JULY	4.571.389	4.593.511	5.214.519	5.480.502
AUGUST	4.470.202	4.945.999	5.283.333	5.130.967
SEPTEMBER	3.991.415	4.266.133	4.352.429	4.251.870
OCTOBER	3.050.981	3.402.460	3.439.554	3.301.194
NOVEMBER	1.631.647	1.709.479	1.729.803	1.720.554
DECEMBER	1.343.220	1.442.995	1.580.041	1.464.791
TOTAL	**31.782.832**	**34.910.098**	**36.837.900**	**36.244.632**

*Temporary data

9. Agriculture and Livestock

It is mandatory to protect natural resources for a sustainable agricultural. For this purpose, systems that retrench chemical agricultural expenses and enable soil amendment and water saving has been developed and put into use. It is critical to conserve genetic resources and make them available to plant breeders as these resources are invaluable for global agriculture and for future of humanity. Various works have been carried out within this scope.

9.1. Organic Agriculture and Good Agricultural Practices

Organic agriculture and good agricultural practices are modes of production that do not harm human health and the environment. Although no chemicals are used in organic agriculture and chemical pesticides, artificial fertilizer etc. are used in good agricultural, all stages of production are made up of controlled and certificated agricultural practices according to integrated product management. Organic agriculture and good agricultural are controlled and conscious modes of production.

The Law on Organic Agriculture Numbered 5262 entered into force on 03.12.2004 following its publication in the Official Gazette N. 27061 dated 21.11.2008. Based on this law, the By Law on Organic Agriculture Principles and Practices was published in the Official Gazette N. 27676 dated 18.08.2010. Good agricultural practices are conducted under the “By Law on Good Agricultural Practices” published in the Official Gazette N. 27778 dated 07.12.2010.

It is aimed to increase the size of organic agriculture area from 842.216 ha (as of 2014) to 1.250.000 ha, and the number of farmers from 71.472 to 125.000 by the year 2023. It is also aimed to increase the share of organic agriculture areas among total agricultural areas from 2% (as of 2014) to 5% by the year 2023. It is targeted through Good Agricultural Practices to provide an agricultural production that does not cause harm to environment and human and animal health, to provide traceability and sustainability in agriculture and to provide food security. The following Tables 20, 21 and 22 illustrates data on production from organic and good agricultural practices.

Table 20 - Data on organic agriculture (Including transition process) (TURKSTAT, 2016)

Years	Number of Products	Number of Farmers	Cultivated Area (ha)	Natural Areas of Collection (ha)	Total Area of Production (ha)	Amount of Production (ton)
2010	216	42.097	383.782	126.251	510.033	1.343.737
2011	225	42.460	442.581	172.037	614.618	1.659.543
2012	204	54.635	523.627	179.282	702.909	1.750.127
2013	213	60.797	461.395	307.619	769.014	1.620.466
2014	208	71.472	660.807	181.409	842.216	1.642.235

The size of the production area, which was 53.000 da in 2007, was increased to 2.147.705 da in 2014 within the scope of Good Agricultural Practices, and it is aimed to make good agricultural practices widespread over all agricultural areas of the country by increasing the good agricultural production area by 20% every year.

Table 21 - Organic and transition process livestock (number) (Ministry of Food, Agriculture and Livestock, 2016)

Years	Number of Farmers	Cattle	Small cattle	Poultry
2010	174	37.432	21.454	342.329
2011	225	12.162	33.818	431.754
2012	1.587	56.204	33.985	281.132
2013	3.270	100.217	174.737	893.864
2014	290	12.550	43.424	769.289

Table 22 – Good agricultural practices (Ministry of Food, Agriculture and Livestock, 2016)

Years	Number of Provinces	Number of Producers	Cultivated Area (da)
2010	49	4.540	781.740
2011	49	3.042	499.632
2012	47	3.676	837.231
2013	56	8.170	985.099
2014	53	21.332	2.147.705
2015	61	39.740	3.443.955

9.2. Environmentally Based Agricultural Land Protection Program Practices

ÇATAK was introduced in 2006. The objective within this project is to take necessary cultural measures to protect water and soil quality, to ensure sustainability of natural resources and to combat with erosion and negative effects of agricultural in areas that are exposed to erosion, water pollution and intensive agricultural activities.

ÇATAK Program practices are performed in accordance with the provisions of Application Communique Numbered 2011/24, Communique on Making Amendments on the Application Communique Numbered 2015/12, and Circular Numbered 2013/003.

ÇATAK Program started to be implemented in Kırşehir, Isparta, Konya and Kayseri provinces as outsourced Pilot Project in 2006. Pilot schemes continued until the end of 2008. It had been aimed to implement the project within an area of 5.000 ha and 4.063 ha of the project was completed successfully. Within the scope of the project, applications were performed in 43 provinces in 2014 and in 51 provinces in 2015. The present objective is to extend the project over the 81 provinces in Turkey in the coming years.

9.3. Use of Renewable Energy Resources

9.3.1. Manure Management System and Biogas Facilities

In an attempt to meet breeders' pure and quality breeding demands, breeding cattles have been raised in 12 facilities under the General Directorate of Agricultural Enterprises with a livestock wealth of 32.000. These animals produce around 130.000 tons of manure. In order to prevent pollution that may result from this manure production and to minimize greenhouse gas emissions, manure management systems have been established and manure storage tanks have been placed to prevent leakage in all breeding cattle facilities. Also, manure decomposition is applied as soon as possible to be put into use in agricultural activities.

Moreover, 4 biogas facilities have been established in breeding cattle facilities of Ceylanpınar, Gözlü, Karacabey and Anadolu enterprises and these biogas facilities hold a total production capacity of 1.025 kW electric energy. After these facilities start to operate in 2015, they will not only produce energy, but wastes that cause environmental pollution, such as greenhouse gasses, will be recycled and quality natural manure will be produced for farmlands.

9.3.2. National Solar Power Plant

Ceylanpınar Agricultural Enterprise is in the borders of Ceylanpınar district of Şanlıurfa Province in Southern Anatolian Region and it has a and area of 1,6 million decares and it shares borders with Syria for 50 km. Total energy need for irrigation and other agricultural infrastructure in the facility is 340 million kWh. It is crucial to supply this amount of energy to the area so that agricultural activities in the area can continue.

At the end of the surveys carried out by TUBİTAK in the area, it was understood that the area receives the most sunshine in Turkey. In order to benefit from this solar power potential without doing any harm to the environment, a pilot project for establishing a solar power station with a capacity of 10 MW in Ceylanpınar enterprise started with the cooperation of TUBİTAK, the Ministry of Energy and Natural Resources, and General Directorate of Agricultural Enterprises and the project is planned to finish in 2017. This project will serve as a model for other large scale solar power plants to be established in Turkey in the future. Thus, it will be made possible to reduce use of fossil fuels in energy production and environmental pollution will be prevented.

9.3.3. Use of Fertilizer, Soil Improver and Pesticides

95% of the farmlands of the General Directorate of Agricultural Enterprises (TİGEM) includes less than 2% organic matter and has a pH level of over 7 and they have an alkaline structure. Alkalinity and low level of organic matter content are important factors that reduce agricultural production.

Around 1.500.000 decares of area is cultivated under the General Directorate of Agricultural Enterprises and insecticides, fungicides and herbicides are used in these areas within the scope of combating with diseases and pests. During this process, cultural combat is exercised in order to minimize environmental pollution. But, appropriate dose and amount of certified pesticides is used against pests if needed.

TİGEM cultivates grains on nearly 1 million decares of area, corn on 250.000 decares of area, forage crops on 100.000 decares of area and legumes and cash crops on 150.000 decares of area and a total 1.500.000 decares of area is cultivated each year. TİGEM applies 68.000 tons of artificial fertilizers on an area of 1,5 million decares.

9.4. Protection and Use of Farm Lands

The Law No. 5403 on Soil Protection and Land Use aims to provide legislative framework for land protection and land use which are becoming important both globally and nationally due to their potential and scope. Thanks to the law, it is expected to provide solutions for problems in land use and soil protection.

Within the scope of the law, erosion sensitive areas that are under risk of desertification and wide plains that have an important place in economy and under risk of degradation due to misuse will be declared as protected areas with a decree of the Council

of Ministers. By this way, these areas will be planned quickly in line with public welfare by local authorities and the Ministry of Food, Agriculture and Livestock.

9.5. Topics under the "Measure No. 201 on Preparation for Implementing Activities Related to Environment and Rural Areas"

The aims of the Instrument for Pre-Accession Assistance Rural Development (IPARD) Program are to take necessary measures for adoption and implementation of UN Common Agricultural Policy and other acquis, provide sustainable development and concordance of rural areas and agricultural sector, ensue food security, livestock and plant health and encourage adoption of EU standards.

With the agri-environmental measures, environment friendly and sustainable activities that support conservation of soil, groundwaters, surface waters, biodiversity and high value farmlands are adopted. The aims of agri-environmental supports are to facilitate implementation and continuous use of environment friendly agricultural practices, support sustainable development of rural areas and satisfy the environmental needs of the society.

This measure is implemented in candidate country at pilot level. Thus it aims to present new agricultural and environmental approaches by adopting an experimental method. It is not a repetition of national or other kinds of supports (like Environmentally Based Agricultural Land Protection ÇATAK) currently in implementation. The measure within the scope of IPARD Programme consists of 5 sub-measures and these sub-measures and pilot districts are provided below.

- Ground cover management and control of soil erosion (Beypazarı)
- Water Conservation (Şereflikoçhisar)
- Biodiversity – increasing the population of the Great bustard (Polatlı)
- Introducing organic agriculture methods and supporting implementation process (pilot area hasn't been identified yet)

9.6. Land Use Planning

Lack of plans on land use causes misuse of farmlands, devastation of forests and wetlands and devastation of natural areas on coastal areas. The Law on Soil Protection and Land Use was enacted in 19 July 2005 and an important step was taken on this matter. The most important topic in the law is conservation of farmlands and the second most important topic is preparation of land use plans.

Farmlands are of great importance since they provide habitat for many organisms and meet the needs of people for food. Preparing Farmland Use Plans will provide solutions to many problems experienced today. Constructions for basic needs such as housing, industry and transportation in farmlands constitute the greatest pressure on farmlands.

The Law No. 5403 on Soil Protection and Land Use is one of the major steps on this matter. By Laws, communiques and instructions under the Law have been put into practice.

Works on "Improvement of Soil Database and Establishing a Background for Farmland Use Plans have started in order to prepare background data (soil survey maps, irrigation areas, non-agricultural land use etc.) that is necessary for preparation of land use plans that will cover the whole country, and will be completed in 2015.

When the works on background data is completed, "National Farmland Use Planning" will start. Within this scope, secondary works will start on conservation of farmlands, making land allocation convenient for investors, preparing spatial plans and axis of production.

Necessary planning will be conducted to satisfy the energy need in basins by planning areas where energy can be produced so that the amount of energy consumed in agricultural production is recovered.

2023 targets within this context: Agricultural Land Use Planning, Planning production according to the plan, achieving the aims concerning agricultural production, providing real protection for farmlands and their environment.

9.7. Aquacultural Resources

World fisheries production in 2013 was around 163 million tons and 93 million tons of this amount was obtained through hunting and 70 million tons through aquaculture. Scientists state that obtaining fisheries from hunting has reached to its maximum level and that the demand for fisheries can be met through aquaculture.

Turkey provides us many opportunities in terms of fisheries hunting and aquaculture with the seas around it and with its lakes, rivers, lakes, ponds and dam reservoirs.

Although it chances by year, around 600-700 thousand tons of fisheries are produced in Turkey annually. The amount obtained through hunting does have a regular trend. The amount of fisheries production was 537.345 tons in Turkey in 2014 and 302.211 tons of this was from hunting and 235.133 tons was from aquaculture.

The main policy of Turkey concerning fisheries is conservation and sustainable utilization of fisheries resources in our seas and inland waters. The main aim in fisheries is to ensure a sustainable use of resources by providing a balance between conservation and utilization of the resources. Within this purpose, a more conservationist approach is adopted for hunting and sustainability principle is given importance. The Ministry of Food, Agriculture and Livestock designates and implements necessary procedures for a sustainable fisheries management.

Turkey has tried to reduce the number of fishing boats since 2002 with an intent to reduce hunting pressure on our resources and provide sustainability of fisheries by providing a utilization conservation balance. The fishermen that voluntarily sell their boats, which are 10 meters or longer, are supported and their boats are excluded from fisheries fleet and their licenses are revocated.

Aquaculture sector has been supported by the Ministry of Food, Agriculture and Livestock since 2003. Aquacultural activities are increasing every year and the share of aquaculture in total fisheries production is also increasing.

"The National Programme for Fisheries Data Collection" started in an attempt to monitor hunting and aquaculture exercised in seas and inland waters and obtain data on the amounts of hunting based production. Within the scope of the programme, necessary data for fisheries management is obtained and production activities are monitored closely.

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A. AIR

A. AIR

A.1. Protection of Air Quality

The works, within the scope of the "Convention on Long Range Transboundary Air Pollution (CLRTAP)", prepared by the United Nations Economic Commission for Europe (UN-ECE), and the related protocol on Long Term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long Range Transmission of Air Pollutants in Europe – EMEP, are carried out by the Ministry of Environment and Urbanisation.

National Air Pollutants Emission Inventory is prepared annually and reported with UN-ECE Secretariat through the European Environment Information and Observation Network (EIONET). The first reporting took place in 2010 and improvements have been made annually. Emission are calculated in concordance with the emission factors given in an internationally accepted guide document.

UN-ECE-Convention on Long-Range Transboundary Air Pollution (CLRTAP) entered into force on 13.11.1979 and Turkey became a party to the convention on 18.04.1983. There are 51 parties to the Convention and the Secretariat of the Convention is directed by UN-ECE.

The convention includes 8 protocols and the only protocol to which Turkey became a party on 20.12.1985 is the protocol on Long Term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long Range Transmission of Air Pollutants in Europe (EMEP). Thanks to this protocol, it is aimed to collect air pollutants emission inventory from each party, to model the inventory data for EMEP region and to confirm the model results by implementing air quality measurements in long range stations.

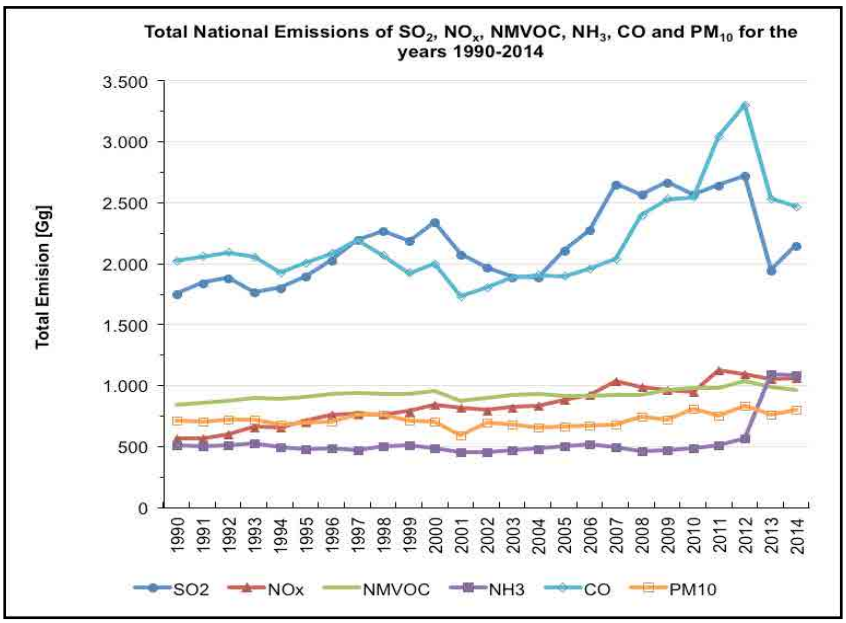
The related bodies of the Protocol are; Executive body, EMEP Monitoring Body, Iplementation Committee, Working Group on Effects and Working Group on Strategies. These bodies hold regular meetings within the frame of the annual work plan. 4 centers and 3 task forces operate under the EMEP Monitoring Body. The main aim of these task forces is to provide technical and scientific support for the implementation of the convention and the protocol. The following works have been carried out within the Convention on Long-Range Transboundary Air Pollution:

- Within our responsibilities under the EMEP protocol, emission inventory reporting has been performed in time sequence since 1990 including the calculations for the years 2011, 2012, 2013 and 2014.
- Informative inventory report, prepared according to emission inventory data, started to be given in 2012 for the first time and the process is still going on.
- Turkey was represented at the annual meeting of Task Force on Emission Inventories and Projections in 2012 at Switzerland and our informative inventory report was nominated for award.
- 2013 stated meeting of the Task Force on Emission Inventories and Projections was hosted by Turkey in Istanbul. At this meeting, our report was granted with "The Most Improved Inventory in the Last Three Years Award".

2015 stated meeting of the Task Force on Emission Inventories and Projections was held in Italy. Inventory report of Turkey was granted within the catagory of "Substantial Progress" award.

The major pollutants considered in reporting are NO_X (nitrogen oxides), SO_2 (Sulphur dioxide), NMVOC (non-methane volatile organic compounds), NH_3 (ammoniac), PM_{10} (particulate matter) and CO (carbon monoxide).

When the data on emissions between 1990-2014 in 2016 report (provided in Graph 3) is analyzed, it is observed that there has been a substantial decrease in burning-induced pollutants. This is thanks to the decrease in fuel consumption in power plants and the emission factors updated according to new technologies. It is seen that highest rate of increase was experienced in (113%) NH_3 and (87%) NO_X) according to the year 1990 and SO_2 (23%), CO (22%), NMVOC(16%) and PM_{10} (12%) come after respectively.



Graph 3 – Total Emissions of SO_2, NO_x, NMVOC, NH_3, CO and PM_{10} for the years 1990-2014 (Ministry of Environment and Urbanisation, 2016)

When the emissions of 2013 is analyzed, it is understood that SO_2, PM_{10} and NO_X emissions increased 10,5, 6 and 0,8 per cent respectively. There was a decrease in other emissions. Table 23 provides data on emission variations compared to the previous year, in time sequence.

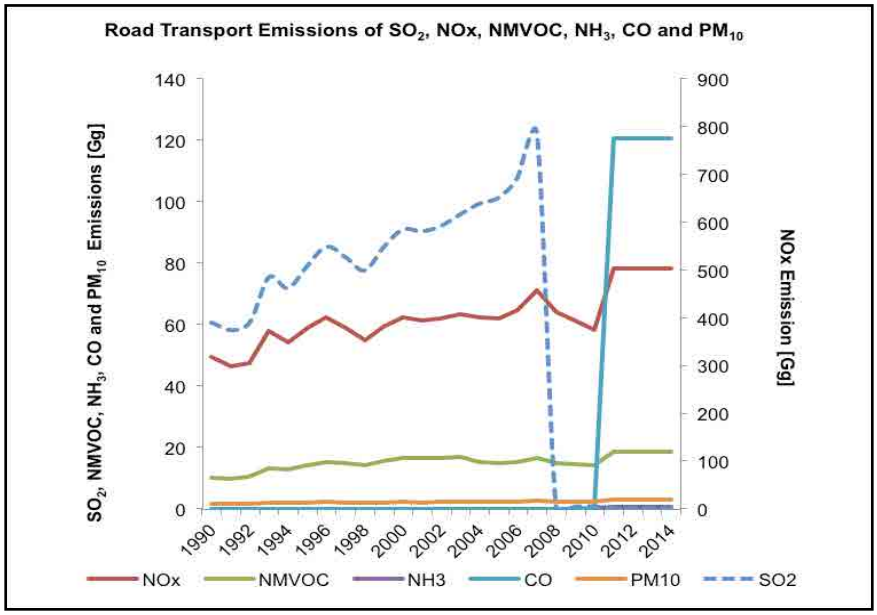
Table 23 - Emission trends of SO_2, NOx, NMVOC, NH_3, CO and PM_{10} (Ministry of Environment and Urbanisation, 2015)

Variation (%)	SO2	NOX	NMVOC	NH3	CO	PM10
Trend (1990-2014)	23	87	16	113	22	12
Trend (2013-2014)	10,5	0,8	-2,3	-0,4	-2,6	6,0

In the year 2014, SO_2 emissions were induced 72% by electric power plants and 13% by domestic heating. NO_X emissions were caused 35% by heavy vehicles and 24% electric power plants. 14% of NMVOC emissions was from domestic heating. The major cause of NH_3 emissions was manure management.

A.1.1 Air Pollutants from Transportation

Another important sector included in National Air Pollutants Emission Inventory is transportation. Emissions resulting from transportations are calculated separately for road, sea, air and railway transports. Information on total national road transport emissions is provided in Graph 4. When the emission data for 1990-2014 is analyzed, it is observed that emission of Sulphur dioxide decreased considerably starting from 2008 thanks to the reduction of Sulphur content in fuel with the legislation. On the other hand, the upside curves for NOx and CO emissions reflects the road vehicles and the financial profile in fuel market.



Graph 4 – Total Road Transport Emissions (Ministry of Environment and Urbanisation, 2016)

A.2. Measurement Stations

Air pollution is observed in some city centers in Turkey especially in winter season due to meteorological conditions as well. The main reasons for air pollution from heating in winter months includes: usage of low quality fuel without applying fuel improvement, adoption of wrong burning techniques and neglecting maintenance of the burning systems. However, because of using natural gas and high quality fuel in domestic heating, there has been a decrease in air pollution in cities compared to 1990s.

Special emission limits are identified in the Environmental Legislation for power plants which are highly pollutive facilities according to the legislation. Necessary permits for building and operating such facilities, procedures and principles on emission from these facilities and determination of the air pollution within the impact area of these facilities are stated in the legislation. These facilities, which use solid, liquid and gas fuels, should meet the requirements of the threshold values both for the flue gas and air quality within the impact area. Hence, it is essential for these facilities to apply necessary techniques for eliminating and decreasing the emissions of Sulphur dioxide (NO_2), nitrogen dioxide (NO_2) and dust. The techniques for decreasing the emissions have been able to reduce the emissions from facilities considerably in the recent years. Some changes have been made in the environmental legislation in order to achieve implementation and common use of these reduction techniques.

Air quality is continuously monitored by the Ministry of Environment and Urbanisation with the help of 195 stationary and 4 mobile air quality measurement vehicles hourly for 24 hours, with a view to protect human health and ecosystem from negative effects of air pollution in both urban and rural areas.

Results of the measurements of Sulphur dioxide (SO_2), particulate matter 10 (PM_{10}), carbon monoxide (CO), nitrogen oxide (NO_X), nitrogen dioxide (NO_2), ozone (O_3) and meteorological parameters are published transiently on the webpage www.havaizleme.gov.tr.

Air quality is compared to threshold values of EU or World Health Organization. Within the program for harmonization with EU Legislation, the upper limits for air quality have been reduced gradually since 2008, and EU upper limits regarding particulate matter and Sulphur dioxide will be achieved in 2019.

Table 24 - Air quality measurement stations (Ministry of Environment and Urbanisation, 2016)

Region	Provinces	Number of provinces	Present station		Additional	Total
			Ministerial	** Other		
İstanbul	İstanbul, Bursa, Kocaeli, Sakarya, Çanakkale, Balıkesir, Yalova, Bilecik, Tekirdağ, Edirne, Kırklareli	12	11	13	39	63
İzmir	İzmir, Manisa, Uşak, Denizli, Aydın, Muğla	7	9	7	*39	*55
Konya	Konya, Isparta, Burdur, Antalya, Karaman, Niğde, Aksaray, Afyonkarahisar, Nevşehir, Kayseri	10	13	2	22	37
Ankara	Ankara, Kütahya, Eskişehir, Kırşehir, Kırıkkale, Yozgat, Çankırı, Kastamonu, Karabük, Bartın, Zonguldak, Düzce, Bolu	14	20	3	39	62
Adana	Adana, Mersin, Kahramanmaraş, Kilis, Gaziantep, Hatay, Osmaniye	7	12	-	*24	*36
Samsun	Samsun, Sinop, Amasya, Çorum, Tokat, Sivas, Ordu, Giresun	8	9	-	20	29
Diyarbakır	Diyarbakır, Urfa, Mardin, Şırnak, Hakkari, Siirt, Van, Bitlis, Batman, Muş, Bingöl, Tunceli, Elazığ, Malatya, Adıyaman	15	15	-	*31	*46
Erzurum	Erzurum, Ağrı, Iğdır, Kars, Ardahan, Artvin, Rize, Trabzon, Gümüşhane, Erzincan, Bayburt	11	12	-	16	28
	TOTAL	**81**	**101**	**25**	**230**	**356**

* Determined according to population data and final numbers will be determined at the end of the pre-assessment project.

** Other institutes and organizations.

Marmara Clean Air Center has been founded and 7 more clean air centers are planned in Samsun, Erzurum, İzmir, Adana, Konya, Ankara, Diyarbakır. The number of at least 330 stations is targeted. Air quality pre-assessment works for Samsun, İzmir, Ankara and Erzurum have been completed and Adana and Konya will be completed in 2016.

Table 25 provides information on air condition of 81 provinces in terms of particulate matter (PM_{10}) between 2011-2015 in Turkey and Table 26 gives annual average values of Sulphur dioxide (SO_2) concentration obtained from measurement stations in centers of provinces and sub-provinces. These Tables was prepared based upon the measurement results of National Air Quality Monitoring Network.

Table 25 - Annual average and rates of change regarding particulate matter (PM_{10}) concentration obtained from measurement stations in centers of provinces and districts. (Ministry of Environment and Urbanisation, 2016)

	Particulate Matter (PM_{10}) Average (µg/m³)					2011-2015 Rates of Change (%)
PROVINCES	2011	2012	2013	2014	2015	
Adana-Çatalan	17	30	32	30	36	111,76
Adana-Doğankent	40	18	62	19	46	15,00
Adana-Meteoroloji	63	57	64	65	69	9,52
Adana-Valilik	69	74	65	65	80	15,94
Adıyaman	83	71	69	71	53	-36,14
Afyon	112	98	94	81	89	-20,54
Ağrı	51	49	51	47	55	7,84
Aksaray	70	67	64	61	63	-10,00
Amasya	43	39	35	29	28	-34,88
Ankara - Bahçelievler	47	64	60	54	52	10,64
Ankara - Cebeci	64	87	82	76	64	0,00
Ankara - Demetevler	63	71	82	60	56	-11,11
Ankara - Dikmen	53	84	57	51	68	28,30
Ankara - Kayaş	72	86	74	66	68	-5,56
Ankara - Keçiören	56	75	71	68	48	-14,29
Ankara - Sıhhiye	90	87	103	75	67	-25,56
Ankara - Sincan	57	62	64	57	43	-24,56
Antalya	63	51	44	53	48	-23,81
Ardahan	65	62	69	33	34	-47,69
Artvin	34	28	30	21	34	0,00
Aydın	95	71	71	65	66	-30,53
Balıkesir	79	45	48	45	44	-44,30
Balıkesir - Bandırma			42	48	50	-
Bartın	71	59	66	56	48	-32,39
Batman	115	110	97	90	92	-20,00
Bayburt	48	65	53	53	46	-4,17
Bilecik	58	51	50	45	43	-25,86
Bilecik - Bozöyük			35	36	57	-
Bingöl	30	34	45	30	26	-13,33
Bitlis	82	84	72	53	25	-69,51
Bolu	59	80	87	78	102	72,88
Burdur	86	78	66	46	64	-25,58
Bursa	68	34	68	97	105	54,41
Bursa - İnegöl	0	0	0	93	76	-
Bursa - Kestel	0	0	0	71	66	-
Çanakkale	22	19	18	23	27	22,73
Çanakkale - Çan			27	52	70	-
Çankırı	46	83	68	34	19	-58,70
Çorum	75	73	64	45	52	-30,67

Table 25 - Annual average and rates of change regarding particulate matter (PM_{10}) concentration obtained from measurement stations in centers of provinces and districts. (Ministry of Environment and Urbanisation, 2016) (cont.)

	Particulate Matter (PM_{10}) Average ($\mu g/m^3$)					2011-2015 Rates of Change (%)
PROVINCES	2011	2012	2013	2014	2015	
Bursa - İnegöl	0	0	0	93	76	-
Bursa - Kestel	0	0	0	71	66	-
Çanakkale	22	19	18	23	27	22,73
Çanakkale - Çan			27	52	70	-
Çankırı	46	83	68	34	19	-58,70
Çorum	75	73	64	45	52	-30,67
Denizli-1	115	86	82	88	84	-26,96
Denizli -2	67	61	57	56	51	-23,88
Diyarbakır	77	69	67	62	65	-15,58
Düzce	93	85	75	107	95	2,15
Edirne	79	74	66	54	55	-30,38
Edirne - Keşan	0	0	0	86	77	-
Elazığ	46	44	37	32	37	-19,57
Erzincan	40	50	56	53	70	75,00
Erzurum	60	57	33	30	39	-35,00
Eskişehir	31	31	35	31	24	-22,58
Gaziantep	101	109	77	58	60	-40,59
Giresun	21	12	21	49	48	128,57
Gümüşhane	59	70	69	63	55	-6,78
Hakkari	93	110	96	85	95	2,15
Hatay	53	50	64	82	80	50,94
Hatay - İskenderun	71	42	67	41	49	-30,99
İçel	51	53	55	52	65	27,45
Iğdır	95	88	97	106	121	27,37
Isparta	93	86	72	75	61	-34,41
İstanbul - Aksaray	48	65	74	57	55	14,58
İstanbul - Alibeyköy	48	46	53	61	45	-6,25
Istanbul - Başakşehir MTHM	0	0	0	58	60	-
İstanbul - Beşiktaş	44	52	51	47	47	6,82
İstanbul - Esenler	55	60	63	53	56	1,82
İstanbul - Esenyurt-MTHM	0	0	0	92	113	-
İstanbul - Kadıköy	46	50	52	53	53	15,22
İstanbul - Kağıthane	0	0	0	82	72	-
İstanbul - Kandilli - MTHM	0	0	0	48	40	-
İstanbul - Kartal	60	79	81	52	46	-23,33
İstanbul - Mecidiyeköy - MTHM	0	0	0	53	51	-
İstanbul - Sarıyer	36	38	39	35	54	50,00
İstanbul - Silivri-MTHM	0	0	0	38	40	-
İstanbul - Şile-MTHM	0	0	0	28	25	-
İstanbul - Şirinevler-MTHM	0	0	0	74	58	-

Table 25 - Annual average and rates of change regarding particulate matter (PM_{10}) concentration obtained from measurement stations in centers of provinces and districts. (Ministry of Environment and Urbanisation, 2016) (cont.)

	Particulate Matter (PM_{10}) Average (µg/m³)					2011-2015 Rates of Change (%)
PROVINCES	2011	2012	2013	2014	2015	
İstanbul - Şirinevler-MTHM	0	0	0	74	58	-
İstanbul - Ümraniye	48	50	54	57	37	-22,92
İstanbul - Ümraniye-MTHM	0	0	0	64	53	-
İstanbul - Üsküdar	41	39	40	40	38	-7,32
İstanbul - Üsküdar-MTHM	0	0	0	48	39	-
İstanbul - Yenibosna	59	53	59	56	63	6,78
İzmir - Alsancak	49	42	41	33	32	-34,69
İzmir – Bayraklı	71	61	59	63	57	-19,72
İzmir – Bornova	49	45	41	40	46	-6,12
İzmir – Çiğli	50	44	41	37	40	-20,00
İzmir - Gaziemir	68	34	24	18	33	-51,47
İzmir – Güzelyalı	53	40	55	51	41	-22,64
İzmir - Karşıyaka	45	52	38	39	29	-35,56
İzmir - Şirinyer	62	57	57	47	46	-25,81
Kahramanmaraş	73	69	62	60	67	-8,22
Kahramanmaraş - Elbistan	78	77	84	77	86	10,26
Karabük	52	50	49	47	75	44,23
Karabük - Kardemir	0	93	85	91	69	-
Karaman	89	93	88	79	85	-4,49
Kars	54	52	57	47	47	-12,96
Kastamonu	34	31	34	34	28	-17,65
Kayseri-OSB	67	66	69	76	76	13,43
Kayseri - Melikgazi	53	60	62	63	67	26,42
Kayseri - Hürriyet	80	103	78	86	98	22,50
Kilis	70	58	35	29	40	-42,86
Kırıkkale	60	67	52	27	26	-56,67
Kırklareli	58	46	56	47	49	-15,52
Kırklareli - Lüleburgaz			48	28	42	-
Kırşehir	47	49	53	35	33	-29,79
Kocaeli	52	54	64	58	57	9,62
Kocaeli - Alikahya-MTHM	0	0	0	52	49	-
Kocaeli – Dilovası	73	78	92	82	73	0,00
Kocaeli - İzmit-MTHM	0	0	0	63	57	-
Kocaeli - Kandıra-MTHM	0	0	0	32	40	-
Kocaeli - Körfez-MTHM	0	0	0	60	50	-
Kocaeli-OSB	67	57	40	53	27	-59,70
Kocaeli-Yeniköy-MTHM	0	0	0	46	39	-
Konya – Meram	72	73	63	52	59	-18,06
Konya - Selçuklu	53	56	50	50	51	-3,77
Konya-Karatay				106	76	-

Table 25 - Annual average and rates of change regarding particulate matter (PM_{10}) concentration obtained from measurement stations in centers of provinces and districts. (Ministry of Environment and Urbanisation, 2016) (cont.)

	Particulate Matter (PM_{10}) Average (µg/m³)					2011-2015 Rates of Change (%)
PROVINCES	2011	2012	2013	2014	2015	
Kütahya	80	77	67	66	67	-16,25
Malatya	72	68	60	43	44	-38,89
Manisa	90	75	83	92	89	-1,11
Manisa – Soma	23	25	76	80	83	260,87
Mardin	76	51	62	58	80	5,26
Muğla	74	71	84	79	86	16,22
Muğla - Yatağan	65	70	71	83	79	21,54
Muş	33	83	105	99	132	300,00
Nevşehir	55	53	54	47	45	-18,18
Niğde	76	80	74	68	75	-1,32
Ordu	61	53	53	48	43	-29,51
Osmaniye	109	82	81	68	68	-37,61
Rize	29	27	41	30	29	0,00
Sakarya	94	82	61	60	73	-22,34
Samsun	39	40	42	65	78	100,00
Samsun - Tekkeköy	43	54	60	47	58	34,88
Şanlıurfa	77	72	71	49	45	-41,56
Siirt	101	101	93	113	103	1,98
Sinop	42	37	27	36	48	14,29
Şırnak	46	41	36	31	35	-23,91
Sivas	48	49	45	30	36	-25,00
Tekirdağ	72	68	56	50	77	6,94
Tekirdağ - Merkez	0	0	0	73	82	-
Tekirdağ - Çerkezköy	0	0	0	46	39	-
Tokat	31	29	44	49	44	41,94
Trabzon-Meydan	65	61	76	63	64	-1,54
Trabzon -Valilik	61	54	54	52	54	-11,48
Tunceli	41	45	30	18	22	-46,34
Uşak	72	69	60	55	63	-12,50
Van	75	64	64	49	39	-48,00
Yalova	41	23	28	34	36	-12,20
Yalova - Armutlu			35	29	33	-
Yozgat	58	50	46	42	42	-27,59
Zonguldak	87	71	77	82	69	-20,69
Zonguldak - Karadeniz Ereğli	60	53	44	47	51	-15,00

Table 26 - Annual average of sulphur dioxide (SO_2) concentration obtained from measurement stations in centers of provinces and districts. (Ministry of Environment and Urbanisation, 2016)

	SO_2 Averages (µg/m³)				
PROVINCES	**2011**	**2012**	**2013**	**2014**	**2015**
Adana-Çatalan	2	3	3	2	2
Adana-Doğankent	5	7	6	6	8
Adana-Meteoroloji	7	5	5	4	5
Adana-Valilik	9	14	7	4	12
Adıyaman	11	8	11	8	12
Afyon	32	35	65	40	31
Ağrı	15	19	10	9	7
Aksaray	17	7	12	10	10
Amasya	26	16	14	14	11
Ankara - Bahçelievler	18	38	10	10	10
Ankara - Cebeci	16	17	12	10	9
Bayburt	9	4	8	5	4
Bilecik	13	7	9	7	8
Bilecik - Bozöyük			1	1	8
Bingöl	12	15	6	6	7
Bitlis	65	41	38	32	10
Bolu	40	33	12	29	23
Burdur	20	11	12	13	15
Bursa	12	8	8	6	10
Bursa - Kestel	0	0	0	34	25
Bursa-İnegöl	0	0	0	25	-
Bursa-Beyazıt Cad.	0	0	0	17	13
Bursa-Uludağ Üni.	0	0	0	6	7
Bursa-Kültür Park	0	0	0	10	9
Çanakkale	46	32	13	12	10
Çanakkale - Biga	16	13	6	14	4
Çanakkale - Çan	0	0	0	0	74
Çanakkale - Lapseki	0	0	14	14	11
Çankırı	8	5	17	17	20
Çorum	33	18	24	14	21
Denizli-1	7	7	25	50	31
Denizli-2	6	5	13	14	17
Diyarbakır	10	7	18	10	9
Düzce	6	4	8	6	7
Edirne	57	49	25	25	25
Edirne - Karaağaç	0	0	0	8	9
Edirne - Keşan	0	0	0	308	241
Elazığ	6	7	15	12	13
Erzincan	10	4	9	10	13
Erzurum	14	13	9	13	13
Eskişehir	6	4	4	3	4
Gaziantep	18	13	12	7	11

Table 26 - Annual average of sulphur dioxide (SO_2) concentration obtained from measurement stations in centers of provinces and districts. (Ministry of Environment and Urbanisation, 2016) (cont.)

	SO_2 Averages (µg/m³)				
PROVINCES	**2011**	**2012**	**2013**	**2014**	**2015**
Giresun	12	5	5	8	8
Gümüşhane	5	5	17	10	10
Hakkari	169	165	84	52	56
Hatay	10	7	8	19	10
Hatay - İskenderun	30	13	14	24	19
İçel	3	3	4	7	6
Iğdır	24	10	11	9	8
Isparta	34	27	26	20	15
İstanbul - Aksaray	12	8	9	8	10
İstanbul - Alibeyköy	10	6	5	4	4
İstanbul - Başakşehir-MTHM	0	0	0	7	8
İstanbul - Beşiktaş	9	6	7	4	4
İstanbul - Esenler	10	8	6	4	5
İstanbul - Esenyurt-MTHM	0	0	0	8	5
İstanbul - Kadıköy	8	6	8	5	11
İstanbul - Kağıthane	0	0	0	14	15
İstanbul - Kağıthane-MTHM	0	0	0	6	5
İstanbul - Kandilli-MTHM	0	0	0	10	27
İstanbul - Kartal	8	9	6	5	7
İstanbul - Sarıyer	9	6	6	7	8
İstanbul - Şirinevler-MTHM	0	0	0	7	10
İstanbul - Sultanbeyli-MTHM	0	0	0	7	7
İstanbul - Sultangazi-MTHM	0	0	0	4	6
İstanbul - Ümraniye	9	5	7	6	9
İstanbul - Ümraniye-MTHM	0	0	0	6	10
İstanbul - Üsküdar	9	7	8	3	10
İstanbul - Yenibosna	8	6	8	5	7
İzmir - Alsancak	4	5	5	9	7
İzmir - Bornova	27	6	7	8	18
İzmir-Bayraklı	11	10	7	6	5
İzmir - Çiğli	7	6	7	10	11
İzmir - Gaziemir	8	5	7	7	17
İzmir – Güzelyalı	24	11	12	6	7
İzmir - Karşıyaka	19	12	10	6	9
İzmir - Şirinyer	8	9	6	9	11
Kahramanmaraş	8	6	16	22	20
Kahramanmaraş - Elbistan	7	15	37	27	26
Karabük	20	15	34	27	30
Karabük - Kardemir		53	57	32	33
Karaman	24	13	25	23	19
Kars	29	17	21	15	21

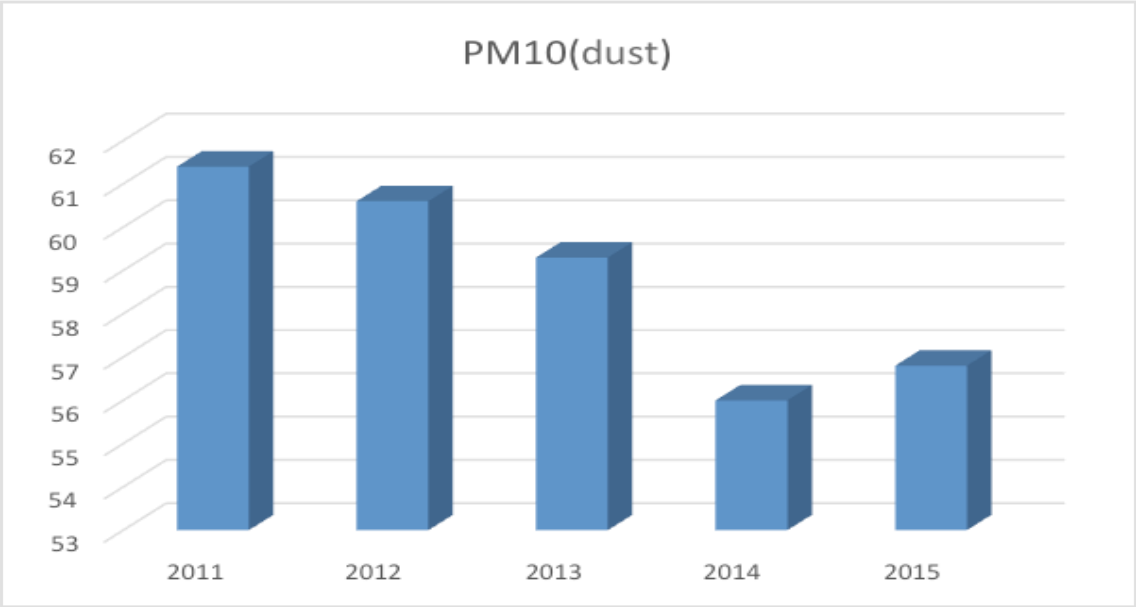
Table 26 - Annual average of sulphur dioxide (SO_2) concentration obtained from measurement stations in centers of provinces and districts. (Ministry of Environment and Urbanisation, 2016) (cont.)

	SO_2 Averages (µg/m³)				
PROVINCES	**2011**	**2012**	**2013**	**2014**	**2015**
Kastamonu	16	8	7	5	7
Kayseri-1(OSB)	10	16	9	7	5
Kayseri-2(Melikgazi)	13	21	7	7	7
Kayseri-3 (Hürriyet)	19	13	12	11	8
Kilis	8	6	4	5	8
Kırıkkale	15	9	15	11	16
Kırklareli	35	10	11	16	16
Kırklareli - Limanköy			6	6	2
Kırklareli - Lüleburgaz					18
Kırşehir	8	7	9	12	10
Kocaeli	7	8	8	3	5
Kocaeli-Alikahya-MTHM	0	0	0	10	13
Kocaeli - Dilovası	18	15	24	16	13
Kocaeli - Gölcük-MTHM	0	0	0	12	12
Kocaeli-Körfez-MTHM	0	0	0	17	11
Kocaeli-OSB	8	12	19	13	18
Kocaeli-Yeniköy-MTHM	0	0	0	8	10
Konya - Meram	14	21	12	14	10
Konya - Selçuklu	26	19	8	11	6
Konya-Karatay				9	10
Kütahya	9	6	12	11	9
Malatya	30	4	10	10	12
Manisa	17	13	18	10	7
Manisa - Soma	10	15	28	65	106
Mardin	40	25	17	16	11
Muğla	51	39	46	32	24
Muğla - Yatağan	55	58	70	59	26
Muş	15	22	31	21	23
Nevşehir	17	10	11	17	13
Niğde	21	8	8	6	7
Ordu	12	7	13	17	11
Osmaniye	5	11	10	11	23
Rize	13	3	7	6	5
Sakarya	10	7	10	6	14
Samsun	10	10	10	6	7
Samsun – Tekkeköy	13	31	19	19	19
Şanlıurfa	7	7	11	11	8
Siirt	24	21	22	20	19
Sinop	12	7	8	7	11
Şırnak	124	150	152	148	119
Sivas	22	9	18	22	15

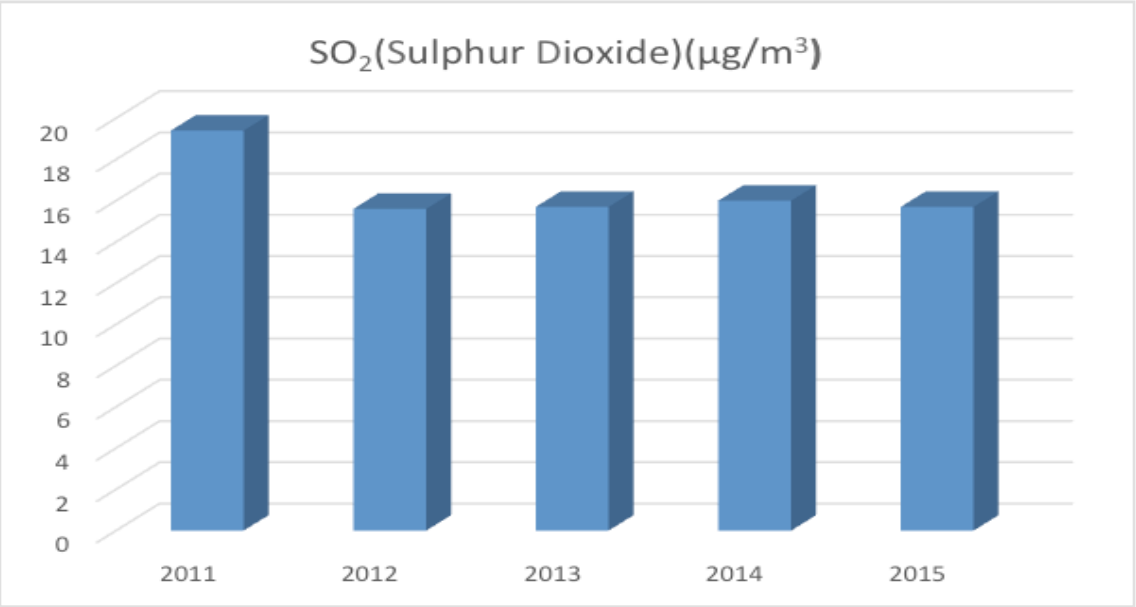
Table 26 - Annual average of sulphur dioxide (SO_2) concentration obtained from measurement stations in centers of provinces and districts. (Ministry of Environment and Urbanisation, 2016) (cont.)

	SO_2 Averages (µg/m³)				
PROVINCES	**2011**	**2012**	**2013**	**2014**	**2015**
Tekirdağ	98	59	38	18	24
Tekirdağ-Merkez	0	0	0	44	33
Tekirdağ - Çerkezköy	0	0	0	18	18
Tokat	15	6	6	8	10
Trabzon-Meydan	10	14	15	15	14
Trabzon - Valilik	6	7	28	37	18
Tunceli	5	8	7	9	5
Uşak	18	10	16	17	15
Van	18	25	46	18	13
Yalova	14	7	5	5	7
Yalova - Altınova			4	4	8
Yalova - Armutlu			4	4	17
Yozgat	29	17	25	33	45
Zonguldak	42	32	25	13	17
Zonguldak - Karadeniz Ereğli	41	15	9	8	9

From 2009, when air quality measurements started, to 2016 there has been 13% decrease in PM_{10} pollution and 14% in SO_2 pollution in Turkey in general. Graph 5 and Graph 6 shows PM_{10} and Sulphur dioxide (SO_2) changes by years.



Graph 5 - Annual changes in PM_{10} emissions by years. (Ministry of Environment and Urbanisation, 2016)



Graph 6 - Annual changes in Sulphur Dioxide emissions by years. (Ministry of Environment and Urbanisation, 2016)

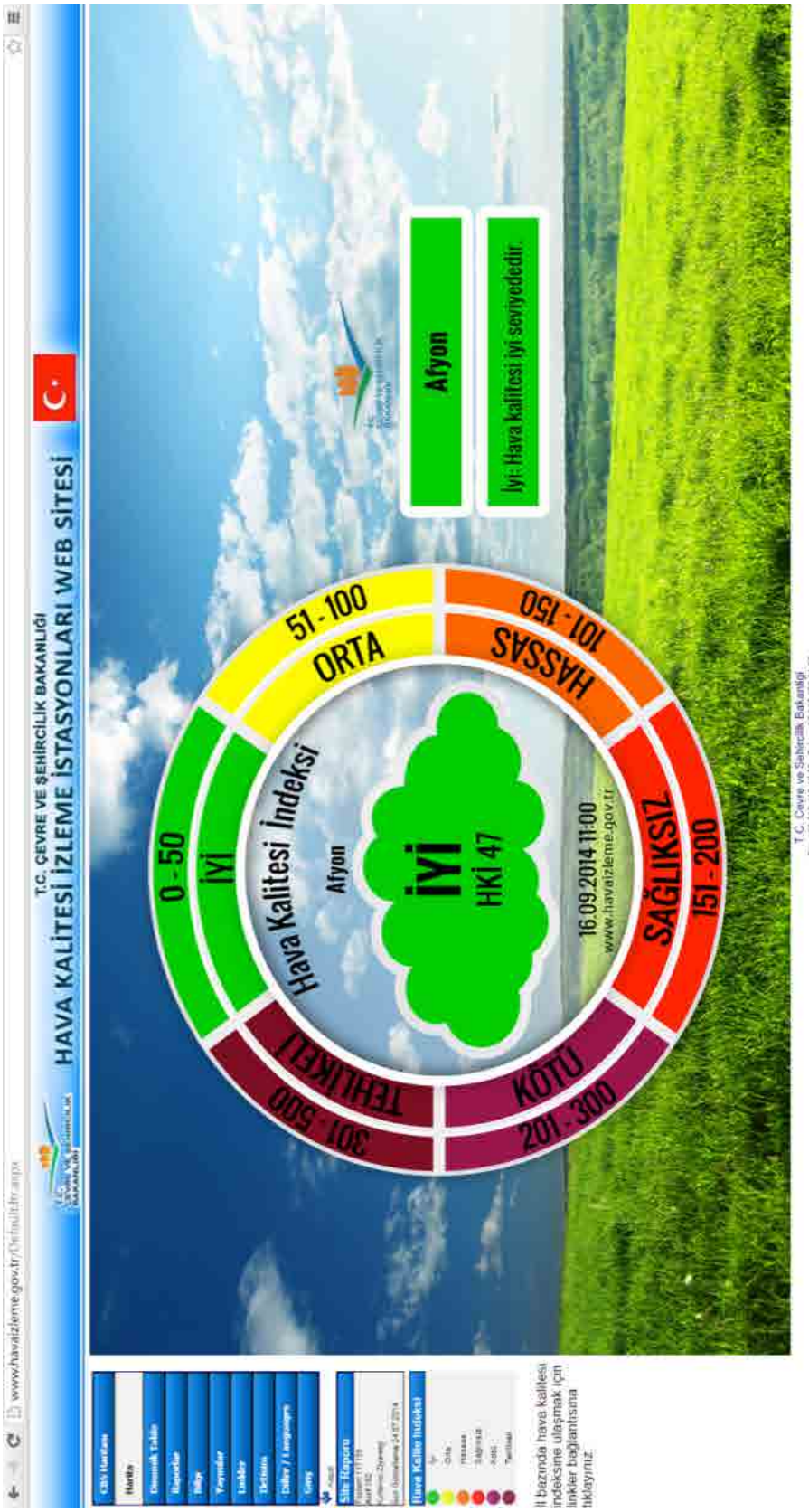


Figure 1–Air quality stations website homepage.

A.2.1. Continuous Emission Measurement Systems

Continuous monitoring of emission from stacks of highly pollutive industrial facilities is among the activities of the Ministry of Environment and Urbanisation.

Based on the EU standard of "Stationary Source Emissions–Quality Assurance of Continuous Measurement Systems EN 14181", Communique on Continuous Emission Measurement Systems (CEMS), which includes various technical matters, entered into force after being published in the Official Gazette N.28082 dated 12.10.2011.

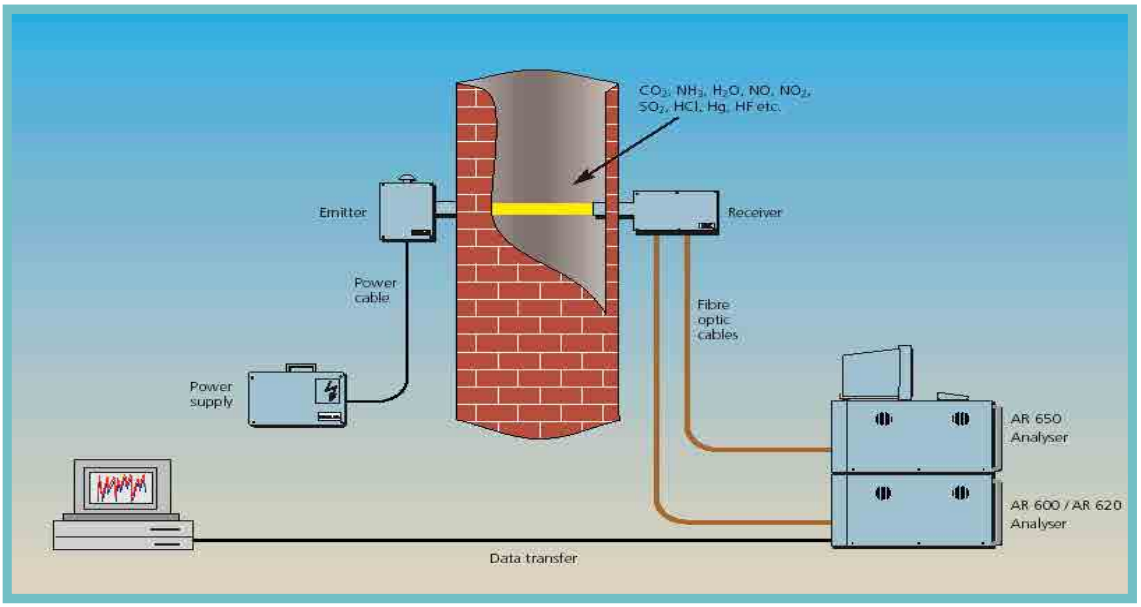


Figure 2– Continuous emission measurement diagram

The Circular on Online Monitoring of Continuous Emission Measurement Systems N. 2014/12 and dated 24.04.2014 was published by the Ministry of Environment and Urbanisation in order to ensure proper use of continuous emission measurement systems and thereby acquire reliable data after the Continuous Emission Measurement Systems in industrial facilities are brought in compliance with the criteria stated in the Communique. The Circular included provisions on foundation of continuous emission measurement systems, storing the data acquired from Continuous Emission Measurement Systems, validating the data and online transfer of the data to the Central Office of the Ministry.

During these legislative process, an inventory of facilities over the country with a high rate of pollution was prepared and the obligation to install Continuous Emission Measurement System was imposed on 281 industrial facilities for 621 stacks over Turkey.

With the Circular on Online Monitoring of Continuous Emission Measurement Systems, it became mandatory for some facilities, which were required to have Continuous Emission Measurement System on their stacks and bring them in compliance with the criteria in the Circular on Online Monitoring of Continuous Emission Measurement Systems pursuant to the Environmental Legislation, to start online data transfer to the center office of the Ministry of Environment and Urbanisation until a specified date. The due dates and sectors are as follows:

- Cement plants, natural gas cycle plants, sugar factories, thermal power plants, iron and steel plants, petrochemical plants, waste recycle and disposal facilities and all other facilities that use waste as additional fuel regardless of their sector, until 31.12.2014.
- Automotive plants, fertilizer plants, rubber production plants, glass factories, chemical plants, woodworking facilities, lime plants, acid production facilities, food factories, paper mills and textile plants, until 31.12.2015.
- Other facilities that are not within the scope of the Circular on Online Monitoring of Continuous Emission Measurement Systems and not stated above, until 31.12.2016.

As of the end of 2015, data from 525 stacks of 164 facilities, which are included in the Circular on Online Monitoring of Continuous Emission Measurement Systems and met the requirements, have been monitored online by the Ministry of Environment and Urbanisation.

Moreover, 8 laboratories have been authorized for calibration works of Continuous Emission Measurement Systems by the Ministry of Environment and Urbanisation within the scope of monitoring the emission from stacks of industrial facilities.

A.3. Exhaust Gas Emission Control

The data on the number of Motor Vehicle Exhaust Emission Licenses and Motor Vehicle Exhaust Emission Decals delivered to 81 Provincial Directorates of Environment and Urbanisation between 2012 and 2015 is provided on the Table below.

Table 27 - The number of Motor Vehicle Exhaust Emission Licenses and Motor Vehicle Exhaust Emission Decals delivered to Provincial Directorates of Environment and Urbanisation

	2012	2013	2014	2015
The number of Motor Vehicle Exhaust Emission Decals	5.465.000	6.850.000	7.375.000	6.245.000
The number of Motor Vehicle Exhaust Emission Licenses	1.365.000	1.775.000	2.320.000	1.485.000

As of May, 2015, around 1.600 Exhaust Emission Measurement Authorization Certificates have been issued by the Provincial Directorates of Environment and Urbanisation and delivered to exhaust emission measurement stations that meet the standards of TS 12047 and operates in accordance with the By Law on Exhaust Gas Emission Control and Gasoline and Diesel Oil Quality published in the Official Gazette N. 28837 dated 30.11.2013 and the related Circular.

A.4. Noise

Noise pollution is a crucial environmental problem that affects human health and life quality adversely.

The first legal By Law on the control of noise pollution in Turkey was made in 1983 with the Environmental Law Numbered 2872. The first technical By Laws pursuant to this Law was carried out with the “By Law on Noise Control” in 1986.

This By Law was harmonized with the European Union, Environmental Noise Directive Numbered 2002/49/EC and published on 04.06.2010 with the title of “By Law on the Assessment and Management of Environmental Noise”.

The purpose of the above mentioned By Law is; “to ensure that necessary measures are taken to prevent loss of people’s peace and quietude, to prevent them from physical and mental health hazards resulting from exposure to environmental noise pollution, to prevent and control environmental vibration on noise-sensitive buildings.”

The By Law includes basis and procedures on vibrations and noise to which humans are exposed, particularly in built-up areas, in public parks or other quiet areas in an agglomeration, in quiet areas in open country, near schools, hospitals and other noise-sensitive buildings and areas.

The By Law imposes obligation of preparing noise maps and action plans that include control measures according to noise map results, for;

- Transportation networks (roads, railways, waterways, airports),
- Industrial facilities, worksites, businesses, workplaces, factories,
- Entertainment venues,
- Outdoor activities in noise sensitive areas
- Environmental vibration
- Roads, railways, airports and industrial facilities in residential areas which holds a population more than 100.000 and have a population density of over 1000 person/km
- Highways out of residential areas (on which more than 3 million vehicle pass in a year), railways (on which more than 30 thousand trains pass in a year), major airports (on which more than 50 thousand planes lands in a year) and the neighborhood of these areas.

Basically, the noise mapping process, that constitutes the base structure of action plans, is conducted with a view to identifying noise problems in an area, determining the number of population, houses, schools and hospitals that are affected by noise pollution and providing necessary measures to eliminate and prevent noise pollution in these areas.

So as to implement the By Law on a scientific ground, it is important to carry out technical works precisely and correctly, follow the up-to-date data and prepare noise maps. Within this scope, applied projects have been carried out by the Ministry of Environment and Urbanisation.

Within the scope of 2004 European Union Financial Cooperation Program, the Project for Building of the Noise Management Capacity of the Ministry of Environment and Urbanisation started in May 2006 and completed in June 2008.

As a part of this project, sample noise maps and action plans were prepared for some specific noise sources in the selected pilot areas in Adana, İzmir, İstanbul, Bursa and Ankara. Additionally, Noise Reduction Measures Handbook, Noise Mapping Guide and a document including useful information on Action Planning for Noise were prepared.

Another project conducted by the Ministry of Environment and Urbanisation is the “Project on Implementation Capacity for Environmental Noise Directive” within the frame of EU IPA 2009 program. The project started on 28.06.2013 and completed at the end of December 2015.

Within the project, it is aimed to enhance the organizational capacity by preparing noise maps for İstanbul, Bursa, İzmir, Kocaeli, Ankara, Adana and Samsun provinces and noise maps and action plans for selected noise sources and their surroundings in Muğla, Antalya, Nevşehir, Eskişehir, Erzurum, Gaziantep and Edirne provinces in Turkey, in order to implement European Union, Environmental Noise Directive Numbered 2002/49/EC.

The project started in 2013 and completed in 2015. Data acquisition works for 2013 and 2014 stage of the project were completed and the following works were carried out in 2015 stage of the project;
Strategic noise maps were prepared for

- Roads, railways and industry (including ports) in İstanbul, Bursa, İzmir, Ankara, Kocaeli settlement areas,
- Airport in Adana,
- Port in Samsun

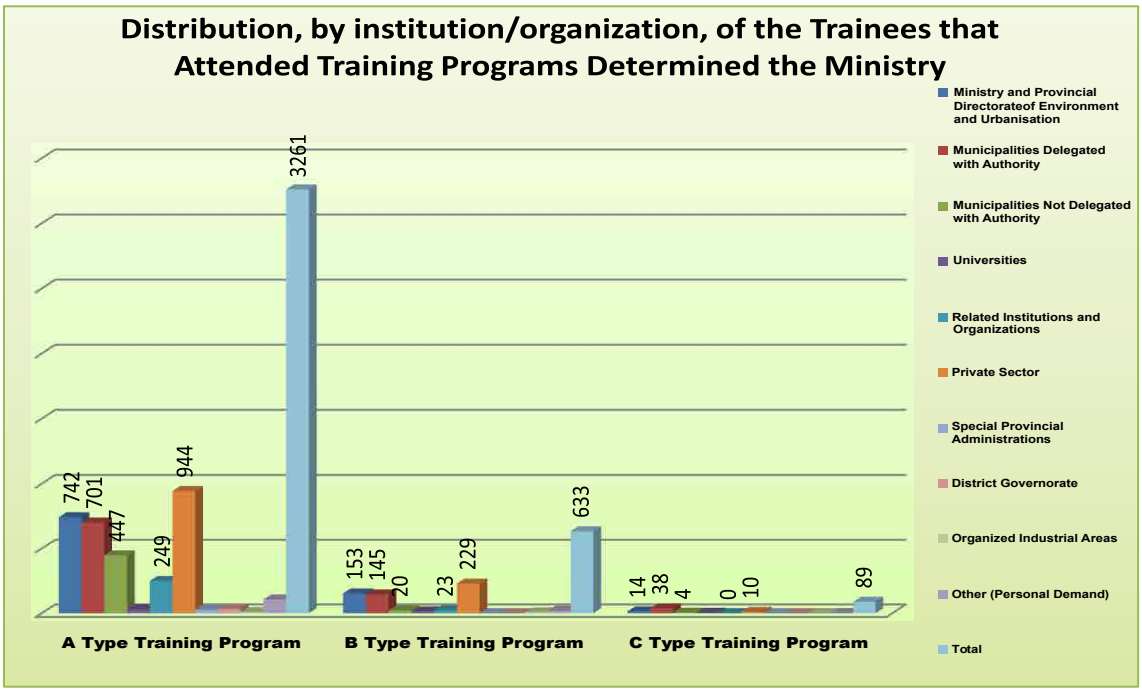
On the other hand, in selected pilot areas in 10 different provinces in 7 different regions of Turkey, noise mapping works were performed and sample works on action plans including control measures were carried out after completing noise mapping for;

- roads in selected pilot areas in Adana, Edirne, Erzurum, Gaziantep and Samsun
- railway in selected pilot area in Eskişehir;
- industry in selected pilot area in İzmir-Aliağa;
- places of amusement in selected pilot areas in Antalya, Muğla and Nevşehir.

Moreover, as a part of the project;

- Report for noise reduction measures in pilot areas
- Report on needs and assessment of training on environmental noise management in Turkey
- Report for sample case work on dose-response relationship
- Report on action plan for implementation of Environmental Noise Directive in Turkey

were prepared in 2015.



Graph 7 – Distribution, by institution/organization, of the Trainees that Attended Training Programs Determined the Ministry of Environment and Urbanisation (Ministry of Environment and Urbanisation, 2016)

The third project conducted by the Ministry of Environment and Urbanisation is the "Project for Preparing Strategic Noise Maps for Settlement Areas". Within this project, strategic noise maps were prepared for urbanized areas of Adana, Gaziantep, Manisa, Kayseri, Samsun, Balıkesir, Kahramanmaraş, Sakarya, Eskişehir, Erzurum, Trabzon, Sivas, Adıyaman, Elazığ and Mersin provinces by December 2015 in cooperation and coordination with related municipalities.

It is of great importance to take these noise maps and action plans into consideration while preparing Territorial Plans, Master Development Plans and Implementary Development Plans.

Furthermore, a training program including key issues on Acoustics, Noise Maps and Action Plans was prepared by the Ministry of Environment and Urbanisation in order to ensure effective implementation of the By Law on Assessment and Management of Environmental Noise, and to ensure specialization of both public and private sector employees in administration and environmental noise.

A.5. Conclusion and Evaluation

In order to prevent environmental problems affecting community life adversely, it is needed to develop and implement problem solving strategies and policies.

Implementation of an effective air management in Turkey is only possible through emission inventories, air quality modelling, air quality measurements and actions toward prevention of pollution from the source in specified areas. By the use of national emission inventories prepared by the Ministry of Environment and Urbanisation, total annual amounts of emissions of air pollutants are calculated by sector and the most pollutive sectors are identified. Local emission inventories underway and scenario works for air quality models to be implemented will reveal primary actions to be performed in air pollution management. Clean Air Action Plans for 67 provinces, monitored by the Ministry currently, will be improved and developed through these works.

As known, another environmental problem is noise pollution. Noise pollution affects quality of the environment and human health negatively. Short or long term exposure of people to noise may result in general disturbance, sleep disorders at night, decline in working performance, difficulty in learning, health problems caused by stress, hypertension, hormonal disorders and mental disorders.

Noise pollution occurs due to the increase in motor vehicle traffic, railway traffic, and airports and industrial facilities, as a result of Urbanisation especially in big cities.

Within this frame, it is of great importance to prepare acoustic plans for cities and to consider strategic noise maps, action plans, territorial plans, and development plans in order to conserve noiseless and peaceful places.

Air quality is continuously monitored by the Ministry of Environment and Urbanisation with the help of 195 stationary and 4 mobile air quality measurement vehicles hourly for 24 hours. Results of the have been published transiently on the webpage www.havaizleme.gov.tr since 2005. Major pollutants from domestic heating, particular matter and Sulphur dioxide, are measured at 195 points in 81 provinces. It is aimed to increase this number to 330 in order to measure air quality more precisely and in more parameters. Within the program for harmonization with EU Legislation, the upper limits for air quality have been reduced gradually since 2008, and EU upper limits regarding particulate matter and Sulphur dioxide will be achieved in 2019.

In conclusion, related institutions as well as the Ministry of Environment and Urbanisation are responsible for carrying out these works. This is because the environment is not a possession of an institution or organization, but it is the habitat of all humanity. Thus, investing in environment means investing in the future.

SOURCES

- Ministry of Environment and Urbanisation – General Directorate of Environmental Management
- Ministry of Environment and Urbanisation - Directorate General of EIA, Permit and Inspection
- Turkish Statistical Institute

B.CLIMATE CHANGE

B.CLIMATE CHANGE

When the solar radiation permeate through the greenhouse gasses in the atmosphere, some of this energy is reflected back to space and the rest is absorbed and re-radiated by greenhouse gases. This greenhouse effect is a natural process that warms the Earth's surface and causes overheating.

The increase in greenhouse gas accumulation in the atmosphere, creates positive radiative forcing which causes overheating of the Earth's surface. This positive contribution to energy balance of Earth surface/atmosphere system is called as reinforced greenhouse effect. This means intensification of the natural greenhouse effect that has been at work for hundreds of millions of years with the help of greenhouse gasses (water vapor, CO_2, CH_4, N2O and O_3) and this intensification of the greenhouse effect triggers climate change.

Greenhouse Gasses are:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFC_s)
- Perfluorocarbons (PFC_s)
- Sulfur hexafluoride (SF_6)
- Nitrogen trifluoride (NF_3)

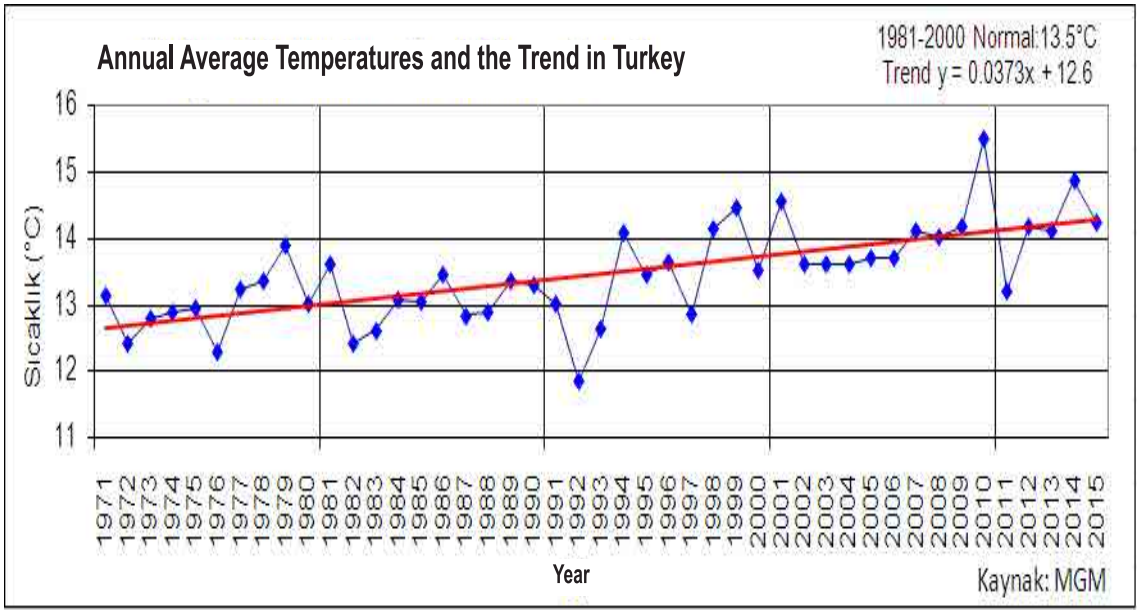
The United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol (CP) aims at bringing major six greenhouse gasses (CO_2, CH_4, N_2O, Hydrofluorocarbons -HFC, Perfluorocarbons -PFC and Sulfur hexafluoride -SF_6), under control. Chlorofluorocarbons-CFCs and hydrochlorofluorocarbons HCFCs that cause depletion of ozone layer at stratosphere are brought under control through Montreal Protocol.

According to the scenario, if no measures are taken against greenhouse gasses that cause climate change, global emissions will increase by 37-52% until 2050 and this will cause a 1,7-2,4 °C global temperature increase compared to pre-industrial period. Accordingly, adverse effects of climate change will increase.

Major policies and measures against climate change focus on the sectors of energy, transportation, industrial activities, agricultural, waste, land use and forestry.

The result of the works by the General Directorate of Meteorology which aims to reveal long term changes in temperature and precipitation in Turkey, is provided below, to show observed and possible changes in Turkey's climate. Mean yearly temperature in Turkey during the climatic period between 1981 and 2010 is 13.5°C. The temperatures tended to increase in general, similar to the global changes in temperature. It can be seen on Graph 8 that there is a temperature increase of 3,7 °C/100 years in Turkey between 1971–2015.

Mean temperatures tend to increase more on the south and southeast of Turkey and substantially in urbanized areas (Istanbul, Kocaeli). Changes in the line of maximum yearly temperatures show temperature increase in general. There is a remarkable temperature increase in South, West, East Anatolia and western parts of Southeast Anatolia.



Graph 8 - Average temperatures and temperature trends in Turkey (General Directorate of Meteorology, 2016).

Precipitation differs in Turkey according to time and place. 35% of total annual precipitation occurs in winter, 30% in spring, 10% in summer and 25% in autumn. Type and amount of precipitation in winter and spring seasons are important for underground and surface water resources.

B.1. Climate Change in Turkey and Related Works

In order to implement National Climate Change Strategy[5], prepared in coordination with the Ministry of Environment and Urbanisation and approved by the Prime Ministry Higher Planning Council on 03.05.2010, National Action Plan on Climate Change (NAPCC)[6], containing strategic principles and objectives for 2011-2023 towards greenhouse emission control and adaptation to climate change, was prepared and put into effect in July, 2011.

In Turkey's first green development strategy NAPCC, objectives and actions concerning industry, buildings, waste, forestry, transportation and agricultural sectors are identified and environmental, economic and social aspects are considered together.

The main aim of NAPCC is to combat with climate change, manage the effects of climate change and increase reliability by identifying actions according to national conditions to limit emission of greenhouse gasses and thereby promote adaptation and combat with climate change in Turkey. NAPCC addresses greenhouse gases emission control and adaptation measures to be imposed on prior sectors identified according to the particular conditions of Turkey. And it also focuses on the topics of institutional structuring, long term cooperation, technology development and transfer and financial matters.

NAPCC consists of two sections about "Action Plan for the Control of Greenhouse Gas Emission" and "Action Plan on Adaptation to Climate Change". The section on "Action Plan for the Control of Greenhouse Gas Emission" includes sub-topics of;

- Energy
- Buildings
- Transportation
- Industry
- Waste
- Farming
- Land Use and Forestry
- Common Issues Between Sectors

[5] http://www.csb.gov.tr/db/iklim/banner/banner592.pdf

[6] http://www.csb.gov.tr/db/iklim/banner/banner591.pdf

And the other section on Action Plan on Adaptation to Climate Change includes sub-topics;

- Management of Water Sources
- Agricultural Sector and Food Security
- Ecosystem Services, Biodiversity and Forestry
- Natural Disasters Risk Management
- Human Health,
- Common Issues Between Sectors

There are 541 actions to be taken within the scope of these sub-topics. An electronic monitoring system was founded to monitor the status of the actions in NAPCC. 330 users from the responsible institutions/organizations enter data onto the system and the process of the actions are monitored.

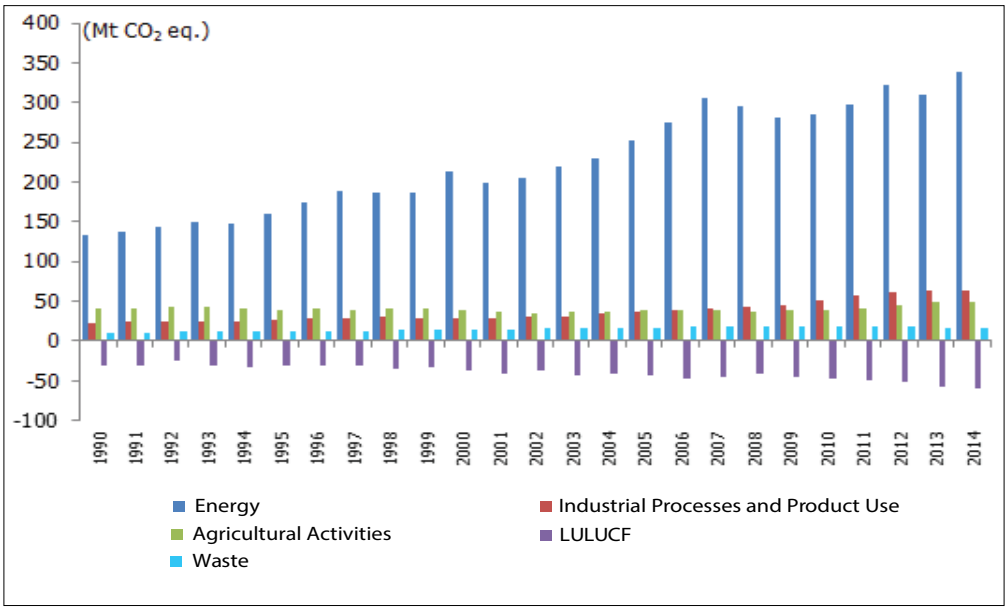
2015 was an important year for both Turkey and the world in terms of climate change. Turkey submitted its Intended Nationally Determined Contribution (INDC) to UNFCCC Secretariat on 30.09.2015 as a party of the United Nations Framework Convention on Climate Change (UNFCCC). According to business-as-usual (BAU) scenario, there will be a 21% decrease in emission of greenhouse gasses by 2030 and this will be achieved through changes in energy, industrial processes, agriculture, land use, land use change and forestry sectors.

Within the frame of climate change negotiations, works on a new universal agreement concerning climate by United Nations was completed between 30 November – 12 December 2015 in a conference on climate in Paris. At the end of the conference, the Paris Agreement was accepted by unanimous vote of 195 countries including Turkey. This agreement is expected to take the place of Kyoto Protocol, which will cease to have effect in 2020.

Turkey also stated that it wants to do the honors for the 26th Conference of the Parties on Climate Change to be held in 2020.

B.2. The Amount of Greenhouse Gases at National Level

According to the 2016 Report on National Greenhouse Gas Inventory, which includes greenhouse gas emission data for 1990 – 2014 that was calculated by using the Guide on 2006 Intergovernmental Panel on Climate Change and submitted to UNFCCC secretariat, total greenhouse gas emission of Turkey in 2014 is; 467,6 Mt equivalent of CO_2 except Land Use, Land Use Change and Forestry (LULUCF) sector; 410,5 Mt equivalent of CO_2 when LULUCF sector included. Generally, it is observed that there had been an increase trend in all sectors between 1990 - 2014. This increase was 171,6% for industrial processes and product use, 156,0% for energy, 98,1% for LULUCF, 47,2% for waste and 20,1% for agriculture.



Graph 9- Sectoral distribution of greenhouse gas emissions (including LULUCF) (Ministry of Environment and Urbanisation, 2016)

Table 28 - Total sectoral greenhouse gas emissions between 1990 – 2014 (CO_2 equivalent), (Million tons), (TURKSTAT, Greenhouse Gas Emission Inventory, 2016)

Year	Energy	Industrial Processes and Product Use	Agricultural Activities	Waste	Total	Change compared to 1990 (%)
1990	132,5	23,1	41,2	10,9	207,8	-
1991	136,6	24,4	41,9	11,2	214,1	3,03
1992	142,6	24,7	42,1	11,4	220,8	6,26
1993	150,5	25,5	43,0	11,7	230,6	10,97
1994	147,0	25,5	40,3	11,9	224,7	8,13
1995	160,1	27,0	39,8	12,2	239,0	15,01
1996	175,2	28,0	40,8	12,6	256,7	23,53
1997	188,1	29,6	39,1	13,1	269,9	29,88
1998	187,7	29,8	40,8	13,4	271,8	30,80
1999	187,4	28,7	41,3	13,9	271,4	30,61
2000	214,4	28,4	39,6	14,4	296,8	42,83
2001	198,3	28,6	37,0	14,9	278,8	34,17
2002	206,0	30,0	35,7	15,4	287,1	38,16
2003	219,1	31,6	37,1	15,8	303,7	46,15
2004	229,2	34,3	37,0	16,4	316,9	52,50
2005	252,7	37,8	37,9	16,9	345,2	66,12
2006	275,2	39,8	38,9	17,4	371,3	78,68
2007	306,1	41,1	38,5	17,7	403,4	94,13
2008	295,3	43,5	36,5	17,8	393,1	89,17
2009	280,9	45,8	38,0	17,9	382,5	84,07
2010	286,0	51,8	39,3	18,1	395,3	90,23
2011	298,2	58,2	41,1	18,4	415,9	100,14
2012	321,3	62,4	45,8	18,0	447,5	115,35
2013	310,0	63,2	49,3	16,2	438,8	111,16
2014	339,1	62,8	49,5	16,1	467,6	125,02

- No information.
- Emissions from forestry and other kinds of land use activities and sink areas are not included.
- The numbers on the Table may not be equal to the total number due to rounding.

According to the results of the inventory, total amount of greenhouse gas emission in 2014 was 467,6 million tons (Mt) CO_2 equivalent. The biggest share as CO_2 equivalent was 72,5% from energy related emissions, 13,4% for industrial processes and product use, 10,6% for agricultural activities and 3,5% for waste.

Table 29 – Sectoral distribution of greenhouse gas emissions and by percentage (LULUCF excluded)

Sectors	1990	1995	2000	2005	2010	2012	2013	2014
Energy	63,76	66,96	72,22	73,18	72,37	71,81	70,65	72,53
Industrial Processes and Product Use	11,13	11,29	9,57	10,94	13,10	13,95	14,41	13,43
Agriculture	19,84	16,64	13,36	10,99	9,95	10,23	11,24	10,59
Waste	5,27	5,11	4,85	4,88	4,58	4,01	3,70	3,45

Due to the increase in transportation demand (calculated in energy sector) between 1990-2014, there was a 173% CO_2 equivalent increase in greenhouse gas emission resulting from transportation. With respect to the 2014 calculations, total

amount of greenhouse gas emission is 73,7 million tons CO_2 equivalent. Of all the emission from this sector, share of road transport is 91%, air transport 5,5%, sea transport 1,8% and railway transport 0,8%.

Table 30 – Amount of emissions from transportation in 2014.2014 (Thousand Tons CO_2 equivalent) (Ministry of Transport, Maritime Affairs and Communication, 2015)

	Amount of Emission
Transportation	73.700
Airline	4.090
Road	67.070
Railway	563
Seaway	1.350
Other	628

Table 31 – Change in greenhouse gas emissions by years (TURKSTAT, 2016)

	1990	1995	2000	2005	2010	2012	2013	2014
Total (Mt CO_2 equivalent)	207,8	239,0	296,8	345,2	395,3	447,5	439,8	467,6
Change compared to 1990	-	15,0	42,9	66,2	90,2	115,4	111,2	125,0

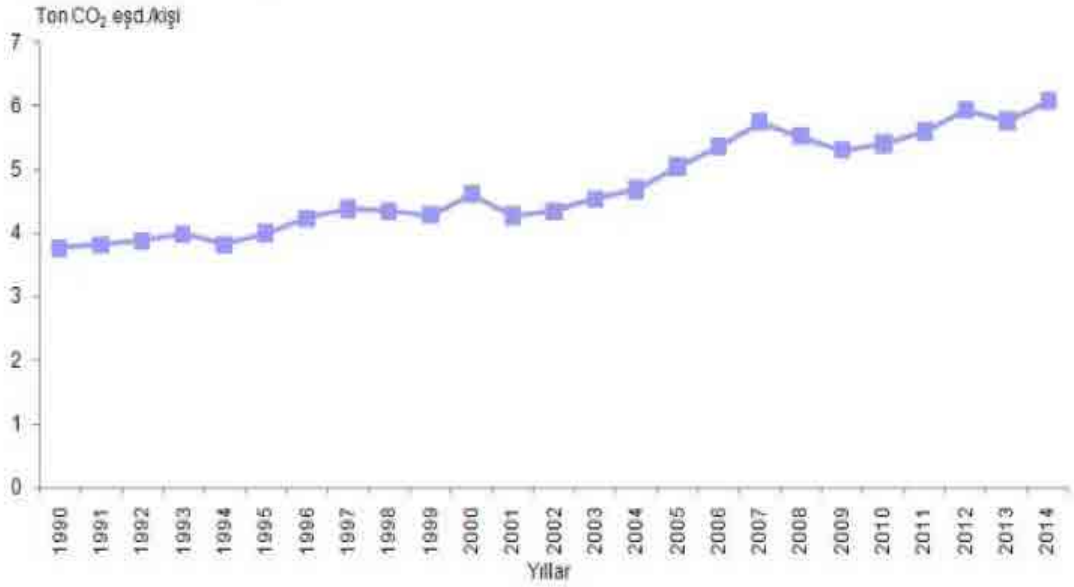
Total amount of greenhouse gas emission in 2014 showed a 125% CO_2 equivalent increase compared to the year 1990. While CO_2 equivalent emission was 3,77 tons/per capita in 1990, this value increased to 6,08 tons/per capita by 2014.

Table 32 – Carbon dioxide emissions per capita in Turkey (Ton CO_2 equivalent/person)

1990	1991	1992	1993	1994	1995	1996	1997	1998
3,96	4,01	4,05	4,15	3,99	4,18	4,42	4,58	4,54

1999	2000	2001	2002	2003	2004	2005	2006
4,48	4,83	4,49	4,56	4,79	4,93	5,28	5,61

2007	2008	2009	2010	2011	2012	2013	2014
6,01	5,77	5,56	5,63	5,83	6,17	6,04	6,08



Graph 10- Carbon dioxide emissions per capita in Turkey (1990-2014) (Ton CO_2 equivalent/person) (TURKSTAT Greenhouse Gas Emission Inventory: 2014, 2016)

While national greenhouse gas emissions had been calculated according to the 1996 Intergovernmental Panel on Climate Change Guide (IPCC) until 2015, 1990-2013 emission were calculated by using 2006 IPCC Guide in 2015 and 1990-2012 emission data was revised. Emission inventory includes emissions of energy, industrial processes, agricultural activities and direct greenhouse gasses of carbon dioxide (CO_2), methane (CH_4), Nitrous oxide (N_2O) and F-gases and indirect greenhouse gases of nitrousoxides (NO_x), non-methane volatile organic compounds (NMVOC), carbon monoxide (CO) and Sulphur dioxide (SO_2)

Table 33 – Change in greenhouse gas emission by years (TURKSTAT, 2016)

YEARS	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CO_2	153,8	184,3	239,0	285,9	309,8	340,6	330,1	318,5	326,1	343,7	368,3	363,4	382,2
CH_4	46,8	48,5	51,0	52,2	54,2	57,0	58,3	58,3	60,4	63,2	67,6	65,8	57,1
N_20	17,0	16,2	19,0	19,7	20,3	19,7	17,9	19,7	19,5	19,5	21,0	23,2	23,3
F Gases	0,6	0,5	1,7	3,9	4,3	4,5	4,0	4,2	5,7	6,1	7,2	6,7	4,9
TOTAL	**218,2**	**249,5**	**310,7**	**361,7**	**388,6**	**421,8**	**410,3**	**400,7**	**411,7**	**432,5**	**464,1**	**459,1**	**467,6**

Table 34 - Distribution of CO_2, CH4 and N_2O emissions by resources in 2014 (National Greenhouse Gas Emission Inventory Report, 2016)

	CO_2	CH_4	N O
Energy	325.470,7	467,9	6,5
Industrial Processes and Product Use	55.954,9	5,2	6,1
Agriculture	787,7	1.242,1	59,3
Waste	0,1	570,3	6,2
TOTAL	**382.213,4**	**2.285,5**	**78,1**

When greenhouse gas emissions are analyzed individually, it can be observed that the biggest share for total CO_2 belongs to energy sector with 85,2%. The rest comprises of industrial processes and product use with a share of 14,6% and agriculture with a share of 0,2%. CO_2 emissions from energy sector shows an increase of 9,4% when compared to 2013 and 161,2% when compared to 1990. CO_2 emissions from industrial processes shows an decrease of 1% when compared to 2013 and 158% increase when compared to 1990.

In 2014, the highest CH_4 emissions resulted from agricultural activities with a share of 54,3%. It is followed by waste sector with a 25% share, energy and industrial processes and product uses with a share of 20,7%. CH_4 emissions resulted from agricultural decreased 0,9% when compared to 2013, and decreased 12,6% when compared to 1990. CH_4 emissions from wastes decreased 1,1% when compared to 2013. On the other hand, CH_4 emissions from wastes increased 48,6% when compared to 1990 due to the increase in managed waste.

In 2014, 75,9% of N_2O emission was caused by agricultural activities, 8,3% by energy, 8% by waste and 7,8% by industrial processes and product use. There is a 0,3% increase in total amount of N_2O emission when compared to 2013 and 41% increase when compared to 1990.

When the distribution of greenhouse gas emissions in the world is analyzed by sector, it is observed that, similar to Turkey, 70% of the emissions resulted from fossil fuels used in power generation. In this regard, changing the fuels used in energy production is of great importance in combatting with climate change. Usage of renewable resources would make great contributions in reducing emission of greenhouse gases and thereby help in the process of combatting against climate change.

Turkey's the 2nd National Declaration on Climate revealed that Turkey holds the lowest values in terms of greenhouse gas emission per capita, historical responsibility and energy consumption per capita among the other OECD and UNFCCC Annex-1 countries. On the other hand, Turkey is behind other OECD countries, many other UNFCCC Annex-1 countries and other out-of- Annex-1 countries in terms of development and industrialization.

Similarly, the amount of emission caused while Turkey is producing one unit of GDP is below the average amount of OECD and world.

Moreover, Turkey's historical contribution to greenhouse gas emission in the atmosphere was only 4% between 1850 – 2000.

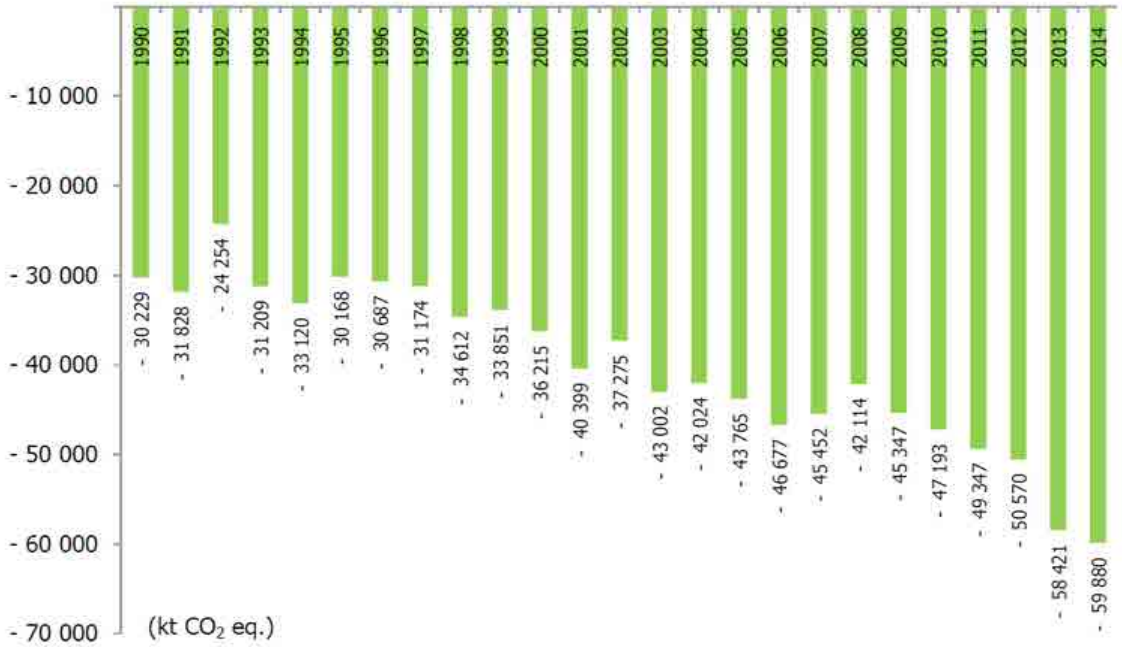
B.3. Sink Areas in Turkey

Forests are important sink areas for greenhouse gases. Especially, as forests store carbon, this decreases total amount of greenhouse gas emission in greenhouse gases inventory. Sustainable forest management, forestation, increasing the size of forest areas, rehabilitating forests, forest tending, effective forest protection and forest fire management and activities of the General Directorate of Forestry are activities that increase the potential of sink areas and decrease the amount of greenhouse gases. These activities positively effects the annually purged CO_2 amounts by forestry sector in Land use, Land-use change and Forestry (LULUCF) section of National Greenhouse Gas Inventory reported to the Secretariat for United Nations Framework Convention on Climate Change, UNFCCC). Furthermore, the amount of CO_2 purge under the category of forestry products in LULUCF section of National Greenhouse Gas Inventory is also a sink mechanism related to forestry.

Table 35 illustrates the total amount of CO_2 absorption by LULUCF sector and forestry and processed forestry products in the National Greenhouse Gas Inventory.

Table 35 - Annual amounts of greenhouse gases absorbed by forests and forest products in Turkey between 1990-2014 (t CO_2 equivalent) (General Directorate of Forestry, 2016)

Years	Annual Amounts of Greenhouse Gases Absorbed by Forests (CO_2 equivalent – Gg)	Annual Amounts of Greenhouse Gases Absorbed by Processed Forest Products (CO_2 equivalent – Gg)
1990	28.118	4,368
1991	29.737	3,604
1992	29.796	3,878
1993	30.068	1,859
1994	32.751	1,597
1995	29.747	1,306
1996	30.267	1,564
1997	31.816	1,577
1998	33.929	1,755
1999	34.864	1,215
2000	35.266	1,257
2001	38.635	1,654
2002	38.542	917
2003	40.761	1,979
2004	40.164	1,680
2005	41.111	3,164
2006	42.413	3,523
2007	41.752	4,234
2008	37.989	4,039
2009	40.565	4,907
2010	42.566	4,585
2011	43.824	5,425
2012	44.070	6,400
2013	50.817	7,509
2014	51.982	7,809



Graph 11 – Annual amount of greenhouse gasses absorbed by LULUCF Sector (Gg ton CO_2 equivalent) (General Directorate of Forestry, 2016)

B.4. Works on Emissions Trade in Turkey

In order to set up the System for Monitoring, Reporting and Verification (MRV) of Greenhouse Gases, underlying the Emissions Trading System, and monitor greenhouse gas emissions from industrial facilities, the "By Law on Monitoring of Greenhouse Gas Emissions" entered into force after being published in the Official Gazette N. 28274 dated 25.04.2012. Later on, the "By Law on Monitoring of Greenhouse Gas Emissions" was revised and published in the Official Gazette N. 29003 dated 27.05.2014. Through this By Law, it is aimed to monitor emission of greenhouse gases especially from electricity, cement, iron and steel, refinery, ceramic, lime, and paper and glass production sectors which are responsible for nearly half of the total greenhouse gas emissions in Turkey.

Within this context, concerning the responsibilities of monitoring and reporting stated in the By-Law, pursuant to the Directive on Monitoring, Reporting and Verification of Greenhouse Gas Emissions N. 601/2012/EC, the following communiques were published by grounding on the "Communique on Monitoring and Reporting of Greenhouse Gases" and the Directive on Reporting and Verification and Accreditation of Greenhouse Gas Emissions N. 600/2012/EC.

- The "Communique on Monitoring and Reporting of Greenhouse Gases" was published in the official Gazette N. 29068 dated 22.07.2014.
- The "Communique on Verification of Greenhouse Gas Emission Reports and Authorization of Confirmatory Institutions" was published in the official Gazette N. 29314 dated 02.04.2015.

Moreover, in order to provide necessary capacity improvements in developing countries and growing economies so that they can benefit from carbon market mechanisms, the World Bank introduced a technical support program called Partnership for Market Readiness (PMR). Turkey also appealed to benefit from this program, and a preparatory grant was provided to Turkey. In relation to this, the Grant Agreement for Market Readiness Proposal Partnership for Market Readiness Multiple Donor Fund, Grant/Project No: TF010793 was published in the Official Gazette N. 28165 dated 06.01.2012.

Some voluntary sectors (electricity, cement, and refinery) have been identified within the scope of the project, and pilot works on implementation of the "By Law on Monitoring of Greenhouse Gas Emissions", analytic works on supporting decision making process on the use of carbon market mechanisms, capacity enhancing works, awareness and training works have been carried out in coordination with all parties.

B.5. Works on Adaptation to Climate Change in Turkey

Adaptation to climate change is a process that include taking and implementing necessary measures towards management of the effects of climate change.

Climate change adaptation is a multi-actor and interdisciplinary topic and it is under the duties and responsibilities of several institutions. Each institution and organization carries out adaptation activities within their area of responsibility and duty. In addition to this, Climate change adaptation activities are coordinated by the Ministry of Environment and Urbanisation at national level.

The Adaptation Strategy and Action Plan for Climate Change (2011-2023), which was prepared under the coordinationship of the Ministry of Environment and Urbanisation and put into effect in 2011, provides the basis for climate change adapting in Turkey. This Strategy and Action Plan includes aims, objectives and actions concerning;

- Management of water sources.
- Agricultural sector and food security
- Ecosystem services, biodiversity and forestry
- Natural disaster risk management
- Human health.

Additionally, it is planned to accord the Adaptation Strategy and Action Plan for Climate Change to EU Package for Adaptation to Climate Change and implement it more effectively by updating it. In line with this purpose, a comprehensive project is underway and within the project, it is aimed to determine;

- the effects of climate change at national level
- Climate change affectability level, risks and uncertainties.
- the expenses of adapting to climate change
- Primary adaptation choices and their implementation expenses.

On the other side, the Project for Creating Awareness on Climate Change is conducted in coordination with the Ministry of Environment and Urbanisation with Yıldırım Beyazıt University. Within the scope of the project, to be carried out between 2015-2017;

- Training sessions, science workshops, seminars and various activities will be held for students, teachers and trainee teachers in 9 selected schools in the provinces of Antalya, Çorum, Denizli, Erzincan, Erzurum, Eskişehir, Gaziantep, Kahramanmaraş, Kastamonu, Kocaeli, Malatya, Manisa, Mersin, Niğde, Rize and Şanlıurfa.
- Within the scope of capacity enhancing for local authorities, seminars, training sessions and meetings etc. will be held in Adana, Ankara, Antalya, Bursa, Çanakkale, Hatay, İstanbul, Kayseri, Kocaeli, Konya, Sakarya, Samsun, Trabzon and Lefkoşa, in order to enhance the capacity of adapting to climate change for municipalities, public institutions, private sector and non-governmental organizations.

B.6. Works on Ozone Depleting Substances in Turkey

Turkey became a party to The Vienna Convention for the Protection of the Ozone Layer and The Montreal Protocol on Substances that Deplete the Ozone Layer in 1991 and accepted all the articles. National and international works related to the Protocol are carried out under the coordination of the Ministry of Environment and Urbanisation. Turkey is among the successful countries in implementing the Montreal Protocol signed by 197 countries. According to the researches, every year 11 Gg ton CO_2 equivalent emission reduction is achieved through the implementation of the Montreal Protocol.

“The By Law on Reduction of Substances that Deplete the Ozone Layer”, published in the Official Gazette N. 27052 dated 12.11.2008, was prepared in compliance with the EU Directive N. 2037/2000. After the By Law was published on 12.11.2008, EU Directive N. 1005/2009 was published. The By Law was revised and it is planned to be published in 2016.

Within the scope of The By Law on Reduction of Substances that Deplete the Ozone Layer (ODS), the Ministry of Environment and Urbanisation controls and terminates the import of these ozone depleting substances which are produced in our country.

The import limit for these substances is brought down every year by the Ministry and a specific amount of ODSs are allowed to enter into the country, and they are monitored from import stage to usage through electronic tracking system of the Ministry.

Fluorinated Greenhouse Gases (F-gases) started to replace gradually reduced Ozone Depleting Substances. In this regard, a Draft By Law has been prepared under the "By Law (EC) No. 842/2006 of the European Parliament and of the Council on certain fluorinated greenhouse gases" within the scope of European Union Chapter on Environment, and it is planned to be published in 2016.

Achievements of the works carried out within Montreal Protocol have had positive effects on ozone layer and they have also contributed greatly in combatting with climate change. Turkey was granted with Medal of Honor in recognition of Ozone Layer Protection in Europe and Central Asia in 2012 and 2014 due to the works carried out under coordinationship of the Ministry.

B.7. Conclusion and Evaluation

2015 was an important year for both Turkey and the world in terms of climate change. Turkey submitted its Intended Nationally Determined Contribution (INDC) to UNFCCC Secretariat on 30.09.2015 as a party of the United Nations Framework Convention on Climate Change (UNFCCC). According to business-as-usual (BAU) scenario, there will be a 21% decrease in emission of greenhouse gasses by 2030 and this will be achieved through changes in energy, industrial processes, agriculture, land use, land use change and forestry sectors.

The national legislation, which was prepared to provide accountability for greenhouse gas emission in parallel with the monitoring, reporting and verifications standards of EU legislation, has been implemented successfully. Guides and training sessions were prepared for facilities in order to ensure proper and timely implementation of the national legislation. Also, an online system has been set up under Environmental Information System for monitoring, reporting and verification activities, and all the works and activities are conducted effectively in this way. In order to provide sustainability of training sessions for all parties towards implementation of the legislation, a Continuing Education Center is underway.

In order to reduce greenhouse gas emission in combatting with climate change, various works are under progress, such as publication of Action Plan for Climate Change, assessment of different international mechanisms and bringing national legislation in accord with EU Directives.

Climate change adaptation works are coordinated by the Ministry of Environment and Urbanisation at national level. Later on, Adaptation Strategy and Action Plan for Climate Change will be updated by considering EU By Laws. For this purpose, national effects of climate change, affectability level, risks and primary adaptation choices and their expenses will be determined.

Furthermore, Turkey became a party to The Vienna Convention for the Protection of the Ozone Layer and The Montreal Protocol on Substances that Deplete the Ozone Layer in 1991 and accepted all the articles. As Turkey adopted a rapid pace in application plan for Montreal Protocol compared to other developing countries (A5 countries), it is among the successful countries in implementing the Montreal Protocol. Thanks to the successful works within the scope of Montreal Protocol, Turkey made great contributions in protecting ozone layer and in combatting with climate change.

SOURCES

- Ministry of Environment and Urbanisation – General Directorate of Environmental Management
- Ministry of Transport, Maritime Affairs and Communication
- General Directorate of Meteorology
- General Directorate of Forestry
- Turkish Statistical Institute
- National Greenhouse Gas Inventory Report 1990-2014, Annual Report for submission under the “United Nations Framework Convention on Climate Change”
- Greenhouse Gas Emission Inventory: 2014 Journal, Number: 21538, Date: 18 April 2016, TURKSTAT, 2016

C. WATER AND WASTEWATER MANAGEMENT

C. WATER AND WASTEWATER MANAGEMENT

Water is indispensable for drinking and potable use, irrigation, energy production and ecosystem. Due to remarkable growth in population for the past 20 years, demand for water sources increased correlatively. This situation called for a more planned, effective and efficient use of water resources. Water is not only crucial for maintaining ecosystem and human life but is also important due to its cleanness and quality.

C.1. Water Resources and Potential in Turkey

The total amount of water on earth is 1, 4 billion km^3. Although three fourths of the surface of the earth is covered with water, humanity still suffers from water problems. The reason behind this is that 97,5% of this water consists of oceans and seas as salt water. The remaining 2,5% is the total amount of fresh water on earth. Of all amount of water, fresh water has a small share and 68,7% of this is glaciers, 30,1% groundwater, 0,8% intrapermafrost water and only 0,4% is on the surface and in the atmosphere. The amount of water on the surface and in the atmosphere is stored in wetlands, rivers, plants, animals and in soil. According to the calculations, it can be concluded that the total amount of freshwater on earth is only 35,2 million km^3. 90% of this little amount is stored in the glaciers in poles and under the ground. Thus, it is easy to understand how little fresh water is accessible for human use.

Table 36 - Water resources potential in Turkey (SHW, 2015)

Average annual precipitation	646 mm/year
Surface area of Turkey	783.577 km^2
Annual Precipitation	501 billion m^3
Vaporization	274 billion m^3
Leakage under ground	41 billion m^3
Surface Waters	
Annual surface flow	158 billion m^3
Available surface water	98 billion m^3
Ground Waster	
Amount of annual usable water	14 billion m^3
Groundwater operational reserve	17,2 billion m^3
Total available water	112 billion m^3

The total amount of annual average precipitation in Turkey is 646 mm and it is equal to 501 billion m^3 water. 274 billion m^3 of this amount returns back to the atmosphere through vaporization from soil, water surfaces and plants, and 69 billion m^3 flows underground as underground water and 158 billion m^3 flows into the seas or lakes by means of rivers. 28 billion m^3 of the ground water (69 billion m^3) joins back to surface waters through springs. Besides this, another 7 billion m^3 water flows into Turkey annually from bordering countries. Thus, gross surface water potential of Turkey becomes 193 (158+28+7) billion m^3.

When the other 41 billion m^3 of water supplying groundwaters is taken into account, total renewable gross water potential of Turkey is 234 billion m^3. However, under the present technical and economic conditions, the amount of water that can be used for different purposes is 95 billion m^3 from domestic rivers and 3 billion m^3 from rivers flowing into Turkey from bordering countries. When combined with the ground water potential of 14 billion m^3, the total amount of usable surface and ground water potential in Turkey is 112 billion m^3.

Table 37 – Total water potential of Turkey (SHW, 2015)

Total Amount of Water		501 billion m^3
Leaving from water budget	Amount of vaporization	-274 billion m^3
	Amount of water flowing underground	-69 billion m^3
Flowing into water budget	Water coming from bordering countries	+7 billion m^3
	The amount of water coming out of the ground through springs	+28 billion m^3
Total Water Potential		**193 billion m^3**

Surface area of Turkey is 78 million hectares and agricultural activities are carried out on an area of 28 million hectares. According to the calculations by General Directorate of State Hydraulic Works (SHW) it is technically and economically possible to irrigate 8,5 million hectares of area. Today, 5,42 million hectares of this irrigable area is available for irrigation.

Table 38 - Falkenmark index (SHW, 2015)

Water (m^3/person/year)	Classification
1.700 and over	No Stress
1.700 – 1.000	Stress
1.000 - 500	Scarcity
500 and below	Absolute Scarcity

In 1989, Malin Falkenmark prepared an index, by taking the population and total amount of water resources into account and also considering the needs of the natural system, and emphasized the pressure of the population on water resources. The threshold values called as “Falkenmark Index” are often used to describe stress on water resources. According to this index, the minimum amount of daily domestic water demand per capita is 100 liters and it is 500-2.000 lt/day for agricultural and industrial activities. The threshold value has been determined as 1.700 m^3 per capita annually. It is stated in this index that if the water supply drops below this value, there will occur related water problems. When the supply drops below the value of 1.000 m^3, there will be water shortage and if this value drops below 500 m^3 the will be chronic water scarcity and serious water problems in the country.

Turkey is not a water-rich country and it is experiencing water stress in terms of the annual amount of water per capita. According to the calculations by SHW, Turkey has an annual water potential of 1.652 m^3 per capita. It is predicted that the population of Turkey will reach to 100 million in 2030 and the amount of water potential per capita will decrease to 1.120 m^3. Turkey will be among the countries suffering from water stress and will have to follow policies that will enable effective use of the resources.

Map 6 – Water basins in Turkey (SHW, 2014)

C.1.1. Surface Waters

Turkey is divided into 25 basins in line with their hydrologic properties. The total amount of average annual precipitation in the basins is 186 billion m^3. The biggest basin in Turkey, in terms of water potential and surface area, is Fırat - Dicle basin and it goes beyond the borders of Turkey. Other transboundry basins are, from north to south, Çoruh River Basin, Aras River Basin, Asi River Basin, and on the east Meriç River Basin. Above mentioned basins have an important role in Turkey's international relations as they are crossing the borders.

Table 39 - Average annual surface water potential of Turkey in terms of drainage areas, by basins, 2014 (SHW, 2016)

Basin name	Average annual flow (km^3)	Potential participation rate (%)	Average annual output(***) ($l/s/km^2$)
Fırat - Dicle(*)(**)	52,94	28,6	8,3 / 13,1
Eastern Black Sea	14,9	8,1	19,5
Eastern Mediterranean	11,07	6,0	15,6
Antalya	11,06	6,0	24,2
Western Black Sea	9,93	5,4	10,6
Western Mediterranean	8,93	4,8	12,4
Marmara	8,33	4,5	11
Seyhan	6,20	3,4	28
Ceyhan	7,76	4,2	12,02
Kızılırmak	6,48	3,5	2,6
Sakarya	6,40	3,5	3,6
Çoruh	6,30	3,4	10,1
Yeşilırmak	5,80	3,1	5,1
Susurluk	5,43	2,9	7,2
Aras	4,63	2,5	5,3
Konya Closed	4,52	2,4	2,5
Büyük Menderes	3,03	1,6	3,9
Lake Van	2,39	1,3	5
Northern Aegean	2,09	1,1	7,4
Gediz	1,95	1,1	3,6
Meriç - Ergene	1,33	0,7	2,9
Küçük Menderes	1,19	0,6	5,3
Asi	1,17	0,6	3,4
Burdur Lakes	0,50	0,3	1,8
Akarçay	0,49	0,3	1,9
TOTAL	**184,82**	**100,0**	

(*)Annual flow of the main tributary of Fırat River is 30,25 km^3 and annual flow of the basin is 31,63 km^3.

(**)Annual flow of the main tributary of Dicle River is 16,24 km^3 and annual flow of the basin is 21,33 km^3.

(***)These values were obtained from the base station flows at the lowest course of the basins.

C.1.2. Groundwaters

In order to ensure management of the amount and quality of groundwaters and meet the requirements of EU concerning groundwater management, the "By Law on the Protection of Groundwater Against Pollution and Degradation" entered into force after being published in the Official Gazette N. 28257 dated 07.04.2012. The By Law includes necessary principles on prevention of groundwater pollution and degradation, maintaining the present condition of the rivers that are in good condition and improving the gorundwaters that are not in poor condition.

Table 40 provides information on variation of groundwater potential in basins by years.

Table 40 - Annual groundwater potential by basins, 2013-2015 (SHW, 2016)

		2013		2014		2015	
Basin No	Basin Name	Groundwater input	Groundwater Management Reserve	Groundwater input	Groundwater Management Reserve	Groundwater input	Groundwater Management Reserve
01	Meriç - Ergene	507,7	498,2	507,7	498,2	507,7	498,2
02	Marmara	241,7	210,7	241,7	210,7	241,7	210,7
03	Susurluk	740,2	585,1	780,4	585,9	780,4	585,9
04	Northern Aegean	289,4	212,9	289,4	212,9	289,4	212,9
05	Gediz	555,0	248,0	555,0	248,0	1.155,9	866,9
06	Küçük Menderes	179,2	179,2	179,2	179,2	179,2	179,2
07	Büyük Menderes	1.045,4	761,5	1.045,4	761,5	1.045,4	761,5
08	Western Mediterranean	473,2	316,7	473,2	316,7	473,2	316,7
09	Antalya	1.093,3	526,3	1.093,3	526,3	1.164,7	576,3
10	Burdur Lakes	106,4	89,5	106,4	89,5	106,4	89,5
11	Akarçay	187,6	182,1	345,4	345,4	345,4	345,4
12	Sakarya	2.197,1	1.545,2	2.197,1	1.545,2	2.197,1	1.545,2
13	Western Black Sea	442,0	438,5	442,0	438,5	641,2	607,6
14	Yeşilırmak	907,2	872,8	907,2	872,8	907,2	872,8
15	Kızılırmak	2.003,1	1.762,9	2.003,1	1.762,9	2.003,1	1.762,9
16	Konya Closed	2.524,8	2.418,5	2.524,8	2.418,5	2.597,0	2.023,0
17	Eastern Mediterranean	96,5	70,5	96,5	70,5	96,5	70,5
18	Seyhan	838,8	749,9	838,8	749,9	838,8	749,9
19	Asi	393,2	289,5	393,2	289,5	393,2	289,5
20	Ceyhan	985,3	533,5	985,3	533,5	985,3	533,5
21	Fırat - Dicle	4.737,0	3.571,2	4.737,0	3.571,2	4.994,8	3.763,7
22	Eastern Black Sea	490,9	490,9	490,9	490,9	490,9	490,9
23	Çoruh	30,0	20,0	30,0	20,0	30,0	20,0
24	Aras	304,0	230,4	406,1	312,1	388,5	294,4
25	Lake Van	179,2	148,2	179,2	148,2	179,2	148,2
	TOTAL	**21.548,2**	**16.952,1**	**21.848,3**	**17.197,9**	**23.032,3**	**17.815,3**

C.1.3. Seas

C.1.3.1. Factors Affecting Marine Environment

The seas surrounding the three sides of Turkey serves for various social and commercial purposes such as transportation, fishery and tourism activities. On the other hand, as in the world, marine pollution and devastation of marine ecosystems are also among the major problems in Turkey, resulting from population growth, industrialization, over-hunting and maritime activities in coastal areas.

Major pollutive sources of marine environment are: domestic waste water, industrial waste water, oil and fuel leakages from petroleum ship and pipeline accidents, artificial or natural fertilizers and pesticides used in agricultural activities, thermal pollution resulting from using water especially in cooling thermal power plants, and wastes from radioactive processes that take place during power generation at nuclear power plants. Bioacumilative pollutants bioaccumulate especially in species and the pollutants pass increasingly from species to species in food chain. Such heavy metals as mercury, cadmium, lead and substances as pesticides can be included in this group.

80% of marine pollution results from land based activities and 20% from maritime activities.

1- Land based pollution sources
- Point source pollution; domestic waste, industrial waste, landfills
- Diffuse source pollution; soil and other pollutants (pesticides) that reach to the seas as a result of agricultural activities

2- Pollution sources from marine transportation
- Pollution from ships and other marine vehicles (fuel, oil, toxic liquids, waste water, garbage etc.)
- Pollution from marine accidents (as a result of the accidents, cargo and fuel may fall and pour into seas)

C.1.3.1.1. Pollution from Ships

Work on pollution from ships are continually carried out under the By Law on Waste Reception from Ships and Waste Control (Amended: 18.03.2010 – 27525 O.G.) and under the legislation in force that regulates management of waste from ships. The By Law was published under the Environmental Law N. 2872, the Directive on Port facilities for ship-generated waste and cargo residues (2000/59/EU) and International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) prepared by the International Maritime Organization (IMO) and acceded by Turkey in 1990.

Within this scope;
- While the number of licensed waste reception facilities in Turkey that receives wastes at ports was 18 in 2005, the number reached to 261 as 2015.
- Works on bringing the coastal facilities, which have been newly established and needs revision on their management plans, in accordance with the Legislation is carried out by Central Organization and Provincial Directorates of the Ministry of Environment and Urbanisation.
- Ship Waste Tracking System (SWTS) was put into use in all facilities over the country in 2011 and the wastes from ships are tracked online from source to disposal of the wastes. Thanks to this system, wastes from ships are tracked online practically and an effective waste management is ensured. Works on improving the system are still in progress.
- On the other hand, Blue Card system was put into use in Muğla in 2011 and in Antalya in 2012 in parallel with SWTS in order to provide an effective collection and management of the wastes from ships. As of the end of 2015, the system has been used in 40 of 41 private marinas and in 12 of 14 municipal marinas.

MAVİ KART
Atık Takip Sistemi

GATS
GEMİ ATIK TAKİP SİSTEMİ

- Another important factor to be considered in prevention of marine pollution is the Control of Illegal Discharges from Ships. In order to control illegal discharges from ships, authority has been delegated to the Ministry of Transport, Maritime Affairs and Communication, Coast Guard Command and Metropolitan Municipalities of İstanbul, Kocaeli, Antalya and Mersin by the Ministry of Environment and Urbanisation. The developments concerning the control of illegal discharges from ships are followed closely.

C.1.3.1.2. Marine Litter Management

The problem of marine litter started to be handled over the world in recent years. Within the scope of the Environmental Law N. 2872 and relevant legislation, principles on prevention of solid wastes from land and ships from entering into marine area have been settled and related works within this frame are carried out by the Ministry of Environment and Urbanisation.

The Ministry have been working on preparing action plans against reducing marine litter in coastal and marine areas in the country by paying regard to our responsibilities stated in Barcelona and Bucharest Conventions, and legislations on regulating awareness raising and coastal cleaning etc. activities. Besides this, another important factor in combatting with marine litter is organizing activities in order for raising the awareness of society. A legislation draft on “Marine Litter” concerning awareness raising, action planning, cleaning works is underway.

Moreover, awareness raising activities are also important in combatting with marine litter. None—governmental organizations have been organizing various marine and coastal cleaning activities and related works in cooperation with different international organizations in order to raise awareness within the scope of combatting with marine litter. The Ministry of Environment and Urbanisation also provides support for these activities and works.

A project for Preparing Strategic Action Plan against Marine Litter and Implementation of Pilot Program that was included in Investment Plan of 2013 was conducted by the Ministry of Environment and Urbanisation. The project started on 19 August 2013 and completed at the end of 2013.

Within the project;

- A road map concerning meeting the liabilities imposed by international By Laws, regional conventions acceded by Turkey and EU legal acquis was determined,
- Some proposals on prevention of marine and coastal pollution from solid wastes were brought forward and principles for Strategic Action Plan (SAP) were settled,
- Strategic Action Plan (SAP) principles for the control of solid marine wastes were settled and a SAP was prepared for İstanbul province.
- It is planned to complete SAPs for all 28 coastal provinces until the end of 2017.

C.1.3.1.3. Sea Bottom Dredging Activities

Dredging activities and works on disposing the dredge material into marine area in Turkey are carried out within the scope of Barcelona and Bucharest Impact Protocols that were designed under London Protocol prepared by International Maritime Organization (IMO).

Draft By Law on Marine and Coastal Dredging and Management of Dredge Material was prepared in order to set the procedures and principles regarding management of dredge materials obtained from marine and coastal dredging, river mouth dredging, excavation and construction activities, in line with the principles of sustainable use, to prevent possible harmful effects of the material on the environment and human health. Draft legislation is developed by considering the recommendations from different institutions and organizations.

The legislation will deal with the topics of; determining the dredge material disposal sites in our territorial waters, setting the quality standards regarding pollutive parameters of dredge material, preparing the necessary licenses for disposal of dredge materials into disposal sites, and monitoring and inspection of disposal sites in terms of pollution load.

On the other hand, in order to contribute to the process of preparing the “Draft By Law on Marine and Coastal Dredging and Management of Dredge Material”, the Ministry started a three-year project titled “Project for Sea Bottom Dredging Activities and Environmental Management of Dredge Material” on 07/11/2013 with the help of TUBITAK (Scientific and Technological Research Council of Turkey) Program for Supporting Research and Development Activities of Public Enterprises.

The project will include principles on;

- identifying the features of dredge material disposal sites in our territorial waters,
- the quality standards regarding pollutive parameters of dredge material,
- preparing the necessary licenses for disposal of dredge materials into disposal sites,
- monitoring and inspection of disposal sites in terms of pollution load

and it is also aimed with this project to meet the necessities to develop the present draft by law.

The project is still under progress. Within the scope of the project, convenient disposal sites in our seas have been identified and recommendations from other institutions are being received.

C.1.3.1.4. Risk Management and Emergency Action Towards Pollution From Marine Accidents

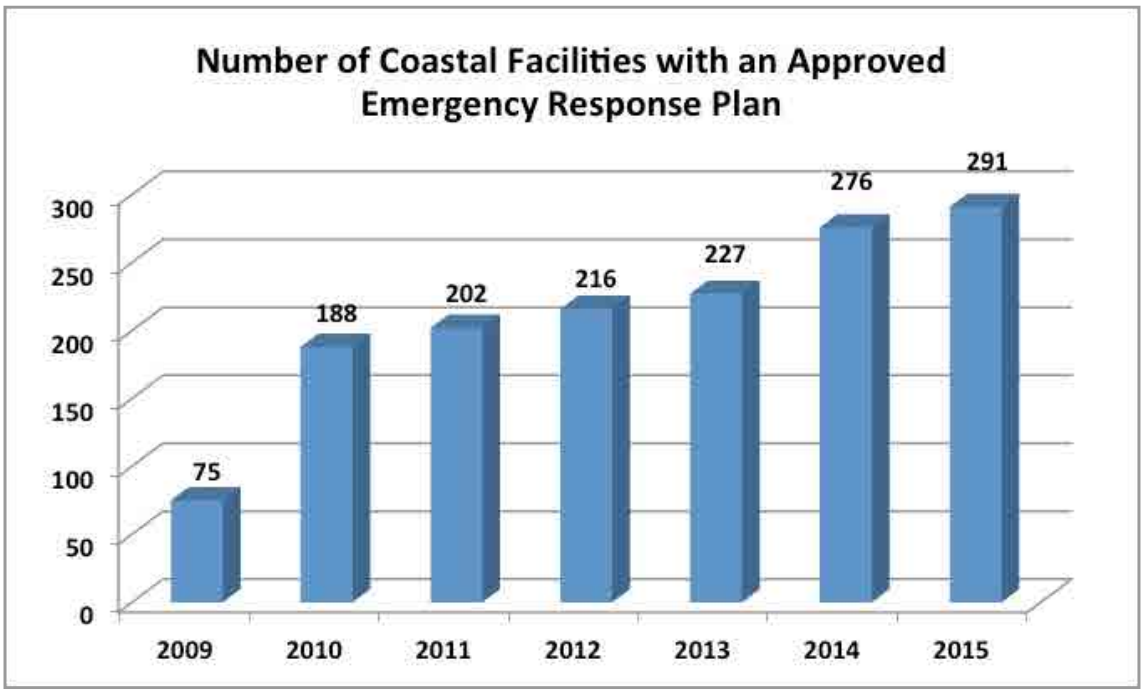
Seas around Turkey are regarded as sensitive areas within the scope of MARPOL convention due to their fruitfulness, economic value, ecological and biological structures. Marine pollution from petroleum and other toxic substances poses a great danger for Turkey as seas are strategically important for Turkey due to its long coastlines, straits and intense traffic on these seas. Furthermore, due to adverse weather conditions especially in winter months, there happens some major and minor marine accidents and pollutions. It is of great importance for the countries with a coastline and a risky line of petroleum refineries and terminals to be prepared for a possible oil pollution, make necessary planning and set the necessary policies and to be prepared in terms of technical staff and equipment. It is required to make possible pollution plans beforehand for risk priority areas of oil pollution.

Within the scope of being prepared for pollutions from marine accidents, response and legal responsibilities, Turkey became a party to the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC 1990) and its Annexes prepared by the International Maritime Organization with a decree published in the Official Gazette N. 25233 dated 18.09.2003. Also, the Decision on Acceding to the 2001 International Convention on Civil Liability for Bunker Oil Pollution Damage entered in force after being published in the Official Gazette No. 25233 dated 18.09.2003. These conventions have provided a basis for national By Laws.

“The Law Pertaining to Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Harmful Substances No. 5312” was published in 2005. The Law designates the procedures and principles regarding responsibilities and authority of the institutions, works and processes to be done, preparedness, response and damage assessment and compensation for damages.

Within the scope of the law, an emergency response system was established and national and regional emergency response plans went in effect in 2012. 6 regions including all the coastal areas of Turkey were identified and 28 provinces in these regions have been made ready for emergency response. Works on improving and updating the plans are in progress.

Within the scope of being prepared for accidents, Project for Establishing Emergency Response Centers was conducted by the Ministry of Transport, Maritime Affairs and Communications in cooperation with TÜBİTAK MAM between 2006-2009. Places of emergency response centers and stations were determined within the project through evaluation of risk maps, environmental sensitivity maps and aerial photographs, and it was decided to establish 1 National Center (National Center for Marine Safety and Emergency Response – Tekirdağ), 1 Regional Center (Regional Emergency Response Center – Antalya) and 16 Equipment Storage Stations. Tender processes for establishing the centers and stations started in 2010 and completed. It is expected that these centers and stations will be delivered in 2016.



Graph 12– Number of Coastal Facilities with an Approved Emergency Response Plan in Turkey (Ministry of Environment and Urbanisation, 2016)

When the Project for Establishing Emergency Response Centers is completed, a system of emergency response to pollution of marine environment by oil and other harmful substances will have been established for Turkey and possible environmental harms will be minimized. Additionally, thanks to the system that ensure maximum benefit from international compensation funds acceded by Turkey against possible risks, use of national budged and resources will be minimized.

Moreover, the Ministry of Environment and Urbanisation also ensured preparation of risk assessment and emergency response plans for coastal facilities operating within the scope of the Law in a way to integrate these plans into national and regional plans. In the first stage, high-risk coastal facilities were identified and approval process of their emergency response plans were completed. In the second stage, medium-risk coastal facilities were determined, but the process for approval of their emergency response plans still continues. As it can be seen on Graph 12, the number of coastal facilities with an approved emergency response plan reached 291 as of the end of 2015.

“The Communique on Selection of Companies/Institutions/Organizations that can provide Emergency Response Services for Pollution of Marine Environment by Oil and Other Harmful Substances” was prepared under the coordinationship of the Ministry of Transport, Maritime Affairs and Communications in cooperation with the Ministry of Environment and Urbanisation and 11 companies/institutions/organizations have been authorized within the scope of the communique. Coastal facilities can fulfill the equipment, material and personnel requirements of their approved emergency response plans and they can also apply service procurement.

Also, nationally and internationally recognized trainings and drills are organized in coastal facilities that own an approved plan. In this way, the national capacity for being prepared for pollution of marine environment by oil and other harmful substances has improved.

C.1.3.2. Environment-Friendly Programs for Seas

C.1.3.2.1. Blue Flag and Bathing Water Program

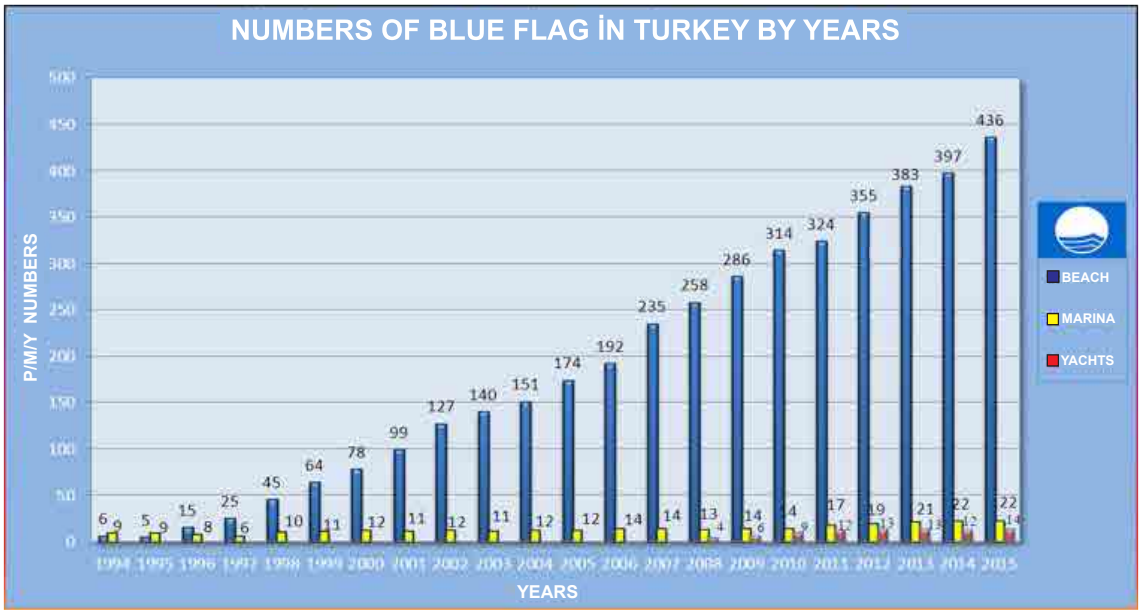
Blue Flag is an international environmental award granted to qualified beaches, marinas and yachts that meet the necessary standards. Blue Flag applications, which started in Europe in 1987 and in Turkey in 1993 under the leadership of abrogated Ministry of Tourism, aims to establish high standards at beaches and marinas.

In the process of obtaining a Blue Flag, beaches are assessed according to 33 criteria and marinas according to 25 criteria by the international Foundation for Environmental Education (FEE), parallel with the developing awareness of conservation of the environment in the world. When the places that meet the necessary requirements are identified, they are granted with Blue Flag for a year with the approval of both national and international juries.

Blue Flag Program plays an important role in protecting the coastal areas, developing environmental awareness and tourism marketing. Although it is an environmental award, it is especially important for tourism sector as it is internationally recognized and it is related to the coastal areas.

As can be seen on Graph 13, the number of Blue Flags in Turkey increased consistently between 1994 – 2015 and reached to 436 beaches, 22 marinas and 14 yachts with Blue Flag in 2015.

As of 2015, Turkey was the second country after Spain (578) among the 50 FEE countries in terms of the number of beaches with Blue Flag. It ranked the 7th in terms of marinas with Blue Flag.



Graph 13– Number of Blue Flags in Turkey By Years (Ministry of Culture and Tourism, 2016)

Turkey has shot ahead of many leading countries in world tourism since it focuses on becoming a nationally and internationally "well known country" and due to achieving a quality tourism through environment, resources and nature protection approaches. It is aimed to maintain this outstanding success of our country through environmental policies ımplemented by the Ministry of Culture and Tourism.

Furthermore, works carried out by the Ministry of Culture and Tourism includes: declaration of Culture and Tourism Conservation and Development Zones and Tourism Centers under the Law No. 2634 on Encouragement of Tourism; identifying, technical infrastructure requirements for tourism sector; making plans for them and preparing survey projects for implementation; apply these projects or getting them implemented; evaluating project and funding demands under technical assistance from local

administrations (Municipality, Special Provincial Administrations, local administrative unions) and Investment Monitoring and Coordination Directorates.

Within this context, it is expected that number of Blue Flags may increase as a result of infrastructure works towards improving bathing water quality.

Turkey has become the Second in the world in terms of Blue Flag beaches in 2015 and Blue Flag program has made a huge contribution to Turkey's place in world tourism. The increase in the number of Blue Flags in the future will show how much importance is given to environmental protection by Turkey and this will also contribute to future success of Turkey in world tourism.

The Environmental Law No. 2872 and alignment with the Council Directive 76/160/EU within the process of harmonization with EU entered in force after being published in the Official Gazette No. 26048 dated 09.01.2006. The aim of the By Law on Bathing Water Quality is to determine quality of waters that are used for swimming and recreational purposes and prevent pollution of these waters especially by microbiological pollutants with a view to protecting environmental and human health.

Within this scope, analysis were carried out on samples taken from 1.112 different sampling points in order to monitor bathing water quality. 1.089 of these points were in compliance with the By Law.

Turkey became the second in 2015 among the 50 countries applying Blue Flag program with its 426 award-winning beaches. Spain came the second with its 578 beaches. İn addition to beaches, 22 marinas and 14 yachts of Turkey were granted with Blue Flags in 2015.

The Ministry of Environment and Urbanisation and local administrations carry out various activities and projects in order to protect marine environment in Turkey. Some of these works include:

- Wastewater treatment plant investments that are implemented by local administrations and also supported financially and technically by the Ministry of Environment and Urbanisation,
- Waste reception facilities established in ports and other coastal facilities under the environmental legislation,
- The " Determination of Bathing Water Profiles in Turkish Coastal Beaches" conducted by the Ministry of Environment and Urbanisation,
- Inspections on pollution sources determined according to profiles.

Thanks to these works and infrastructure investments, it is aimed to increase the number of Blue Flags in our country and to be the first in the world in terms of the number of Blue Flags in 2023.

C.1.3.2.2. Green Star Program

As a part of sustainable tourism, since 1993, the Ministry of Culture and Tourism has awarded accommodation facilities with an Environment-Friendly Accommodation Facility (Green Star) with a view to protect the environment, raise environmental awareness, and encourage tourism facilities to make positive contributions in environmental protection. This certification service is provided upon demand from touristic facilities that meet the necessary requirements.

Environmental measures are getting more and more important in Turkey. Thus, categorization form for environmental friendly accommodation facilities have been improved and developed and published in the Official Gazette N. 27005 dated 22.09.2008 as an annex of the " Communique for the Certification of Environment-friendly Tourism Establishments,"

The communique includes; principles on reducing wastes and consumption of energy, water and environmentally hazardous substances, encouraging the use of renewable energy resources, planning and operating accommodation facilities in an environmental friendly way beginning from the investment stage, adaptation of the facilities to the environment, landscaping activities, ecological structure, environmental awareness raising, providing trainings and cooperating with relevant institutions and organizations.

With the Decree of the Council of Ministers numbered 2013/5265, published in the Official Gazette N. 28757 dated 06.09.2013, it was decided to meet some of the electricity expenses of the facilities, which have an Environmentally Sensitive Accommodation Facility Certificate from the Ministry of Culture and Tourism, from the budged of the Ministry of Culture and Tourism.

Table 41 – Number of Facilities with Green Star Certificate (Ministry of Culture and Tourism, 2016)

YEARS	Number of Facilities
2011	20
2012	28
2013	48
2014	188
2014	294

Aim;

- Protecting the environment,
- Raising environmental awareness,
- Encouraging touristic accommodation facilities towards environment friendly activities and structuring.

Environmental awareness campaign includes;

- Saving water,
- Increasing energy efficiency,
- Reducing wastes and reducing consumption of environmentally hazardous substances,
- Encouraging the use of renewable energy resources,
- Planning the accommodation facilities in an environmental friendly way beginning from the investment stage,
- Adaptation of the facilities to the environment, landscaping activities, ecological structure,
- Environmental awareness raising, providing trainings and cooperating with relevant institutions and organizations,
- Experiences of the Ministry of Culture and Tourism on this matter since 1993, comments of relevant organizations and institutions and the EU criteria (Eco-label) on this topic.

C.1.3.3. Legally Protected Marine Areas

The United Nations Environment Programme (UNEP) decision to place the protection of the Mediterranean Sea among its priority actions resulted in the establishment of the Mediterranean Action Plan (MAP) in 1975 involving the countries bordering the Mediterranean Sea as well as the European Union. In order to give the actions carried out under the MAP a legal foundation, “The Convention for Protection of the Mediterranean Sea against Pollution” (Barcelona Convention) was opened for signature on 16 February 1976 in Barcelona. The Barcelona Convention was revised in 1995 to include coastal areas as well as the marine environment and the revised Convention was renamed as “The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean” which entered into force on 9 June 2004. Turkey has become a party to the revised

Convention in 2002 with a Decree of the Council of Ministers. An additional protocol of this Convention, “Protocol Concerning Specially Protected Areas in the Mediterranean” was revised and renamed as “Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean”.

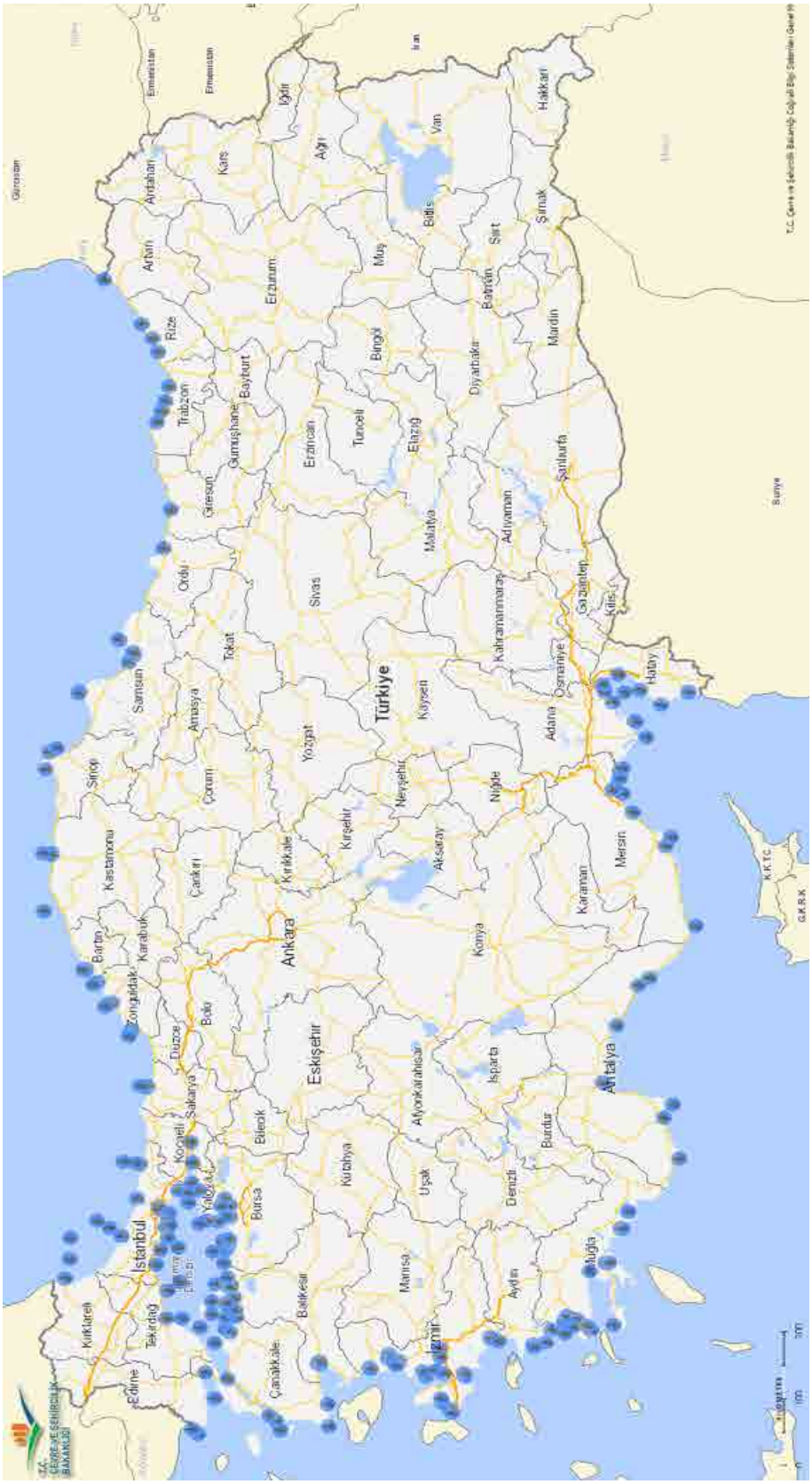
Within this frame, the following areas were declared as Specially Protected Environment Areas and they are legally protected marine areas. Detailed information on these areas can be found in the chapter F.3.1. Specially Protected Environment Areas.

- Belek Specially Protected Environment Area
- Datça- Bozburun Specially Protected Environment Area
- Foça Specially Protected Environment Area
- Gökova Specially Protected Environment Area
- Fethiye- Göcek Specially Protected Environment Area
- Kaş- Kekova Specially Protected Environment Area
- Göksu Deltası Specially Protected Environment Area
- Köyceğiz- Dalyan Specially Protected Environment Area
- Saros Bay Specially Protected Environment Area
- Patara Specially Protected Environment Area
- Finike Seamounts Specially Protected Environment Area

C.1.3.4. Integrated Marine Pollution Monitoring Activities

Seas in our country is exposed to pollution due to Urbanisation, tourism activities, increasing industrial facilities and their discharge, maritime transportation and industrial and domestic wastes carried by surface waters from inland areas. In order to bring pollution under control and take necessary measures, pollution state of the seas, pollution changes in time and pollution sources should be identified and seas should be monitored in terms of pollutants.

In this context, the countries with coasts have developed joint research programs and signed conventions starting from 1970s in an attempt to determine necessary policies, strategies and steps to be taken towards prevention of marine pollution. The first joint initiative for Mediterranean countries was the Barcelona Convention and application of the International Programme for the Assessment and Control of Marine Pollution in the Mediterranean (MEDPOL) was accepted. Similar works have been carried out by the countries which have coasts on Black Sea and Black Sea Strategic Action Plan was prepared. Black Sea Integrated Monitoring and Assessment Programme (BSIMAP) was prepared. Within the frame of these programs, the parties became obliged to prepare pollution monitoring programs at national/international level. It is aimed through these monitoring programs to identify changes in coastal water quality that is effected differently from land-based pollutants, to assess the risks of human induced pollution on marine ecosystem and to assess the socio-economic effects of pollution. Especially in Black Sea and Marmara, the eutrophication by land-based pollution increasing after 1970s caused irreversible ecological changes in these seas. Similar eutrophic conditions started to be observed in 1970s especially in Adriatic, Aegean and Baltic Seas. In this context, attempts to monitor coasts and marine areas in an integrated and regular way gained momentum and in 2000s ecosystem based management approach and integrated monitoring approach was adopted through EU Water Framework Directive (WFD) and Marine Strategy Framework Directive (MSFD).



Map 7 - Integrated pollution monitoring points in seas (Ministry of Environment and Urbanisation, 2016)

In this regard, marine monitoring activities carried out in our country were incorporated with an integrated and ecosystem based approach in 2011. Marine monitoring activities have been carried out under the name of "Integrated Marine Pollution Monitoring Activities" since 2011. Thanks to these activities, it is aimed to provide a basis for determining strategies for national marine and coastal management by monitoring the pollution in all marine areas. Detailed reports on findings are prepared at the end of these activities.

Thanks to integrated monitoring activities, pollution state in seas is determined, sensitive, less sensitive and grey areas are reassessed according to the By Law on Urban Waste Water Treatment and situation assessment is carried out with the help of trend analysis and data on river load. In biological monitoring stage, areas with high risk of algae phytoplankton bloom and mucilage formation are identified and new and foreign species in trawl areas are monitored. Pollution maps are prepared according to the results of researches and quality indexes. As of 2013, monitoring activities also focused on microplastic which is the 10th environmental state indicator included in Marine Strategy Framework Directive (MSFD). As there is no international standard for sampling and analysis in microplastic monitoring, research based monitoring activities are carried out at 9 points in our seas. Also, marine radioactivity monitoring activities started in Turkey in 2014.

Integrated Marine Pollution Monitoring activities for 2014-2016 period are carried out by the Ministry of Environment and Urbanisation in collaboration with The Scientific and Technological Research Council of Turkey- Marmara Research Center (TUBITAK-MAM). Detailed reports on chemical and ecological conditions of seas are prepared with 6 universities, Turkish Atomic Energy Authority and many experts as well as TUBITAK-MAM and while preparing the report, chemical and biological parameters are monitored on marine waters, sea bottom and fish and mussel tissues.

As can be seen on Map 8, within this activity, coastal waters, transitional waters and marine waters are monitored at 79 stations Black Sea, 66 stations in Mediterranean, 65 stations in Aegean Sea and 59 stations in Marmara and Straits in terms of sediments, biodata, physicochemistry, chemistry and biology.

Integrated pollution monitoring activities involve physicochemical, chemical and biological monitoring on marine water, sediment and biodata matrixes. Related to these matrixes, the following activities are implemented in marine, coastal and transitional waters:

- Temperature, conductivity (salinity), light transmittance (secchi disk depth), dissolved oxygen and oxygen saturation, total phosphorus (TP) and dissolved organic phosphorus (DIP/PO4-P), total dissolved inorganic nitrogen (DIN) [(NO_3 + NO_2 +NH_4)], silicate and chlorophyll-a parameters are measured,
- Microplastic researchers are carried out,
- Risk of marine eutrophication is measured by measuring TRIX Index.
- Radioactivity researches are conducted in Black Sea and Mediterranean,
- Coastal water monitoring results are interpreted according to the By Law on Urban Waste Water Treatment (BLUWWT) and maps of sensitive, less sensitive and grey areas are prepared,

- Biological parameters, phytoplankton, macroflora, benthic, and biodiversity and abundance of demersal fishery, which affects ecological condition, are monitored,
- Monitoring activities of metal, total organic carbon and total organic nitrogen, polycyclic aromatic compounds (PAH), halogenated hydrocarbons (PCB), pesticides and microplastic in sediment are implemented and pollution trends are identified by analysing the trends,
- Heavy metals and organic pollutants are monitored on the red mullets (Mullus barbatus) and mussels (Mytilus galloprovincialis) which are accepted as bio-indicators of marine pollution as biota species in coastal areas. The results are evaluated according to national and international criteria such as Turkish Food Codex and FAO standards.
- Ecological Condition and Chemical Condition are determined according to WFD.
- Current condition is determined with regard to MSFD.

Integrated Marine Pollution Monitoring activities were carried out only in summer period in 2014 and the following observations were made:

- It was observed that 6 bodies of water in Southern Aegean in Aegean Sea were in good/very good condition and some areas in Güllük Gulf and Büyük Menderes river mouth were in average quality. There wasn't observed any problematic areas in these analysis areas in terms of pollutants. However, 7 bodies of water in Middle Aegean coast showed various ecological conditions. Ecological quality of the interior part of Izmir Gulf was rated as "bad", ecological quality of exterior part of the gulf and Çeşme area was rated as "good", and ecological quality of Küçük Menderes impact area and Aliağa area were rated as "average". Ecological quality of the areas outside these places were generally evaluated as average/good. It is possible to mention about metal pollution in sediment in Bakırçay, Aliağa and interior of Izmir Gulf. Also it was detected that, in some other areas, levels of some metals were over the effects range-low (ERL). Levels of polycyclic aromatic compounds were much higher in Izmir Gulf interior and Aliağa than all other stations and seas. Ecological conditions of 3 bodies of water in Northern Aegean Coast are variable. According to the measurements in 2014, the condition was generally "poor" in these water management units. The same evaluation is valid for Meriç impact area but the condition of Saros is "good".

Other water management units are generally in "good" condition. But, southern part of Bozcaada is in "average" quality. Metal pollution in sediment is present in Meriç impact area. However, levels of metals such as mercury, cadmium and zinc are measured below the effects range-low (ERL).

All marine waters and mostly coastal waters also showed oligotrophic features, but high levels of food substance and chlorophyll concentration was observed in gulfs, bays and river impact areas. Remarkable variances were observed between open sea and coastal area stations in terms of the levels of phytoplankton, abundance and biomass. Numbers of both species and individual were much lower at open sea stations than coastal stations. The richest station in terms of macroalgal species diversity was Dikili followed by Saros Gulf, Yeniköy and Didim. The lowest level of macroflora was in Izmir Gulf that was in "bad" ecological condition.

Toxic heavy metal contents of fish samples were compared, and when levels of some heavy metals (Cd, Pb and Hg) were evaluated according to Turkish Food Codex (TFC) in terms of human consumption; it was observed that levels average mercury content of large size fishes from Saroz, Ildır and Gökova and levels of cadmium content of large size fishes from Dikili were over the threshold value. Lead content of fishes from Aegean Sea were below the threshold value. It was determined that total PCB values of biodata samples from 5 stations in Aegean Sea were below the maximum limit (75 ng/g wet weight).

- Coastal waters in Mediterranean Sea are oligotrophic (very good) and generally mesotrophic (good water quality). However, a trend from mesotrophic condition to oligotrophic condition was observed in the shallow coastal waters between Mersin provincial waste water discharge area and delta of Seyhan River on the eastern side of Mersin Gulf, due to land-based influx into the coastal waters. In this area, which doesn't have much connection with open waters, light transmittance was low (SSD<5m), biomass and nutrient concentrations were high. It is observable that, especially in İskenderun and interior gulf of Antalya, urban waste water and ground waters affects coastal waters. According to the Concentration Factor (CF) calculated in Mediterranean by using heavy metal and aluminium levels in coastal sediments, no significant land-based sediment transport the may lead to metal concentration in the monitored area was detected. Total mercury accumulation in multiple sediment samples from Göksu delta was higher than other coastal sediment results. No remarkable variation was observed in analysis of the trends of other metals.

- In Black Sea, ecological condition of 3 coastal bodies of water was described as average/poor, and only Şile area was described as in good quality. Especially Sakarya action radius and Zonguldak region is under intense land-based pressure. The sediments analyzed in terms of PAH and metals are below ERL values, but in İğneada area, levels of DDT and its derivatives are over the ERL limits. Of the 3 water management units in Central- Western Black Sea, 2 is in average/poor ecological condition and the easternmost one is in "good" condition. According to the analyses, sediments in Zonguldak region and nearby areas are highly polluted by all groups of pollutants and compounds and the area showed a bad chemical condition. Sinop region was identified as in very good condition in terms of ecological quality; however, remarkable sediment pollution is present in west part of Sinop Cape. In Kızılırmak-Yeşilırmak impact area, ecological conditions of Kızılırmak impact area was identified as "average", Samsun port and its nearby as "bad" and Yeşilırmak impact area as "poor". Sediments in Samsun area, which is under domestic waste discharge, was determined to be polluted by DDT and its derivatives. Ecological condition of 6 bodies of water in Eastern Black Sea was determined as average-poor. Although conditions of most analyzed benthos stations were good, qualities of water management units were identified as low according to WFD ecological condition assessment principles. This condition is due to low quality of chlorophyll (phytoplankton) and macro algae indicators and reflects the direct effect of eutrophication.

All bodies of water (except a few local areas) are in oligotrophic condition according to TRIX evaluation. The results of the analyses carried out in terms of biodata pollutants showed that, when levels of heavy metals (Cd, Pb and Hg) are compared to the threshold values of Turkish Food Codex, cadmium content of the mussels from Şile region is over the threshold values(1,0 mg/kg). Level of the lead content in large sized fishes from Sinop is (0,30 mg/kg) over the limits and it was near the limits for the small sized fished from Ordu. Cadmium and mercury content of the fishes from both regions is (0,05 mg/kg and 1,0 mg/kg) below the threshold values. PBC levels of all biodata samples from Black Sea are below the threshold values (75 ng/g wet weight) of Turkish Food Codex.

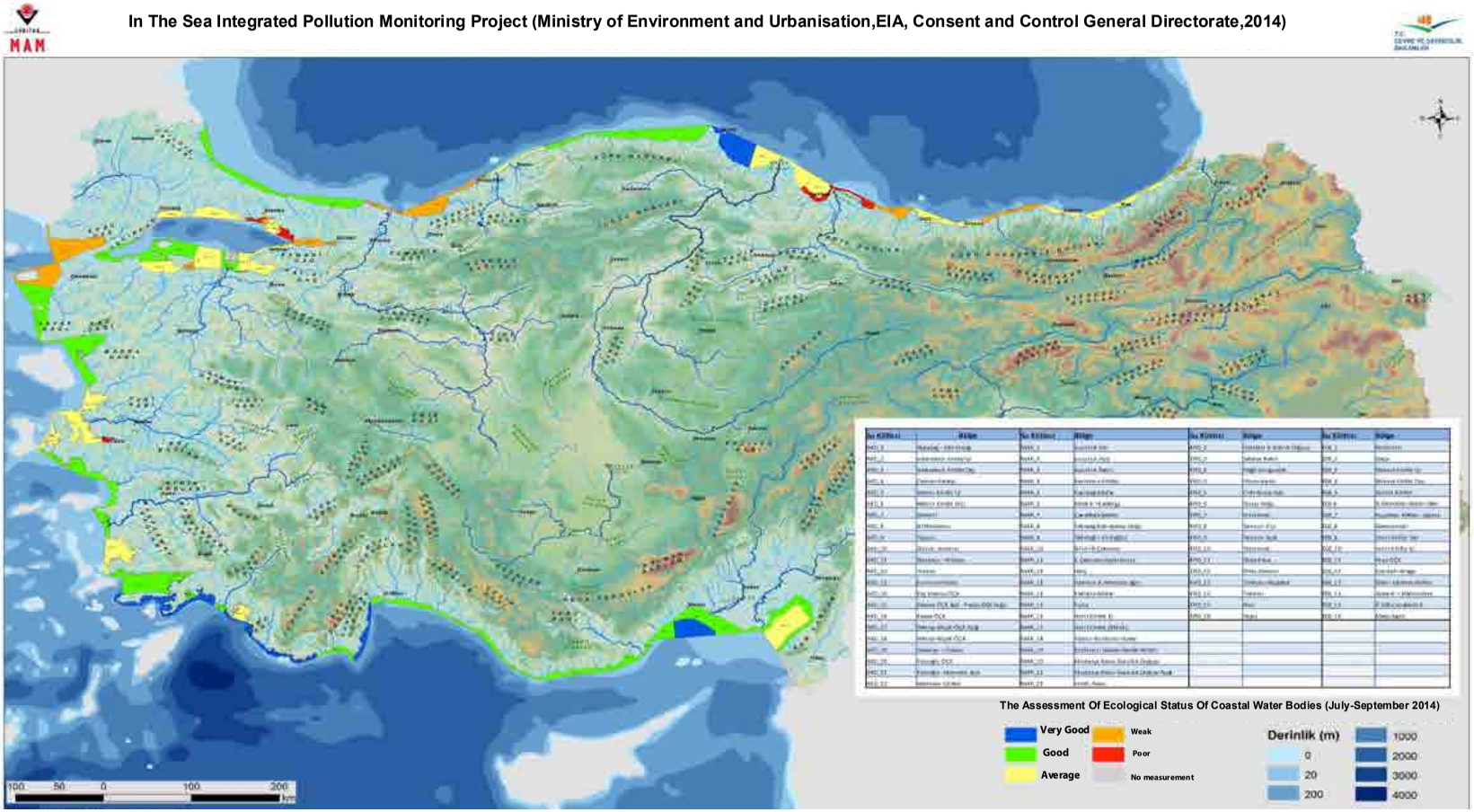
- Sea of Marmara showed average and good ecological qualities according to the TRIX index data and only Gönen Creek impact area was identified under "bad" condition (eutrophic). It was observed that the amount of phytoplankton was relatively low in August and there wasn't a considerable change in species composition. Eutrophia and hypertrophy were observed in terms of TN and TP, but oligotrophic conditions were present in terms of chlorophyll-a and SD. This is due to low levels of chlorophyll on the surface of the Sea of Marmara in summer season and the low levels of planktonic activities. The eutrophic and hypertrophic condition in terms of total nitrogen and phosphorous indicates high levels of land-based influx. When the gulfs on the Sea of Marmara are classified according the By Law on Surface Water Quality

Management (SWQMR), the transitional water in Gulf of Erdek (GD 1 station), Gulf of Bandırma and interior gulf of İzmit are in hyper/trophic condition and Gulf of Gemlik, central and exterior gulfs of İzmit and other regions of Gulf of Erdek are in mesotrophic condition. Levels of some heavy metals (Cd, Pb and Hg) were compared to the threshold values of Turkish Food Codex in order to evaluate the biodata analysis results in terms of human consumption. According to this comparison, cadmium (Beykoz and Erdek) and lead (Pendik and Beykoz) content of mussels from the Sea of Marmara was over the threshold values and mercury content was below the limit value. When compared to the mussels from Şile region, cadmium content of the mussels from Marmara was lower and chrome, copper and lead contents were higher than the samples from Şile. Arsenic content of the samples from both region is similar. According to the biodata samples collected from 5 stations on the Sea of Marmara, total PCB levels were under the limit value (75 ng/g wet weight).

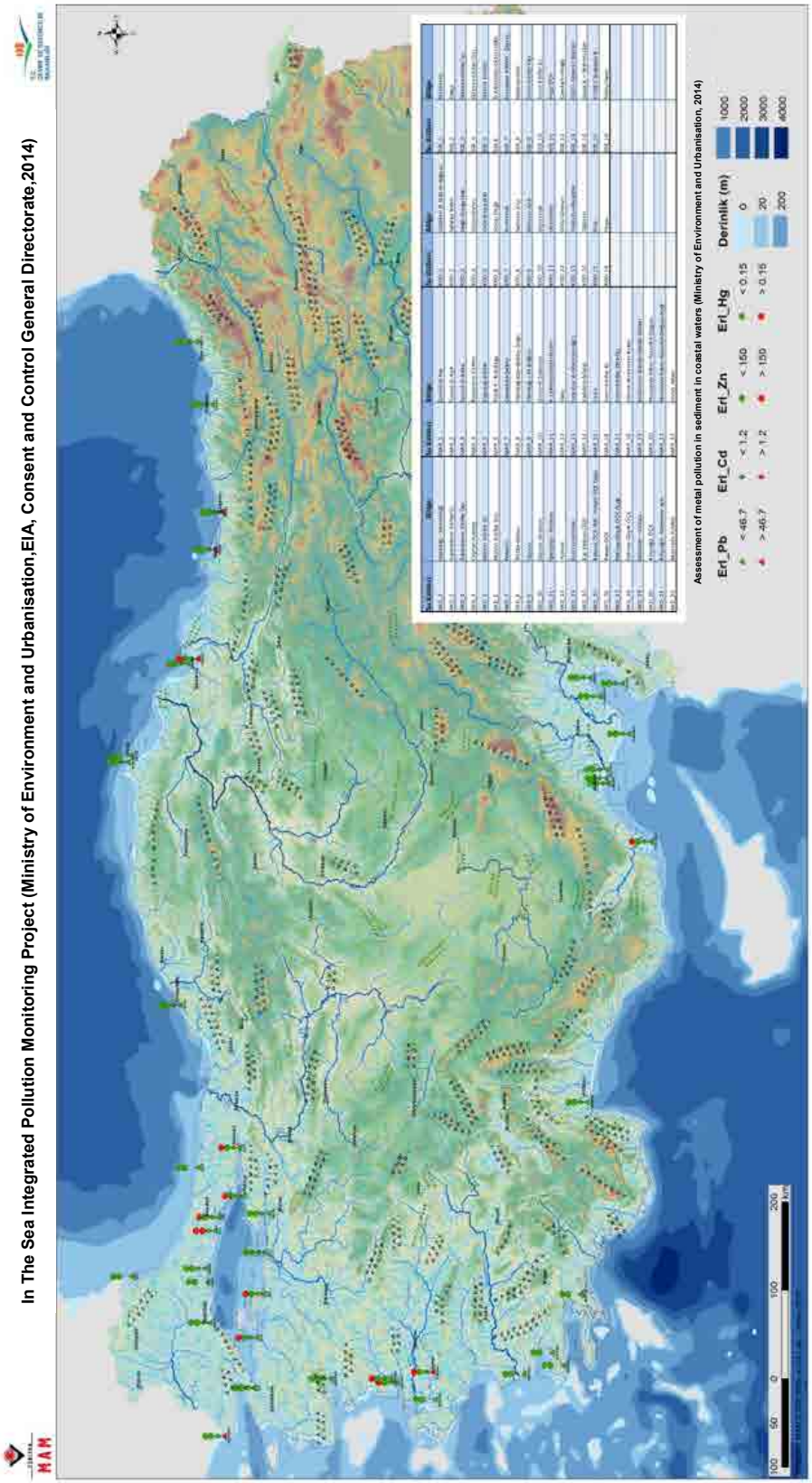
Monitoring results of the ecological assessment of Turkey's seas and coasts according to WFD are provided on Map 8 and chemical assessment results are provided on Map 9 and Map 10. The areas of bad condition according to ecological condition assessment are: Samsun coast, Yeşilırmak, interior gulf of İzmir, Küçükçekmece-Zeytinburnu and Tuzla regions. Western Sinop, Bozburun, Datça, Köyceğiz, Marmaris, Patara, Fethiye, Kaş, Kekova, Kemer and exterior gulf of Mersin are in very good ecological condition.

When our coasts are compared in terms of macro algae, Sinop, Gulf of Saros, Yeniköy, Didim, Bodrum, Datça, Kaş, Anamur and Taşucu regions are in good/very good ecological condition.

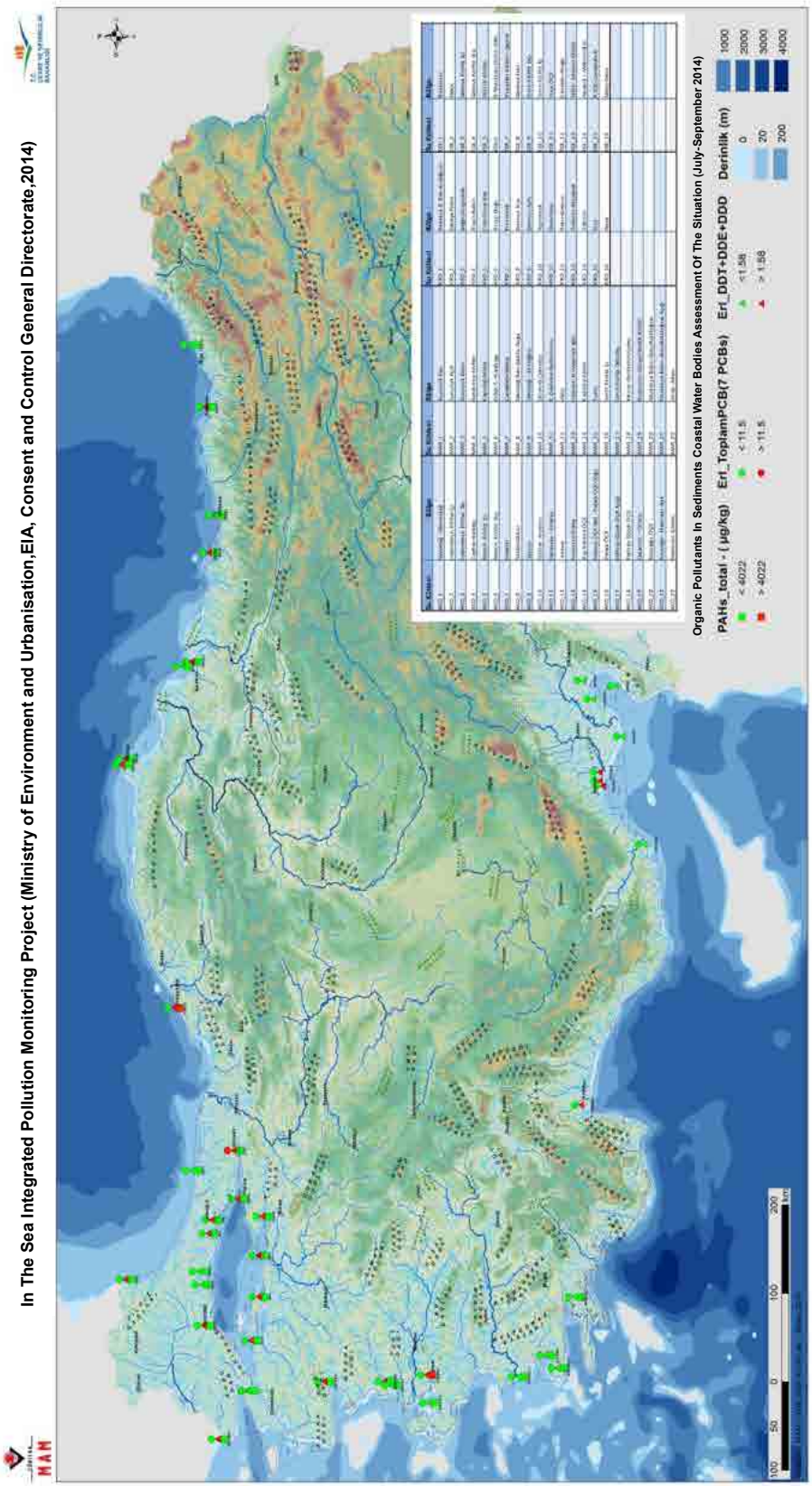
When total petroleum hydrocarbon content of the sediment samples were compared, the samples from Black Sea showed the highest levels. When Zonguldak, which has the highest level due to coal mining in the area, is excluded, average values of Black Sea are much lower than the average levels of Marmara and Aegean Sea. When concentration levels of polyaromatic hydrocarbon compounds were analyzed in Black Sea, Sea of Marmara, Agean Sea and Mediterranean Sea, Black Sea, Sea of Marmara, Agean Sea showed levels below the limit values, and no concentration was detected in Mediterranean Sea. When the values of Black Sea is analyzed, the effect of coal mines in Zonguldak and its neighborhood on PAH compounds can be seen easily. When metal enrichment factors are compared, the areas of high metal content (>10) in sediment are Black Sea, Aegean Sea and Sea of Marmara in terms of lead content, Aegean Sea and Black Sea in terms of arsenic content and Sea of Marmara in terms of mercury content.



Map 8 - Ecological state Assessment of Coastal waters (Ministry of Environment and Urbanisation, 2014)



Map 9 - Assessment of metal pollution in sediment in coastal waters (Ministry of Environment and Urbanisation, 2014)



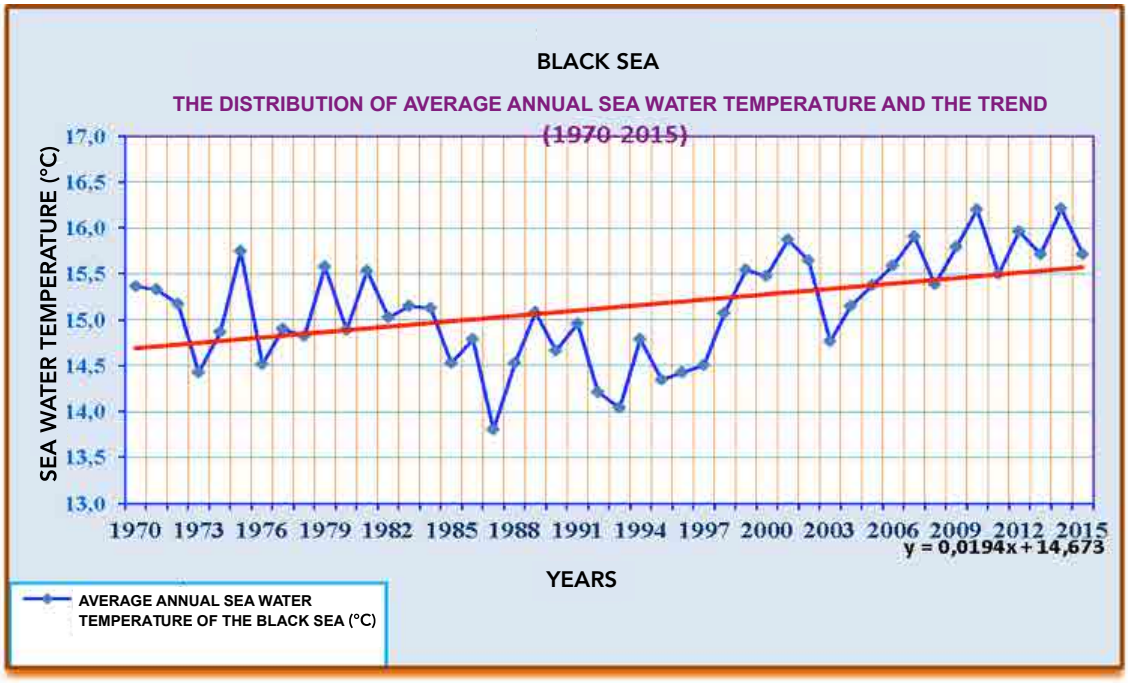
Map 10 - Assessment of organic pollutants in sediment in coastal waters (Ministry of Environment and Urbanisation, 2014)

C.1.3.5. Sea Water Temperatures

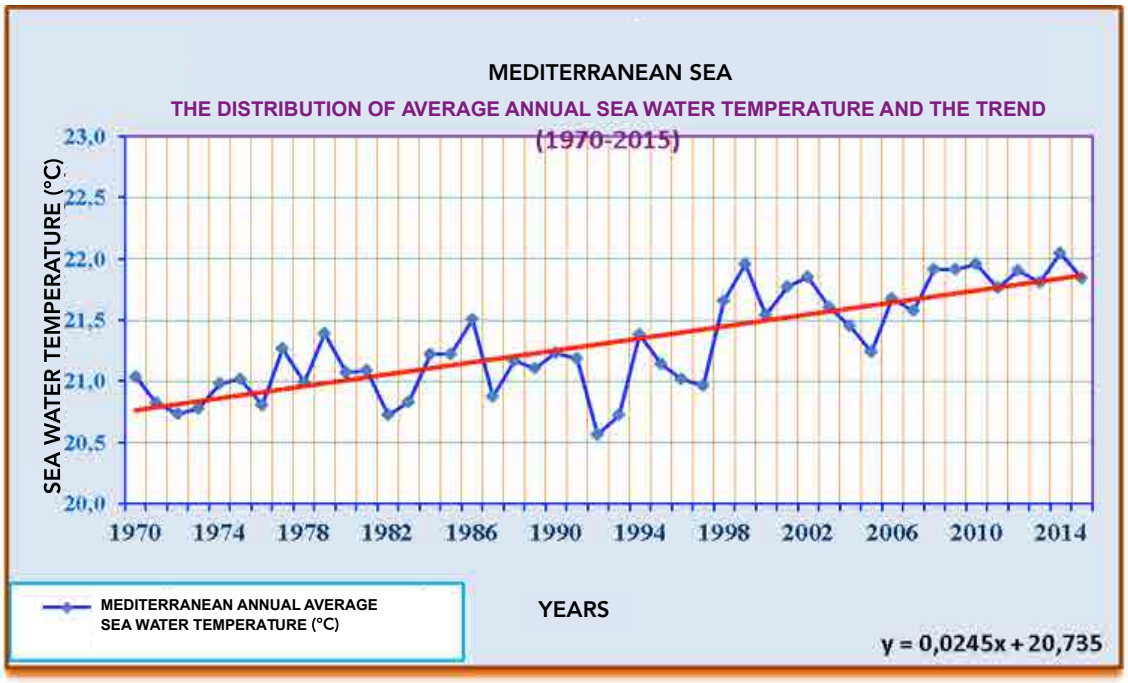
The main sources of weather events and air mass in the atmosphere are oceans and seas. The most accurate indicator of climate change is temperature increase and decrease in marine waters. Cooling or heating of marine waters changes many ecological structures in seas and effects many species, and this is especially important for those who benefit from seas economically.

According to data by General Directorate of Meteorology, although there has been a slight increase in marine waters in Turkey in years, it is not possible to mention about a global temperature increase in marine waters for now. In order to monitor this process, the General Directorate of Meteorology carries out marine water temperature measurements on all coastal waters including all marine waters of Turkey. Thereby, a more precise data source on condition of marine waters is obtained.

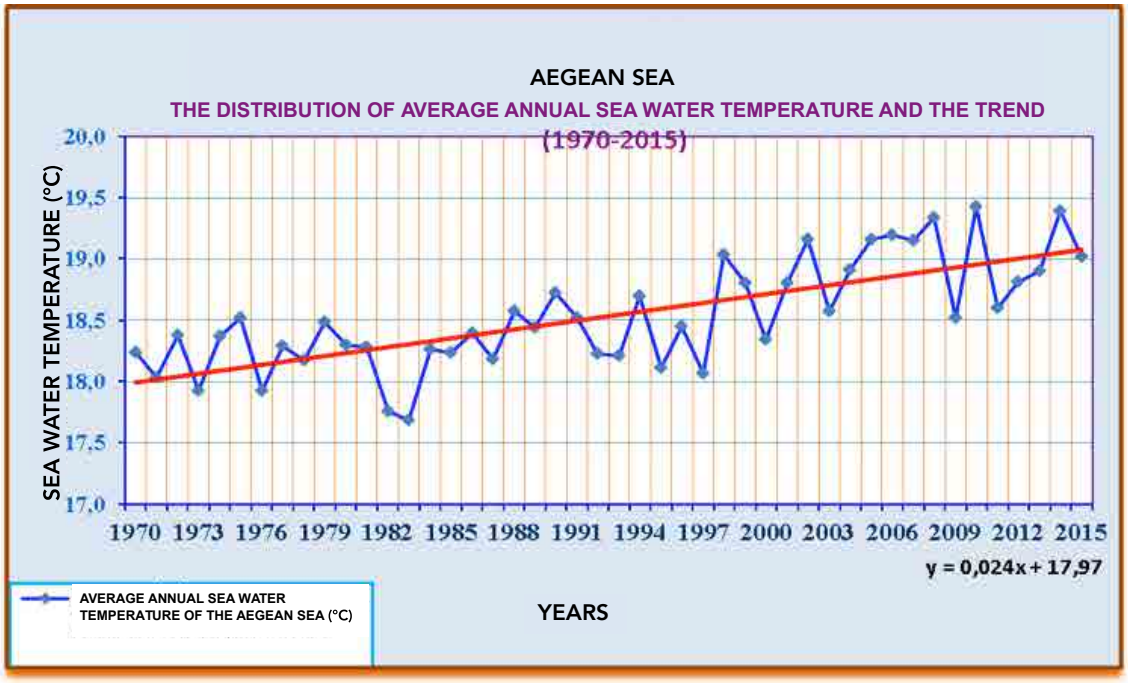
Mean marine water temperatures for 2015 were 21,8°C in Mediterranean, 19,0°C in Aegean Sea, 16,0°C in Marmara and 15,7°C in Black Sea. Information on mean yearly marine water temperatures (in °C) between 1970-2015 is provided on the graphs below.



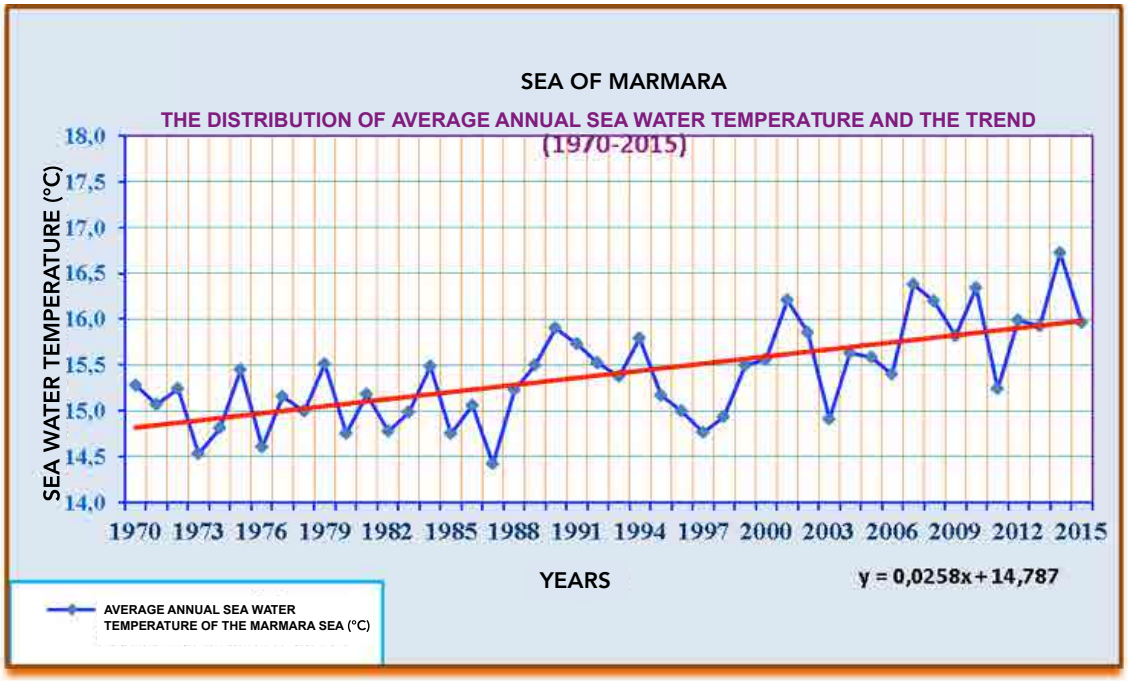
Graph 14 – Average annual sea water temperature pattern and trend of Black Sea (General Directorate of Meteorology, 2016)



Graph 15 – Average annual sea water temperature pattern and trend of Mediterranean Sea (General Directorate of Meteorology, 2016)



Graph 16 – Average annual sea water temperature pattern and trend of Aegean Sea (General Directorate of Meteorology, 2016)



Graph 17 – Average annual sea water temperature pattern and trend of the Sea of Marmara (General Directorate of Meteorology, 2016)

C.1.3.6. International/Regional Cooperation to Combat Marine Pollution

Seas act as borders between countries and they are shared areas. Thus, it is not only one country's responsibility to carry out activities on prevention of marine pollution and international cooperation is necessary in protection of marine waters as they are collectively used for different purposes such as tourism, transportation and food.

For this purpose, conventions are signed by countries for regional cooperation on prevention and control of marine pollution and ensuring sustainable use of natural resources. These conventions are Convention on the Protection of the Black Sea against Pollution (Bucharest Convention) acceded by the countries that have borders on Black Sea and The Convention for Protection of the Mediterranean Sea against Pollution (Barcelona Convention) acceded by the countries that have borders on Mediterranean including Turkey.

Barcelona Convention was implemented in 2003 by TUBITAK-MAM Environment Institute as the first step of a series of national and international projects in Mediterranean and Aegean coastal basins within the frame of the responsibilities brought by the Protocol for the Protection of the Mediterranean against Pollution from Land-base Sources and Activities (LBS Protocol), through National Baseline Budget (NBB) work, with the help of UNEP Secretariat for Mediterranean Action Plan and under the coordinatorship of the Ministry of Environment and Urbanisation. The second stage of these works was carried out under the title of National Baseline Budget 2008 (NBB 2008) as a revision of the first stage. These works were carried out every 5 years with experts from TUBITAK-MAM and reported to the relevant Secretariat until the end of 2014.

Turkey successfully performed its duty of Periodic Presidency and Bureau Presidency delegated to our country after the Contracting Parties Meeting of the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) and its Annexes which was held in İstanbul on 03-06.12.2014.

After the 18th Contracting Parties Meeting of the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) held in İstanbul in December 2013, "The İstanbul Declaration" was approved by Environmental Ministers and Delegation Ministers of contracting parties, and it was agreed to give "Environmental Friendly Cities" award to coastal cities upon Turkey's recommendation. Within the Istanbul Declaration; principles on encouraging Environmental Friendly Cities and an integrated approach to urban planning and construction are included. It is also ensured

within this declaration that urban planning should be carried out by considering integrated coastal management principles, green technologies should be introduced in reduction of environmental pollution, activities towards commitment to ecosystem based management policies should be approved and encouraged and coastal cities should be granted with "Environmental Friendly Cities" award in order to encourage cooperation of authorities in coastal areas with local governments. The idea of giving the award was reacted positively by the countries bordering Mediterranean and the EU.

Within the scope of legislative alignment with European Union, "Capacity Building on Marine Strategy Framework Directive in Turkey" (MARinTURK), which was submitted to Instrument for Pre-accession Assistance (IPA), was completed. Within this project, it is aimed to understand EU Marine Strategy Framework Directive, find out the present condition of Turkey according to the directive and build the necessary technical and organizational capacity for future activities. The project will be an instrument for preparing plans and programs in National Policies, and it will provide a better environmental management in protection of marine environment by evaluating present organizational and administrative capacity and recommending a road map for future implementation of Marine Strategy Framework Directive. Moreover, the project will be helpful in sketching a program for taking necessary measures in order to achieve a good Environmental State within the scope of Marine Strategy Framework Directive and environmental aims will be settled within the project.

It was determined during the 18th Contracting Parties Meeting of the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) that the contracting parties update their National Action Plans that they had prepared before according to the Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources and Activities (LBS Protocol) and Strategic Action Plan (SAP-MED).

In an effort to create a basis for monitoring pollution and determining national marine and coastal management policies and strategies, measurements and analyses are carried out in all seas and the data on pollution monitoring and assessment is reported within the scope of Bucharest (Convention on the Protection of the Black Sea Against Pollution) and Barcelona Conventions (Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean) acceded by Turkey.

As part of Convention on the Protection of the Black Sea against Pollution (Bucharest Convention), our country plays the host for the Commission on the Protection of the Black Sea against Pollution Permanent Secretariat. The works of advisory groups created under the convention, works of national focal points and works of centers of activities are followed.

Works in making our country a party of The Protocol on Environmental Protection to the Antarctic Treaty are under progress.

C.1.3.7 Deep Sea Discharge

All domestic and industrial deep sea discharge projects needs to be approved by the Ministry of Environment and Urbanisation within the scope of the By Law on Water Pollution Control. Within this context, deep sea discharge projects of all industrial waste waters, especially from thermal and nuclear power plants, are reviewed and approved by the Ministry of Environment and Urbanisation within the scope of the Circular on Approval of the Projects of Waste Water Treatment Facilities and Deep Sea Discharge Facilities numbered 2014/7.

As a part of this process, "The Project for Determining Designing Criterias of Deep Sea Discharge" was conducted by the Ministry of Environment and Urbanisation in 2015. Domestic and industrial (as cooling water) deep sea discharge facilities designed and conducted in Black Sea Region were identified and their design and operation conditions were determined. Also implementations of Deep Sea Discharge (DDD) in Black Sea were monitored and present criteria and legislation were evaluated. Project approval procedures were revised and a guide on the subject was prepared.

Deep sea discharge is required for the discharges of cooling waters and concentrated salt waters with a waste water capacity of more than 5.000 m^3/day, by considering above mentioned dilution and modelling criteria. And the Ministry of Environment and Urbanisation should be appealed for the projects under the Circular on Approval of the Projects of Waste Water Treatment Facilities and Deep Sea Discharge Facilities numbered 2014/7.

C.2. Quality of Water Resources

Potential of the water that will be directed for different uses according to its quality is of great importance. For an appropriate management of water resources, quality and amount of the water should be managed at the same time. There have been considerable developments in Turkey in alignment of management of water quality and amount with European Union Water Framework Directive (2000/60/EC).

Comprehensive By Laws have been designed on water quality management with the By Law on Water Pollution Control, which was published for the first time on 04 October 1988 and took its final form in 2004. Two basic approaches have been adopted through the By Law on Water Pollution Control. It is aimed by the first one maintaining the present quality of water resources; and the second one enhancing water quality according to the needs in the country.

Within this frame,

- Some By Laws have been made on the protected areas around drinking and potable water reservoirs,
- Limitations have been placed on discharge of domestic and industrial waste waters,
- By Law have been made on protection of farm lands.

On the other hand, with the "By Law on Surface Water Quality Management" published in the Official Gazette N. 28483 dated 30.11.2012, principles and procedures on management of water resources with an ecosystem based integrated approach in accordance with the requirements of Water Framework Directive (2000/60/EC) were introduced. Within the By Law, principles on classification of surface waters including coastal and transitional waters used for different purposes, assessment of pressures and impacts, identifying the measures towards improving water quality and identification of trophic levels were designated. Classification of surface waters is carried out according to Quality Criteria of İntra-continental Surface Waters According to Their Class included in the By Law on Surface Water Quality Management Annex-5 Table-5 According to the By Law, there are 4 water quality classes for intra-continental surface waters. According to this:

- Class I: High quality water
- Class II: Water with low contamination
- Class III: Contaminated Water
- Class IV: Highly contaminated water.

Within the context of quality assessment for coastal waters, target quality criteria for Aegean Sea, Mediterranean Sea, Sea of Marmara and Black Sea, in terms of dissolved oxygen, pH, color and turbidity, temperature, Hazardous substances, salinity and floating matters, are stated in the By Law on Surface Water Quality Management .

Moreover, eutrophication criteria for coastal and transitional waters of Aegean Sea, Mediterranean Sea, Black Sea and Sea of Marmara, threshold Values of Trophic Classification System for Lakes, Ponds and Dam Reservoirs, limit values for dissolved inorganic nitrogen, total phosphorus, secchi disk depth and chlorophyll-a parameters in determination of trophic level in coastal and transitional waters and lakes, ponds and dam reservoirs are determined.

The main reasons why quality of Turkey's water resources decrease are; over use of natural resources, untreated industrial and domestic waste waters mixing into water resources due to unplanned and rapid Urbanisation and non-planned Urbanisation, insufficiency of present waste water treatment facilities in terms of capacity and process, and agricultural activities. The main approach in protection of water resources should be prevention of pollution. It is more difficult and costly to take measures after the resources are polluted.

Water quality monitoring activities of 25 river basins in Turkey have been carried out by General Directorate of State Hydraulic Works (SHW) since 1970s. As of 2014, monitoring programs covering biological, chemical, physicochemical and hydromorphological quality factors have been prepared in accordance with European Union Water Framework Directive in order to achieve a standardization in monitoring and obtain long term and effective water quality monitoring data. Monitoring activities are carried out by General Directorate of State Hydraulic Works within the scope of above mentioned monitoring programs.

The data obtained at the end of monitoring activities is evaluated according to the By Law on Surface Water Quality and Water Quality reports are prepared for each basin and present water quality conditions are revealed. To illustrate, although the water quality of Sakarya Basin, which is one of the largest basins of the country, is in Class II on the source, the water quality decreases to Class III. and IV on the lower parts of the river. It is seen that the dominant pollutants in the basin are organic pollution and nutrients pollution and the major pressure factors are urban and industrial wastes and agricultural activities.

In Gediz Basin, with important farmlands and a developed industry, water quality is generally in class III-IV. The major pollution sources in the area are industrial waste waters and untreated urban waste waters.

Dominant pollution sources in Closed Basin of Konya, which has an important role in agricultural production in the country, are nitrogenous compounds and metals and water quality in the basin is around class III-IV. Major pressure sources effecting the water quality in the area are agricultural activities, stockbreeding activities and urban waste waters.

Water quality in Susurluk basin, which has intense industrial activities and mine resources, is around class III-IV. Major factors effecting the water quality in the area are industrial and urban waste waters and mining activities.

Besides these basins, in most basins as well as Ergene Basin, Büyük Menderes Basin, Ceyhan Basin, Seyhan Basin, Eastern Mediterranean Basin, Yeşilırmak Basin, Asi Basin, water quality is around class III. and IV.

In addition to water quality assessments, trophic conditions of Lakes, Ponds and Dam Reservoirs are assessed by considering Limit Values of Trophic Classification System. Accordingly, the major factor threatening lakes, ponds and dam reservoirs is eutrophication. In order to take eutrophication problem under control, nitrogen and phosphorus loads reaching to receiving bodies should be classified.

Within this purpose, areas in 25 river basins that are sensitive to urban waste and nitrate have been identified and necessary measures have been taken in order to improve water quality in these areas. Furthermore, as a result of industrial activities and mining activities, metal and organic matter pollution is observed in some lakes such as Lake Manyas and Lake Uluabat. Water Quality Action Plans have been prepared and implemented for some priority lakes in order to solve pollution problems and improve water quality in lakes. Some of the action plans that are currently in process of implementation are “Water Quality Action Plan for Lake Uluabat”, “Water Quality Action Plan for Sub-Basin of Lake Mogan-Eymir”, “Water Quality Action Plan for Lake Manyas” and “Water Quality Action Plan for Sub-Basin of Lake Ilgın”.

C.3. Sectoral Water Use and Allocation of Water

According to the data of 2015, 3,3 billion m^3 groundwater was allocated for drinking and potable use by General Directorate of State Hydraulic Works.

There is 112 billion m^3 available water supply in our country, but we benefit from only 39% of this amount. 32 billion m^3 is used in irrigation, 7 billion m^3 as drinking and potable water and 5 billion m^3 in industry. In this case, around 73% percent of the water resources in our country is used in agriculture, 11% in industrial activities and 16% in urban consumption (Table 42).

Table 42 – Sectoral water consumption in Turkey (SHW, 2016)

Year	Total water consumption		Sectors					
			Agricultural		Drinking and Potable		Industry	
	km^3	%	km^3	%	km^3	%	km^3	%
1990	30,6	28	22,0	72	5,1	17	3,4	11
2004	40,1	36	29,6	74	6,2	15	4,3	11
2008	46	41	34	74	7	15	5	11
2012	44	100	32	73	7	16	5	11
2023	112	100	72	64	18	16	22	20

6 million hectares of the 78,5 million hectares of land (Turkey's Statistical Yearbook, 2011) in Turkey consists of cultivated agricultural areas. 5,61 million hectares (65%) of 8,5 million economically irrigable land is open to irrigation; 3,32 million hectares (61%) irrigated by General Directorate of State Hydraulic Works, 1,29 million hectares (21%) irrigated by abrogated General Directorate for Rural Services and 1 million hectares (18%) irrigated by public.

Table 43 - Amount of waters drawn from the resources by usage (Billion m³/year) (TURKSTAT, 2016)

	2008	2010	2012	2014
Municipalities	4,56	4,79	4,93	5,23
Villages	1,22	1,01	1,04	0,43
Facilities of manufacturing industry	1,20	1,42	1,67	2,20
Thermal power plants	4,54	4,27	6,40	6,53
Organized industrial zones	0,11	0,11	0,12	0,14
Mining facilities	…(*)	0,05	0,11	0,21
Irrigation (1)	27,00	30,95	34,00	26,67
Total		**42,61**	**48,26**	**41,41**

(*) No information.

(1) Data by SHW

Irrigation is the impetus for rural development. Each irrigation projects is also a rural development project. The farmers who was applying grain – fallowing system in dry conditions have been able to cultivate the land every year with the coming of irrigation system and accordingly, product diversity has increased, yield have increased 2-5 times and agro-industries have been able to develop. 2/3 of food production are obtained from irrigated areas. Sustainable agricultural and sustainable rural development is possible through sustainable management of water resources.

"Water" is one of the most important strategical resources of our day and future and it is also an inseparable part of modern agricultural. It is crucial to save water in the process of delivering and distributing water to farm lands and operating and implementing the system.

Table 44 - Soil and water potential in Turkey and state of use (SHW, 2012)

Areas of water use	
Cultivated Area (million ha)	28,05
Irrigable Area (million ha)	25,85
Economically Irrigable Area (million ha)	8,50
Area opened for irrigation (million ha)	5,61

It is also important to plan and implement irrigation projects together with consolidation projects in order to benefit from irrigation more effectively and improve water and land resources in our country. Thanks to the irrigation projects that are implemented with consolidation projects, not only investment costs reduce but also parcel structure is formed in a way to provide effective use of land and water.

Amount of annual precipitation in our country is 642,8 mm and this is equal to around 501 billion m³ water annually. It is identified that the total amount of surface and ground water that can be technically and economically consumed for different purposes is 112 billion m³. Thanks to the works carried out so far, only 44 billion m³ (39%) of this reserve is utilized.

C.3.1. Drinking and Potable Water

Water may be a direct cause of an illness and it can also set the stage for diseases or promote formation of illnesses. Thus, it is highly important to access healthy and reliable water in maintaining human health.

According to data from Demographic and Health Surveys of Turkey -2008 (DHS-2008), 92% of the houses in Turkey (urban and

rural successively 94%-88%) have access to regenerated water (municipal water, well water, spring water through city water system and bottled water). Indicators of drinking and potable water in Turkey are provided in Table 45.

According to the "By Law on Water Intended for Human Consumption", the amount of free available chlorine in samples taken from extreme points of drinking and potable water should be 0,5 mg/lt at most. In practice, levels of chlorine under 0,2 mg/lt is deemed as insufficient. Chlorine measurements carried out in Turkey and insufficiency rates are provided on Table 46 by years.

Table 45 - Data on indicators of drinking and potable water use in Turkey (TURKSTAT, 2015)

	2010	2012	2014
Population of Turkey	73.722.988	75.627.384	77.695.904
Total number of municipalities	2.950	2.950	1.396
Total population of municipalities	61.571.332	63.743.047	72.505.107
Number of municipalities served by water supply network water for human consumption	2.925	2.928	1.394
Municipal Population Served By Water Supply Network with water for human consumption	60.664.687	62.649.551	70.522.136
Rate Of Municipal Population Served By Water Supply Network In Total Population (%)	82	83	91
Rate Of Municipal Population Served By Water Supply Network In Total Municipal Population (%)	98	98	97
Water Abstraction For Municipal Water Supply Network (thousand m^3/year)	4.784.734	4.936.342	5.237.407
Dam	2.252.421	2.416.018	1.886.617
Well	1.273.822	1.395.957	1.423.751
Source	1.015.865	948.133	984.869
River	159.472	78.282	652.370
Lake-pond/sea	83.154	97.953	289.800
Fresh Surface Water Abstraction For Municipal Water Supply Network (thousand m^3/year)	2.495.047	2.592.253	2.828.787
Fresh Ground Water Abstraction For Municipal Water Supply Network (thousand m^3/year)	2.289.687	2.344.090	2.408.620
Water Abstraction Per Capita In Municipalities (liter/person-day)	216	216	203
Amount Of Water Distributed with Supply Network (thousand m^3/year)	2.579.676	2.801.939	3.394.545
Number Of Drinking Water Treatment Plants	206	258	381
Physical	77	79	69
Conventional	96	132	165
Advanced	33	47	147
Capacity of Drinking Water Treatment Plants (thousand m^3/year)	4.499.508	4.629.842	6.133.100
Physical	156.490	132.800	148.052
Conventional	4.172.571	4.291.360	4.955.564
Advanced	170.447	205.681	1.029.484
Amount Of Drinking Water Treated (thousand m^3/year)	2.520.085	2.729.430	2.995.001
Physical	54.615	43.314	47.875
Conventional	2.401.093	2.602.102	2.860.041
Advanced	64.378	84.015	87.085
Number Of Municipalities Served By Drinking Water Treatment Plants	346	411	436

Table 45 - Data on indicators of drinking and potable water use in Turkey (TURKSTAT, 2015) (Cont.)

	2010	2012	2014
Municipal Population Served By Drinking Water Treatment Plants	32.992.877	35.868.415	42.141.181
Rate Of Municipal Population Served By Drinking Water Treatment Plants In Total Population	45	47	54
Rate Of Municipal Population Served By Drinking Water Treatment Plants In Total Municipal Population	54	56	58

As of 2012, there are 49.456 water reservoirs in our country. There are chlorinators in 17.510 (35,4%) of these reservoirs. Rural areas are in poorer condition than urban areas in terms of chlorinators. On the other hand, even if there are chlorinators in reservoirs, ensuring active operation of the devices is another problem.

Table 46 - Rates of chlorine insufficiency in drinking and potable waters in Turkey by years

Years	Number of Chlorine Measurements	Number of insufficiency results	Insufficiency rate (%)
2011	1.417.585	279.910	19,8
2012	1.202.320	225.941	18,8

C.3.2. Irrigation

Surface area of Turkey is around 78 million hectares and 28 million of this surface area (1/3) consists of farm lands. According to studies carried out in Turkey, there is an identified area of 8,5 million hectares that can be irrigated economically and 5,2 million hectares of this was irrigated. 3,1 million hectares of this irrigable area is irrigated through modern irrigation system constructed by General Directorate for State Hydraulic Works. 1,1 million hectares of area was open to irrigation by abrogated General Directorate of Rural Services. Also, around 1 million hectares of area was irrigated by public.

Graph 18- The total amount of irrigation water used for irrigation in Turkey (million m³), (2000-2014), (SHW, 2016)

C.3.2.1. Areas of Flood Irrigation and The Amount of Water Used

The area of flood irrigation and amount of water used in Turkey is not precisely known. As people do not apply a controlled irrigation in flood irrigation method, negative effects of flood irrigation on natural resources cannot be prevented. Inappropriate irrigation activities in flood irrigation effects water and soil resources adversely. Especially in closed basins, levels of ground

waters rise due to flood irrigation, salt concentration in soil increases as a result of vaporization in arid and semi-arid climates and calcification occurs accordingly. Since a more controlled irrigation is possible through pressurized irrigation, it is possible to prevent above mentioned problems.

C.3.2.2. Areas of Drip and Pressurized Irrigation and the Amount of Water Used

There is no information on the size of the area of pressurized irrigation and the amount of water used across Turkey. However, in the areas monitored by the General Directorate for State Hydraulic Works, rate of springer irrigation is 16% and rate of drip irrigation is 8%.

Ministry of Food, Agriculture and Livestock provides grants for infield pressurized irrigation system within the scope of Rural Development Investment Support Program (RDISP). Within this scope, as of 2014, 227 million TL has been granted to 9.526 projects and around 842.000 hectares of area has been equipped with pressurized irrigation system.

Within the scope of 10th Development Plan "Action Plan for an Efficient Use of Water in Agricultural", it was aimed to build pressurized irrigation systems on 10.000 hectares of area each year in the years 2014, 2015, 2016, 2017 and 2018.
Drip irrigation provides an economic use of irrigation water. Through the use of solar power systems, use of alternative energy is promoted and thus protection of the environment is supported.

C.3.3. Industrial Water Supply

2,4 billion m^3 water was drawn from surface and ground water resources in 2014 and 1,7 billion m^3 of this was marine water. 77,4% percent of the this total amount was used as cooling water. (Turkish Statistical Institute 2016)

Table 47 - Manufacturing industry water indicators (thousand m^3/year) (TURKSTAT, 2016)

	2008	2010	2012	2014
Amount of water abstracted	**1.313.878**	**1.556.705**	**1.792.010**	**2.355.547**
Municipal water supply network	33.052	47.342	31.835	34.173
Spring	52.730	38.951	31.293	30.947
Sea	658.650	821.324	1.169.631	1.665.570
Lake	16.372	14.152	11.717	16.125
River	54.523	64.220	62.181	63.139
Dam	79.435	98.353	86.835	82.276
Well	334.115	386.066	305.629	340.643
Tanker	12.496	13.523	7.451	8.793
Organized Industrial Zone (OIZ) Water supply network	68.086	62.366	69.863	89.185
Other(1)	4.420	10.408	15.574	24.697
Amount of water consumption	**1.311.748**	**1.550.889**	**1.786.145**	**2.349.106**
Process water	352.743	390.091	329.840	345.727
Supplementary boiler water	43.736	37.259	29.520	36.601
Supplementary cooling water	777.463	970.751	1.301.611	1.817.076
Domestic water	76.271	102.031	67.182	83.886
Other(2)	61.535	50.756	57.992	65.816

(1)Includes water abstracted from State Hydraulic Works irrigation channels, village water supply networks, tax free zone water supply netwoks, other establishments, bottled water, unions/private companies providing water supply and treatment services, etc.
(2) Includes water used for air conditioning, fire extinguishing, garden irrigation, vehicle cleaning, street sprinkling, water consumed during water and wastewater treatment, water transferred to other establishments, etc.

157 of the 196 organized industrial zones that was active in 2014 had their own water supply network and 168 million m3 of water was drawn from resoruces in order to be distributed through these networks.

Table 48 - Water, Wastewater and Waste Indicators in Organized Industrial Zones, 2010 – 2014 (TURKSTAT)

	2010	2012	2014
Number of organized industrial zones in operation	134	181	196
Number of organized industrial zones having its own water network	101	129	157
Number of organized industrial zones without water network	17	26	15
Number of OIA without water supply network	16	26	24
Amount of water abstracted for organized industrial zones water network (thousand m^3/year)	**126.013**	**138.494**	**167.592**
Well	55.222	60.868	76.218
Spring	23.909	24.473	26.752
Municipal Network	13.648	18.198	22.706
Dam, lake, pond and river	33.236	34.955	41.915

TurkStat, Organized Industrial Zones Water, Wastewater and Waste Statistics, 2014

C.3.4. Use of Water for Energy Production

129 billion kWh of electricity was consumed in 2002 and this amount reached to 260 billion kWh as of 2015, and it is foreseen that around 450 billion kWh electricity will be consumed in 2023.

Total installed electricity power capacity of Turkey reached to 75.081,5 MW as of 31 May 2016. Within this context, information on installed power capacity and the fuel of power plants is provided on Table 49 according to the calcuations made at the end of 2015 and as of 31 May 2016.

When the information on Table 49 is considered, it can be seen that the share of renewable energy power plants in total installed power capacity is 42,8%. Hydroelectiric Power Plants With a Dam and River has the biggest share in this renewable energy capacity with a share of 34,9% in total installed power capacity.

Table 49 – Distribution of installed power in Turkey (MoENR, 2016)

	END OF 2015			AS OF THE END OF 31 MAY 2016		
TYPE OF FUEL	INSTALLED POWER (MW)	CONTRIBUTION (%)	NUMBER OF POWER PLANTS	INSTALLED POWER (MW)	CONTRIBUTION (%)	NUMBER OF POWER PLANTS
FUEL OIL + NAPHTHA + MOTORIN	446,0	0,6	17	446,0	0,6	17
DOMESTIC COAL (HARD COAL + LIGNITE + ASPHALTITE)	9.418,4	12,9	29	9.842,4	13,1	29
IMPORTED COAL	6.064,2	8,3	8	6.070,2	8,1	10
NATURAL GAS + LNG	21.222,1	29,0	233	21.785,1	29,0	242
RENEWABLE + WASTE + WASTE LIKE + PYROLYTIC OIL	344,7	0,5	69	385,0	0,5	70
MULTI FUEL (SOLID + LIQUID)	667,1	0,9	23	667,1	0,9	23
MULTI FUEL (LIQUID + NATURAL GAS)	3.684,0	5,0	46	3.684,0	4,9	46
GEOTHERMAL	623,9	0,9	21	695,4	0,9	24
HYDRAULIC (DAM)	19.077,2	26,1	109	19.382,2	25,8	113
HYDRAULIC (RIVER)	6.790,6	9,3	451	6.849,9	9,1	457
WIND	4.498,4	6,1	113	4.762,1	6,3	122
THERMAL (NON-LICENSED)	56,5	0,1	24	60,9	0,1	28
WIND (NON-LICENSED)	4,8	0,0	9	80,0	0,0	16
SOLAR (NON-LICENSED)	248,8	0,3	362	443,3	0,6	597
TOTAL	**73.146,7**	**100,0**	**1.514**	**75.081,5**	**100,0**	**1.794**

(http://www.teias.gov.tr/yukdagitim/kuruluguc.xls)

Electric Energy Market and Security of Supply Strategy Document was prepared in May, 2009 and promulgated. With this document, it is aimed to give priority to use domestic resources in electric energy production. For this purpose, necessary market directing measures have been taken in order to encourage use of domestic resources.

Table 50– Profile of hydroelectric power plants in Turkey, as of 21 May 2016 (Ministry of Energy and Natural Resources, 2016)

Number of Active Plants	570
Installed Power	26.232 MWe
Share in Installed Power	34,9%
Annual Electricity Production	~ 69 GWh (2015)
Rate of Production to Consumption	25% (2015)
License Status	570 Licensed, 0 Non-licensed
Network Connection	570 yes, 0 no

Various projects of strategy development, identification of the potential, measurement, feasibility, research and development, test and demonstration have been carried out in order to determine energy potential of the country, present the methods of benefiting from this potential, make the use of these resources widespread, and benefit from the advantages of these resources with a view to utilize the renewable energy resources such as hydraulic, wind, geothermal, solar and biomass and energy resources by considering their effects on the environment.

Within this context, it is clear that negative pressure on water resources and climate change will be reduced by increasing the share of energy production from renewable energy resources in energy production sector.

"By Law on Procedures and Principles Regarding the Signing of Water Use Right Agreement for Production Activities in the Electricity Market" was published in the Official Gazette N. 25150 dated 26.06.2003 with respect to building and operating hydroelectric power production facilities by legal entities that are active or will be active in the market within the frame of the provisions of "Electricity Market Law" Numbered 4682 and the related By Law on Electricity Market Licence.

Hydroelectric energy from surface water resources is still produced by using storage dam reservoirs and regulators.

Although less water is used in thermal power plants when compared to hydroelectric power plants, a substantial amount of water is also used in thermal power plants especially for cooling purposes. Table 51 provides information on the amounts of water drawn from water resources in order to use for cooling purposes.

Table 51 – Amount of water abstraction by sources in thermal power plants, 2010 - 2014, (thousand m³/year) (TURKSTAT, 2014)

Water resource	Year	Total amount of water drawn from resources	Cooling water
Total	2010	4.285.419	4.227.027
	2012	6.407.505	6.334.599
	2014	6.536.015	6.397.092
Sea	2010	4.139.761	4.125.206
	2012	6.254.111	6.242.314
	2014	6.388.620	6.304.087
Dam	2010	49.817	29.400
	2012	52.128	31.121
	2014	66.515	36.679
River	2010	40.426	33.395
	2012	42.066	30.860
	2014	40.001	31.966
Well	2010	9.205	4.706
	2012	10.456	4.457
	2014	12.324	4.858
Other(1)	2010	46.209	34.320
	2012	48.744	25.847
	2014	28.554	19.503

TurkStat, Thermal Power Plants Water, Wastewater and Waste Statistics, 2014

Figures in tables may not add up to totals due to rounding.

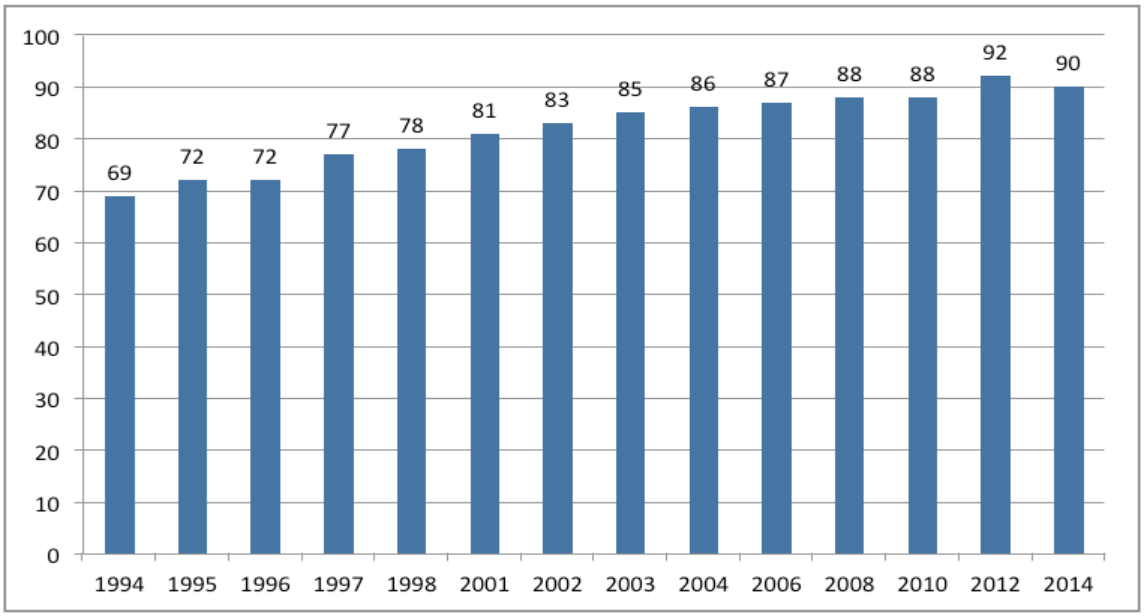
(1) Includes water supplied from public water supply network, spring, lake, organised industrial zone›s water network, other establishments, etc.

C.4. Environmental Infrastructure

C.4.1. Urban Sewerage System and the Beneficiary Population

Waste water infrastructure systems consist of sewerage system and rain water and waste water treatment plants (WWTP). In recent years, sewerage networks have been built as separate systems. However, some of the previously built sewerage networks are combined system and they are still in use. Investments for sewerage networks started in 1970s and carried out under the supervision of the General Directorate of Provincial Bank until 1980s and considerable amount of investments were made during this period. In 1990s, the investments continued at a lower level. The investments focused on city centers at the beginning and extended to smaller residential areas afterwards. The new trend in water management is that private sector has also started to take part in building infrastructure services as well as local governments. Founding of water and sewerage administrations in Metropolitan Municipalities is an example of indigenization in this field.

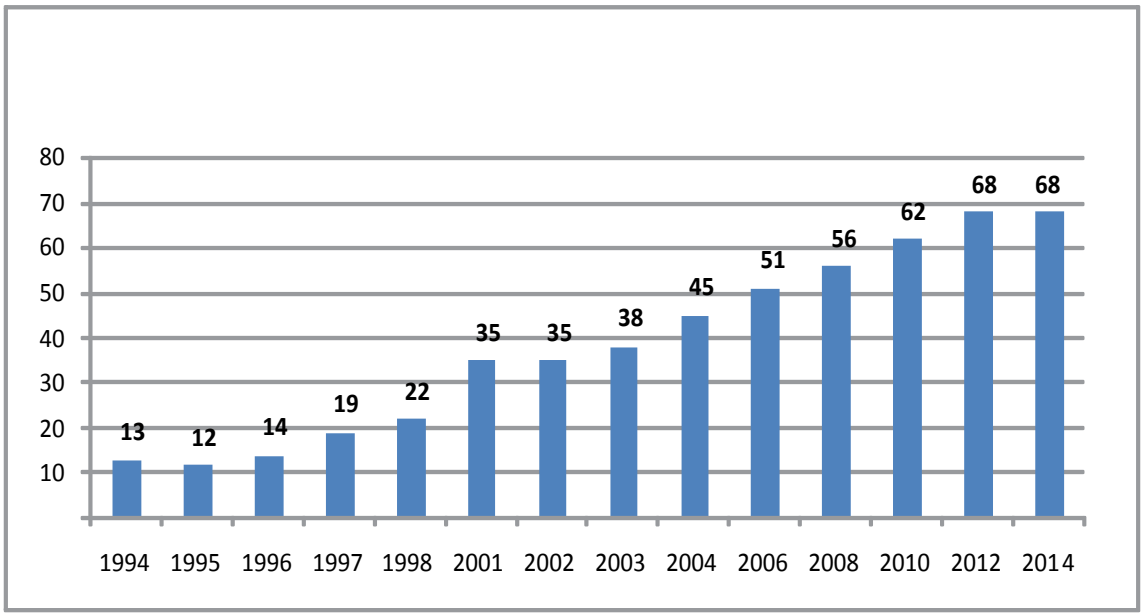
Thanks to environmental protection works in our country and financial and technical support by the Ministry of Environment and Urbanisation, there has been a considerable increase in the number of municipalities providing sewerage and waste water treatment services and in the number of population benefiting from these services.



Graph 19 - Rate of population served with a sewerage system in municipal population (TURKSTAT, 2015)

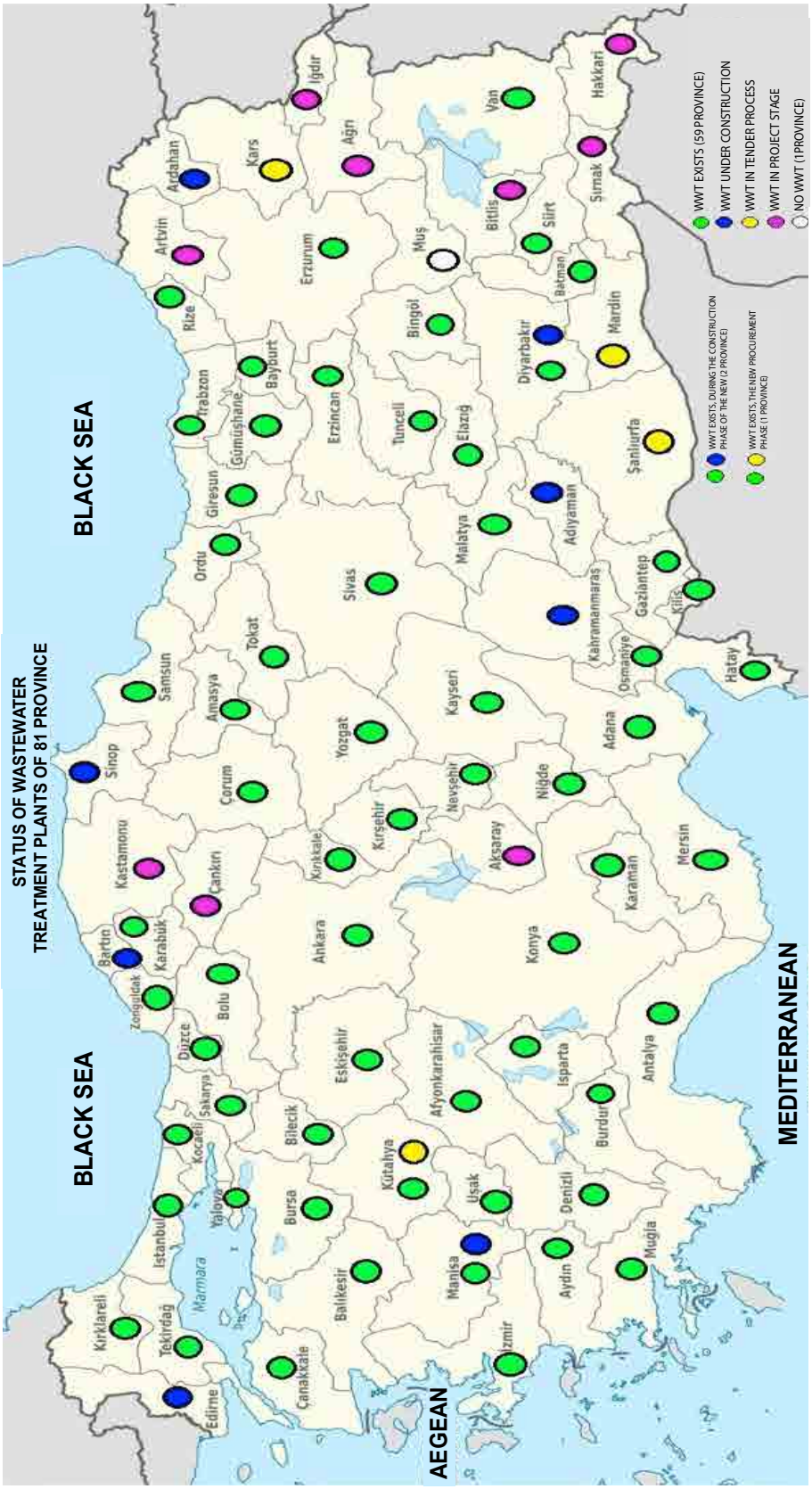
While the rate of population that receives sewerage services was 69% of municipal population in 1994, this rate reached to 90% in 2014. Although the rate was 92% for 2012, it decreased to 90% in 2014. This was mostly due to the fact that some municipalities were given district/village status with Municipality Law numbered 6360. (Graph 19).

As can be seen on Graph 20, while 13% of municipal population received waste water treatment services in 1994, this rate reached to 68% at the end of 2014.

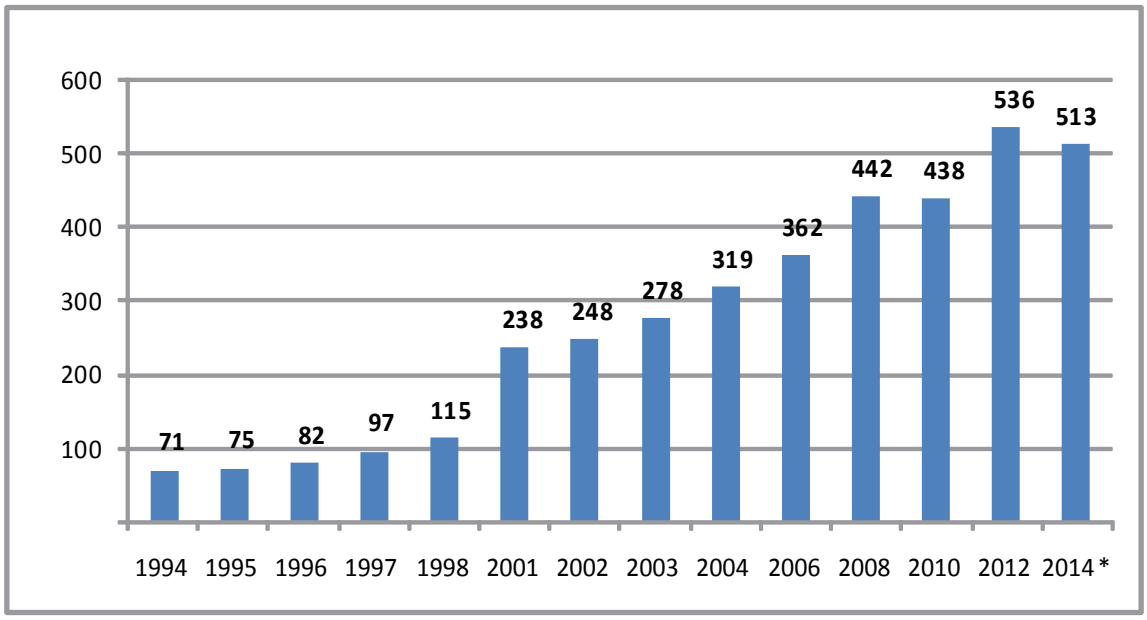


Graph 20 – Rate of population served with a wastewater treatment plants in municipal population (%), (TURKSTAT, 2016)

Thanks to environmental protection works in our country and financial and technical support by the Ministry of Environment and Urbanisation, there has been a considerable increase in the number of operating waste water treatment plants. Treatment of waste waters is an important application in ensuring an effective use of water and maintaining the present resources. Significant amount of investments are made in Turkey within this context and while 71 municipalities were providing service with 41 waste water treatment plants in 1994, these numbers reached to 513 municipalities with 604 waste water treatment plants at the end of 2014. (TURKSTAT, 2015). As of the end of 2015, 551 municipalities have been providing services with 653 waste water treatment plants. (MoEU, 2016).



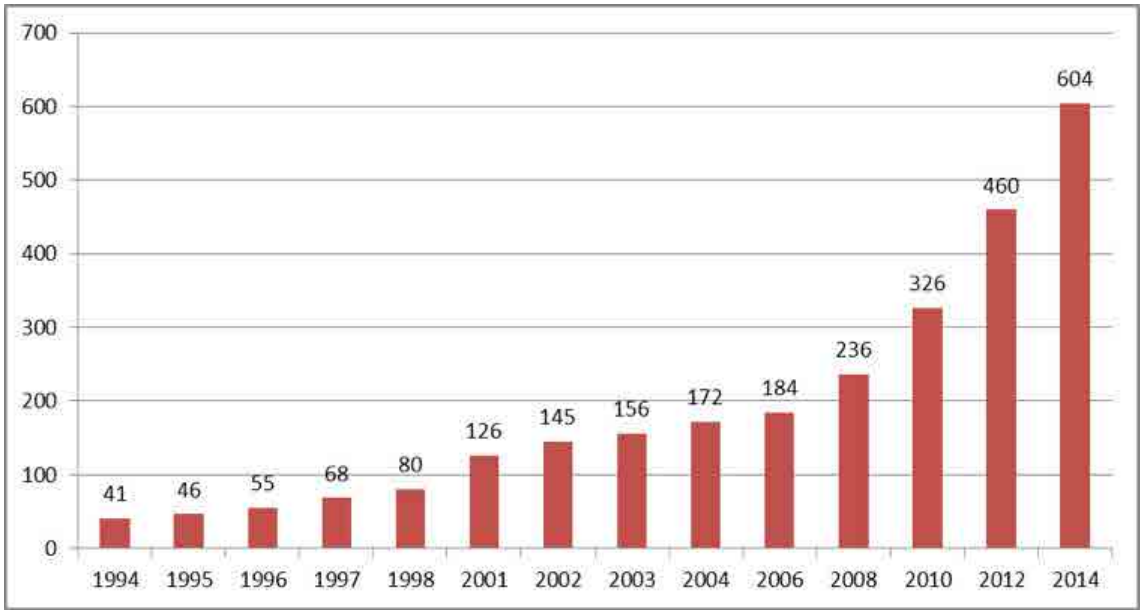
Map 11 - Waste water treatment plants in city centers in Turkey (Ministry of Environment and Urbanisation, December 2015)



Graph 21 - Number of municipalities that provide waste water treatment services (TURKSTAT, 2015)

* The data of 2014 shows a decrease compared to 2012, due to the fact that some municipalities were given district/village status with Municipality Law numbered 6360.

Project approval works for waste water treatment plants are carried out by the Ministry of Environment and Urbanisation in the process of building waste water treatment plants (WWTP) in an attempt to increase treatment efficiency and to ensure selection of waste water treatment technologies that are cost efficient both in in investment and operation stages. Projects of 861 waste water treatment plants was approved by the Ministry between 2004 and 2015.



Graph 22 –Number of waste water treatment plants owned by municipalities (TURKSTAT, 2015)

In an effort to encourage management of waste water treatment plants, the Ministry of Environment and Urbanisation meet 50% of the energy expenses of waste water treatment plants that are operated in concordance with the legislation.

The Ministry meets 50% of the energy expenses of waste water treatment plants that are operated in concordance with the provisions of By Law on Water Pollution Control. According to the statistics of the end of 2015, 437 facilities obtained Repayment Documents in order to benefit from Electricity Incentive. Within the scope of the legislation, 22,8 million TL was refunded to 172 facilities in 2011, 26,6 Million TL to 212 facilities in 2012, 30,2 Million TL to 207 facilities in 2013, 30,4 Million TL to 225 facilities in 2014 and 46,4 Million TL to 294 facilities in 2015.

Table 52 - Amounts of waste waters discharged into receiving environments from municipal sewerage system, by receiving environments (TURKSTAT, 2015)

	2010		2012		2014	
	Amount	%	Amount	%	Amount	%
Amounts of discharged waste water	**3.582.131**	**100,0**	**4.072.563**	**100,0**	**4.296.851**	**100,0**
Treated	2.719.151	75,9	3.260.396	80,1	3.483.787	80,1
Non-treated	862.979	24,1	812.167	19,9	813.064	18,9
Into Seas	**1.498.728**	**41,8**	**1.843.115**	**44,9**	**1.915.294**	**44,6**
Treated	1.347.977	89,9	1.718.588	93,2	1.759.461	91,9
Non-treated	150.751	10,1	124.528	6,8	155.833	8,1
Into Lakes/Ponds	**76.024**	**2,1**	**75.116**	**1,8**	**93.596**	**2,2**
Treated	37.881	49,8	36.748	48,9	47.893	51,1
Non-treated	38.143	50,2	38.368	51,1	45.703	48,8
Into rivers	**1.741.078**	**48,6**	**1.817.352**	**44,3**	**1.898.895**	**44,2**
Treated	1.180.630	67,8	1.276.456	70,2	1.409.633	74,2
Non-treated	560.448	32,2	540.896	29,8	489.262	25,8
Into dams	**130.224**	**3,6**	**114.199**	**3,5**	**120.781**	**2,8**
Treated	83.409	64,1	63.296	55,3	61.843	51,2
Non-treated	46.816	36,0	50.903	44,7	58.938	48,8
On lands	**35.091**	**1,0**	**35.770**	**0,9**	**17.954**	**0,4**
Treated	9.166	26,1	8.999	25,2	8.367	46,6
Non-treated	25.925	73,9	26.771	74,8	9.587	53,4
Other receiving environments	**100.985**	**2,8**	**187.011**	**4,5**	**250.332**	**5,8**
Treated	60.088	59,5	156.309	83,3	196.649	78,6
Non-treated	40.897	40,5	30.701	16,7	53.683	21,4

Note: Amount of waste waters treated out of municipal facilities is included.

Photo 1– Samsun Doğu Waste Water Treatment Plant (Ministry of Environment and Urbanisation, 2016)

C.4.2. Waste Water Infrastructure Facilities for Organized Industrial Zones and Individual Industries

Providing solutions for environmental problems caused by industrialization and ensuring a controlled development of the industry is only possible through a disciplined organization of the industry. Organized Industrial Zones are industrial places where numerous industrial facilities from different sectors operate and these places contribute to an organized industrial development. Main purposes of organized industrial zones are, to enable planned development of cities, to handle the problems of industries on a common ground and find solutions for these problems. Organized Industrial Zones have an important role in organization of the industry, protection of the environment and operating the facilities within the environmental rules. Among the most important advantages of Organized Industrial Zones are using common treatment facilities with a view to protect environmental pollution resulting from industrial activities.

There are 280 Organized Industrial Zones in Turkey that have acquired legal entity status. Productive activities are carried out in 215 of 280 Organized Industrial Zones. According to the results of inventory works by the Ministry of Environment and Urbanisation, 77 of 215 active Organized Industrial Zones possess waste water treatment facilities, 44 Organized Industrial Zones are connected to municipal sewerage network that ends with a waste water treatment plant and projects and construction works for waste water treatment facilities is under process in 25 Organized Industrial Zones. Treatment facility projects haven't been able to be prepared for 66 Organized Industrial Zones that don't hold waste water treatment facilities due to their low occupancy rate.

Table 53 - Data on waste waters from manufacturing industry (TURKSTAT, 2015)

	2010	2012	2014
Amount of discharged waste water (thousand m³/year)	1.256.195	1.539.818	1.931.282
Amount of discharged cooling water	883.651	1.197.421	1.572.229
Amount of discharged waste water except cooling water	372.544	342.397	359.053
Total amount of treated and discharged waste water (thousand m³/ year)	164.315	188.577	207.575
Amount of treated and discharged cooling water	9.804	11.055	9.697
Total amount of treated and discharged waste water except cooling water	154.510	177.521	197.878
Amount of wastewater discharged by receiving bodies (thousand m³/year)	1.256.195	1.539.818	1.931.282
Municipal sewerage	80.922	59.459	59.723
Sea	c	1.193.937	1.558.816
Lake	239	c	c
River	244.893	148.432	140.321
Dam	731	c	486
Tailings dam	c	c	c
Septic tank	5.446	2.539	2.126
Organized industrial zone sewerage	109.326	112.658	121.292
Other(1)	28.443	13.683	47.764
Number of waste water treatment plants	1.825	2.075	2.096
Physical /Chemical	656	778	878
Biological	1.089	1.190	1.094
Advanced	80	107	124
Capacity of waste water treatment plants (thousand mᵗ/year)	489.955	555.809	539.453
Physical /Chemical	103.387	159.582	157.153
Biological	335.505	334.402	318.508
Advanced	51.062	61.825	63.792
Amount of waste water treated in waste water treatment plants (thousand m³/year)	244.497	239.647	244.112
Physical /Chemical	54.677	57.797	66.865
Biological	170.061	151.291	149.822
Advanced	19.760	30.559	27.425

(1) Includes wastewater discharged to village sewerage, tax free zone sewerage, wastewater treatment plants of cooperatives, State Hydraulic Works channels, dry stream bed, mining site, wastewater used for on-site or off-site irrigation, etc.

C: Confidential data.

The following Table 54 provides information on the change in waste water and treatment facility indicators of organized industrial zones by years according to data from TURKSTAT.

Table 54 – Indicators of water, waste water and waste in Organized Industrial Zones, 2010 – 2014, (TURKSTAT, 2016)

	2010	2012	2014
Number of organized industrial zones in operation	134	181	196
Sewerage Network			
Number of OIA that have their own sewerage system	102	136	162
Number of OIA benefitting from municipal sewerage system	17	21	12
Number of OIA without a sewerage system	15	24	22
Amount of waste water discharged through OIA sewerage system (thousand m^3/year)(1)	190.014	234.679	253.967
Treated	161.023	191.990	220.547
Untreated	28.991	42.690	33.420
Number of waste water treatment plants	38	57	76
Chemical/ Biological treatment	24	41	54
Advanced treatment	14	16	22
Waste water treatment capacity (thousand m^3/year)	297.055	318.772	368.748

TURKSTAT, statistics of water, waste water and waste in Organized Industrial Zones, 2014

(1) The amount of discharged wastewater is greater than the amount of abstracted water as it includes wastewater generated from self supplied water of some establishments.

Figures in table may not add up to totals due to rounding.

C.4.3. Wastewater Recovery and Reuse

Around 1,1 billion people (18% of world population) have difficulty in reaching clean water resources. 2,4 billion people don't have access to water that is healthy enough. Demand for water is increasing every passing day and available fresh water resources are declining due to pollution. Due to the pollution of limited water resources and increase in demand, great importance have been given to sustainability and controlled use of natural resources all over the world, especially for the last 20 years, and works on alternative water resources increased. Developed technologies have accelerate the process and treatment applications have become popular as a result of successful and secure waste water recycling activities. When waste water recycling activities around the world are considered, it is observed that use of treated waste water is popular especially in agricultural activities and irrigation practices come into prominence in areas where irrigation is highly required. On the other hand, it is also remarkable that recycled water is widely used for urban purposes, supplying ground waters, environmental development and human consumption. The most important advantages of waste water recycling activities are that it increases the strength against drought, reduces the use of natural water resources and meet the need for water intended for human consumption. In general, central waste water recycling applications are more common. However, individual and local domestic waste water recycling and greywater recycling activities are also carried out.

Selection of the method for waste water recycling depends on many factors such as the purpose of recycled water, features of the application area, landforms, state of water resources, socio-economic features of users. At the same time, plans of local governments, waste water recycling policies and legal By Laws are also important.

In developed countries, there is an increase in recycling and reuse of waste waters in irrigation areas within the purpose of protecting accessible fresh water resources. Around 20 million ha of area is irrigated with recycled water in developing countries and this area makes up 7% of all irrigated areas. Turkey is a country which is under water stress. It is important for Turkey to recycle waste waters and reuse them. Around 72% of water in Turkey is used for irrigation. When treated waste waters are used in irrigation, available fresh water resources will not be depleted and a new water resource will be obtained.

It was important to treat waste waters 20 years ago, whereas, today, it is important to treat waste waters in a way to ensure minimum impact on the environment and present them for reuse. It is observed that treatment facilities that apply biological nutrient stripping have been built in recent years in our country in order to protect ground and underground resources. Moreover, works on rehabilitating present waste water treatment facilities and using the recycled water in irrigation are carried out. One of the major indicators of living in a healthy environment is collection and disposal of waste waters in an appropriate way. Stinks

from waste waters reduces the life quality and welfare of the residents in the area. Necessary attention and importance should be given to waste water treatment and collection systems (sewerage systems).

In Turkey, reuse of waste waters from industrial facilities takes place mostly through a process of collecting the waste waters and returning them into the same facilities. Recycling of waste waters from stationary industrial facilities is economically desirable especially in Marmara Region, since water expenses are high for these industrial facilities. In Aegean and Mediterranean Regions, where tourism oriented investments and settlements are intense, exit waters from treatment facilities, which have been built as a result of the needs emerging over time, have been used in irrigation only recently. Some of the treated water is used for watering the parks and gardens and some is stored in stabilization pools to be used in irrigation practices in agricultural.

Waste water recycling methods can be presented as recycling for irrigation practices in agricultural, watering green areas, industrial recycling, injecting under the ground, recycling in recreational areas (lake etc.), indirect recycling (fire-protection water, in toilets, etc.) and direct recycling (as drink water). The level of technology used in waste water recycling is parallel with the purpose of recycled water. It is known that biologically treated waters can be used for irrigation in agricultural or for watering the green areas after an appropriate disinfection process. Furthermore, if direct or indirect recycling is in question, more advanced treatment alternatives (membrane technologies, active carbon and advanced oxidation methods) can be used.

As each drop of water is very important, treatment and reuse of waste waters that results from domestic or industrial use of clean waters should be thought as an inseparable part of water management. Urban waste waters is an important water potential for Turkey. In addition to promoting use of treated waste waters in industrial and agricultural activities, recycling and reuse of waste waters from holiday resorts, business centers and similar facilities is targeted with the intent of protecting water bodies and preventing pollution within the scope of revision works for By Law on Water Pollution Control. ın order to ensure an effective use of this water potential, national policies should be determined as soon as possible and necessary researches on the matter should be conducted.

As a part of this process, the “Project for Determining Bathing Water Profiles on the Coasts of Turkey” started after signing an agreement with TUBİTAK on 18 October 2012. The aim of the second component of the project, which is on waste water management in tourism, was to popularize recycling and reuse of waste waters for protecting the water resources in Turkey and to develop an environmental friendly waste water treatment model in tourism in order to build necessary capacity and infrastructure. The project includes activities on doing a research on recycling and reuse of waste waters and rain waters from a selected tourism facility and preparing the best model and an application project about preventing the waste water from the source.

The second component of the project consists of a Workshop on Project Method and Strategy, an Inception report, 3 interim reports, a final feasibility report and an additional application project.

Discussions were made on current conditions and identification of strengths and weaknesses during the group works on waste water management in tourism in the “Workshop on Determining Bathing Water Profiles on the Coasts of Turkey and Waste Water Management in Tourism” which was held in TÜBİTAK TUSSİDE facilities in Gebze campus of TÜBİTAK on 3-4 December 2012.

“Closing Workshop on Training about Determining Bathing Water Profiles on the Coasts of Turkey and Waste Water Management in Tourism” was held in Kocaeli/Darıca on 24-26 September 2014 and, during the workshop, some presentations were made on “Waste Water Management in Turkey”, “Waste Water Recycling Practices and Water Use in Tourism Facilities”, “Legislative Regulations on Reuse of Waste Waters”, “Points to Take into Consideration in Using Treated Waste Waters for Landscape Irrigation Purposes and in Reservoirs”, “Rainwater Harvesting and its Feasibility in Tourism Facilities” and “ Alternatives and Recommendations for Waste Water Recycling in Tourism”. Additionally, within the project, a technical visit was paid to a tourism facility that was selected as pilot facility.

At the end of the two-year project, condition of present infrastructure facilities were identified and feasibility works on improving the condition were completed. Later, investment needs were determined for places which doesn’t hold waste water treatment facilities and infrastructure or need improvement. Possible expenses for revision works of present infrastructure and waste water treatment facilities were identified and a demonstration project was carried out in a selected pilot tourism facility about recycling and reuse of waste waters to set an example for an effective water use and reducing pollution of receiving environments with the intend of ensuring sustainability of sea tourism which is crucial for our country.

Also, on the web site created within the project:

- Links were provided on the concepts of waste water recycling and reuse and their tools, other related concepts, tools, works carried out in our country and educational documents, national/international web resources and databases etc. The project was introduced and project documents and news were published.
- Educational documents and guides on strategies and principles of waste water recycling and reuse were prepared.
- A detailed Handbook of Recycling and Reuse, including technical, economic and administrative analysis, was prepared.

Within the scope of the project, web-based applications (http://turkiyeplajlari.cevre.gov.tr/) a tool for calculation of recycled waste water for hotels (http://www.csb.gov.tr/projeler/tay/) are available on the internet.

C.4.4. Action Plan for Wastewater Treatment

Current Wastewater Treatment Action Plan (WTAP) that had been prepared in a way to cover the years 2008-2012 was revised. Within this process, a revised Wastewater Treatment Action Plan was prepared for the years 2014-2023, by evaluating the achievement status of aims and strategies, legislation, wastewater infrastructure services and investments stated in the previous WTAP in 2008-2013 period.

With the WTAP, current status of urban wastewater infrastructure investments by all the municipalities over the country was determined, data was obtained on the amount of investments including spendings on renewal of urban wastewater infrastructures constructed between 2008-2013 (wastewater treatment plants and sewerage network investments) and on the distribution of the amount of investments by years and by source of financing (from central authorities, local authorities, public-private partnership, bilateral cooperation, EU fundings and other grants and sources), wastewater infrastructure conditions of all active Organized Industrial Zones, Free Zones and Industrial Areas were determined in order to reveal current condition of infrastructures of industrial facilities over the country.

Through the Action Plan, not only priorities of the Ministry of Environment and Urbanisation were addressed, but also necessary wastewater treatment plants (WTP) were prioritized so that the aims in Strategic Plan of the Ministry of Environment and Urbanisation could be achieved.

Thanks to the WTAP, 1501 Wastewater Treatment Plants (1.418 new WTP and 83 renewed WTP) will be established between 2015-2023

It has also been determined that there is a financial need of 37.052.677.055 TL in order to meet the expenses both for initial investments and renewal and for the expenditures that can emerge during the operation process.

In addition to this, it has been projected that 7.880.383.346 TL of the initial WTP investments will be covered from national resources, 890.919.365 TL from IPA funds, and expenses of initial investment (14.461.469.151 TL) and renewal (10.800.000.000 TL) of sewerage system will be covered from national resources and WTP operation expenses (3.019.905.193 TL) will be covered by the municipalities.

C.5. Action Plan for Preventing Pollution in Gediz Basin

Some prioritization works were carried out by the Ministry of Environment and Urbanisation for 25 river basins in our country by considering water pollution in an attempt to handle water resources on basin basis. Gediz Basin was placed among the priority basins at the end of these works.

“Action Plan for Preventing Pollution in Gediz Basin” was prepared with the objective to protect the environment and human health in Gediz River basin, ensure sustainability of economic activities, bring point and nonpoint source pollution under control to prevent pollution and improve water quality in the basin.

Within the scope of the Action Plan, prospective projections were made by determining available water resources and water quality in the basin, assessment of threats and potentials was made by considering different sectors and resource beneficiaries

concomitantly, and a program of short, medium and long term measurements was prepared in order to improve water quality in the basin. It is foreseen that, when the short and medium term measures have been put into use, water quality of Gediz River will improve from Class IV to Class III; and when long term measurements are carried out, the quality will improve to Class II.

Making necessary plans for completing the works on waste disposal facilities and wastewater infrastructure by relevant municipalities, OIA authorities and industrial facilities in order to bring point source pollution in the basin under control as soon as possible, developing necessary personnel and equipment infrastructure, choosing new technologies and adopting innovative approaches and obtaining necessary environmental permits will contribute to the process in achieving the aims.

Additionally, thanks to the process of gradually making online monitoring obligatory for all industrial facilities according to flow rate in the basin, the Ministry of Environment and Urbanisation will be able to monitor wastewater discharge of all kinds of industrial facilities in long term, regardless of wastewater flow. By this means, not only discharges of industrial facilities into receiving environments will be monitored and controlled effectively, but also it will be possible to monitor the pollution in the receiving environment continuously.

Within this scope, the works on putting the action plan into effect on the dates stated in Action Plan for Preventing Pollution in Gediz Basin, which has been prepared to improve water quality in Gediz River Basin that has an important place in national economy, is still progress.

C.6. Water Management Plans

C.6.1. River Basin Management Plans

One of the criteria of closing the Environmental Chapter for Turkey, which is in process of being a member of European Union, is alignment of Water Frame Directive and preparing river basin management plans for 25 basins. Water Framework Directive numbered 2000/60/EC aims to maintain and control the amount and quality of water resources and adopts basin-based integrated management approach. Integrated basin management enables a balance between socio-economic and nature protection purposes. Thus, the Directive adopts integrated basin management approach as the most efficient way of ensuring sustainable water consumption. This approach requires a coordinated planning process for any kind of surface, ground and coastal waters.

Basin Master Plans have been prepared by the General Directorate of State Hydraulic Works on the purpose of; preparing a water budget by doing researches on water potential and quality in the basins, land use status, land resources, water consumption and demand; determining utilization priorities of the potential and possible water need; investigating supplying methods and identifying technical, economic and environmental feasibility.

Tenders were made for preparing 24 basin master plans (Seyhan, Akarçay, Closed Basin of Van, Sakarya, Büyük Menderes, Ceyhan, Meriç-Ergene, Closed Basin of Konya, Eastern Black Sea, Antalya, Susurluk, Aras, Yeşilırmak, Western Mediterranean, Western Black Sea, Kızılırmak, Fırat Alt, Dicle Alt, Asi, Eastern Mediterranean, Marmara, Burdur, Çoruh, Küçük Menderes, Northern Aegean, Gediz). Basin Master Plans for Seyhan and Akarçay have been completed and the others are under progress.

Within the scope of the projects developed by the General Directorate of State Hydraulic Works, water quality monitoring activities from planning stage have been performed since 1979. Water quality monitoring activities have been carried out by Regional Directorates of General Directorate of State Hydraulic Works in 6 basins as of 2014 (Ergene, Closed Basin of Konya, Susurluk, Büyük Menderes, Sakarya, Akarçay) and in 7 basins as of 2015 (Yeşilırmak, Western Black Sea, Seyhan, Ceyhan, Eastern Mediterranean, Western Black Sea, Asi), within the scope of monitoring programs prepared by the Ministry of Forestry and Water Affairs in concordance with EU Water Framework Directive. Monitoring activities are also carried out in other basins for quality of general purpose water and water for human consumption. Monitoring programs that cover monitoring points and monitoring parameters pursuant to requirements of EU Water Framework Directive have been completed for all basins as of 2015.

The "Project for the Conversion of River Basin Action Plans to River Basin Management Plans", which has been carried out by the Ministry of Forestry and Water Affairs, started on 29 December 2014 and it is planned to finish the project on 29 December 2017. By means of the project, it is aimed to carry out works on converting River Basin Action Plans into River Basin Management Plans within the frame of European Union Water Framework Directive and other related directives, and enhance the national capacity during this process. Within the project, characterization report, report on important water management topics, monitoring report, report on environmental objectives, measures report and river basin management plans covering all these works will be prepared for Büyük Menderes, Meriç – Ergene, Susurluk and Konya basins. Thanks to the project, a new management model will be developed in which water resources will be assesses in terms of the amount and quality. It is planned to complete river basin management plans for other basins until 2020.

C.6.2. Action Plans for River Basin Protection

By means of preparing integrated basin protection plans in order to protect water resources, prevent pollution, improve their quality, Basin Protection Action Plans have been prepared for 25 river basins by the Ministry of Forestry and Water Affairs as of 2013 with a view to control developments and utilization of the resources. Measures and implementation work calendars were involved as annexes in "National Basin Management Strategy" published in the Official Gazette on 4 July 2014 after being approved by Higher Planning Council.

During the process of preparing Basin Protection Action Plan, short, medium and long term measures were determined in cooperation with all stakeholders of the basin with the objectives to; determine the amount, quality and pollution state of available surface, ground and coastal waters in the basin and determine the pressures and effects on basin due to urban, industrial, agricultural and economic activities; analyze amount and utilization potential of water resources in the basin and analyze pollution sources and loads identified in the basin; prepare water quality maps; determine the condition of environmental infrastructure; protect the basin, reduce pollution and improve the basin. Follow-up studies on the implementation of mentioned measures are continuing.

Within this context, in order to enable all stakeholders to work in cooperation and coordination on water management in the basin, 26 Basin Management Commissions were established in 25 basins in 2013 under the provisions of the "Communique on Establishment, Duties and Working procedures and Principles of Basin Management Commissions" prepared by the Ministry of Forestry and Water Affairs and published in the Official Gazette No. 28681 dated 18 June 2013. The communique was revised and promulgated after being published in the Official Gazette No. 29361 dated 20 May 2015. Through the revised communique, Basin Management Commissions were re-established and Provincial Water Management Coordinating Boards were established in 81 provinces. The works performed in relation with the measures stated in action plans are monitored by Water Management Coordinating Boards and Basin Management Central Boards in the centers, by Basin Management Commissions in basins and by Provincial Water Management Coordinating Boards in provinces.

C.6.2.1. Basin Action Plans

C.6.2.1.1. Action Plan for Sub-Basin of Nilüfer Creek

Within the scope of quality improvement works for Nilüfer Creek in Bursa Province, Water Quality Action Plan for Sub-Basin of Nilüfer Creek was put into practice in 2014. Within the action plan, the factors affecting water quality was handled holistically and 15 actions to be taken in coordination with relevant institutions and organizations were determined.

C.6.2.1.2. Action Plan for Sacır Brook and Nizip Creek

On the purpose of solving the water quality problems in Sacır Brook and Nizip Creek in Gaziantep Province, "Action Plan for Water Quality Improvement in Sacır Brook and Nizip Creek" was prepared in coordination with the Ministry and the Circular "Letter on Action Plan for Water Quality Improvement in Sacır Brook and Nizip Creek" numbered 2015/2 was signed on 20.10.2015 and put into effect to ensure the application of Action plan in a sensitive and disciplined way by responsible institutions and organizations.

Within the scope of the action plan, 12 actions for Nizip Creek and 6 Actions for Sacır Brook were determined by considering the pollution pressure in the basin and its possible effects.

C.6.2.1.3. Water Quality Action Plan for Sub-basin of Boğazköy Dam Reservoir

In September 2014,Water Quality Action Plan for Sub-basin of Boğazköy Dam Reservoir was put into practice in order to improve water quality in Boğazköy Dam Reservoir, which is in Bursa Province and was built to provide irrigation on Yenişehir Plain, and influent water resources and bring the water quality in the dam to a level suitable for irrigation. Within the action plan, the factors affecting water quality was handled holistically and 7 actions to be taken in coordination with relevant institutions and organizations were determined.

C.6.2.1.4. Action Plan for Protection of Sub-basin of Melen Creek

As most of the need for water for human consumption in Istanbul will be met through exploitation of Büyük Melen Water System in 2020, necessary emergency plans had to be prepared in order to maintain water quality and amount and prevent water pollution. Thus, the “Action Plan for Protection of Sub-basin of Melen Creek” was prepared in coordination with the Ministry of Forestry and Water Affairs and the “Circular on Action Plan for Protection of Sub-basin of Melen Creek numbered 2015/5” entered into force after being published in the Official Gazette N. 29453 dated 22.08.2015. Within the action plan, the factors affecting water quality was handled holistically and 15 actions to be taken in coordination with relevant institutions and organizations were determined. Preparation works of the work calendar including these actions is still under progress.

C.6.2.1.5. Water Quality Action Plan for Sub-basin of Lake Ilgın (Çavuşçu), Action Plan for Protection of Lake Mogan-Eymir Basin, Water Quality Action Plan for Sub-basin of Lake Manyas and Water Quality Action Plan for Lake Uluabat

Action Plans have been prepared and put into practice for Lake Ilgın, Lake Uluabat, Lake Manyas and Lake Mogan. Action Plan preparing works for Lake Aksehir-Eber, Lake Gala and Demirköprü Dam are still under progress.

C.6.2.1.6. Action Plan for Management of Lake Burdur Basin

Sub-basin of Lake Burdur was analyzed in detail in order to prevent low water in Lake Burdur and protect the basin water against pollution risks and data on water resources and structures in the basin, treatments, discharges and land use was prepared, and necessary actions were determined and planned towards improving water quality and protecting and improving the environment in the basin. Within this direction, “Action Plan for Sub-basin of Lake Burdur” was prepared in order to improve and maintain water quality in the lake by considering the balance between sustainable and integrated utilization and protection of the quality and amount of the water.

Circular on Action Plan for Sub-basin of Lake Burdur numbered 2015/4 was signed on 13.11.2015 and put into effect to ensure the application of Action plan in a sensitive and disciplined way by responsible institutions and organizations in coordination with the Ministry of Forestry and Water Affairs.

Developments regarding the work calendar on determined actions have been followed regularly through meetings that are held every three months. Within the scope of the action plan, pressures on the lake, their effects and general condition of the basin was assessed and findings in the basin and necessary measures were collected under 9 main topics.

C.6.2.1.7. Action Plan for Groundwater Management

The “Action Plan”, prepared in order to direct the implementations of the By Law on the Protection of Groundwater against Pollution and Degradation, was signed in 11.07.2013 as an annex of Circular of the Ministry numbered 2013/5 and put into effect. Through the Action Plan, the theoretical activities and processes stated in the By Law was turned into practices and detailed schedules.

C.6.3. Monitoring Activities for Domestic and Industrial Pollution in Basins

The role of monitoring is very important in developing, implementing and assessing environmental policies. Requirements of National legislation and European Union legislation also stresses the importance of monitoring. The duty of "monitoring receiving environments and building necessary infrastructure…" was imposed on the Ministry pursuant to the Decree Law N. 644 on the Organization and Duties of the Ministry of Environment and Urbanisation.

Within this scope, Domestic and Industrial Pollution Monitoring Program (DIPMP) was prepared and monitoring activities have been carried out since 2012. It was aimed through the program to carry out water monitoring activities in the receiving environments of Ergene, Küçük Menderes, Gediz and Northern Aegean basins, determine hot spots, take necessary measures against pollution in the basin and obtain data. Samples are taken from the basins seasonally and analyzed in mobile water and wastewater laboratories and Environmental Reference Laboratory (ERL) in accordance with Surface Water Quality Management By Law; In 2014, Sakarya and Susurluk Basins were also included in the basins to be monitored and the scope of monitoring activities was expanded.




When the average results of 2014 is evaluated within the frame of Surface Water Quality Management By Law, Ergene River holds Class IV water in term of general condition, (A) oxygenation Parameters, (B) Nutrient Parameters and (D) Bacteriological Parameters, and it is in Class III in terms of (C) Trace Metals. Gediz River water quality is in Class IV in terms of (A) oxygenation Parameters, (B) Nutrient Parameters, (C) Trace Metals and (D) Bacteriological Parameters, and it is in Class III in terms of general condition. Bakırçay River water quality is in Class IV in terms of (A) oxygenation Parameters, (B) Nutrient Parameters and (D) Bacteriological Parameters, and it is in Class III in terms of (C) Trace Metals and in Class II in terms of general condition. K. Menderes water quality is in Class IV in terms of general condition, (A) oxygenation Parameters, (B) Nutrient Parameters and (D) Bacteriological Parameters, in Class II in terms of (C) Trace Metals. Susurluk River water quality is in Class III in terms of general condition, in Class IV in terms of (A) oxygenation Parameters, (B) Nutrient Parameters and (D) Bacteriological Parameters and in Class II in terms of (C) Trace Metals. Sakarya River water quality is in Class III in terms of general condition, and in Class IV in terms of (A) oxygenation Parameters, (B) Nutrient Parameters, (C) Trace Metals and (D) Bacteriological Parameters.

Table 55 – The most polluted points identified in the basins. (Ministry of Environment and Urbanisation, 2015)

Ergene Basin	ERG-05 (Çorlu Creek/Tekirdağ) ERG-09 (Evrensekiz Creek/Kırklareli) ERG-07 (Bridge on Çorlu Velimeşe Entrance, Çorlu)
Gediz Basin	GDZ-15 (Nif Creek/Latter part of Kemalpaşa OIA /İzmir) GDZ-11 (Ilıcak Brook, Manisa)
Northern Aegean Basin	BÇ-02 (Bakırçay River, Soma Exit/Manisa) BÇ-04 (Bakırçay River, İzmir Entrance/İzmir)
K. Menderes Basin	KM-03 (Ödemiş Tire Highway, K. Menderes Bridge) KM-04 (D550 İzmir-Aydın highway, The area below the bridge before Belevi, Selçuk)
Susurluk Basin	SU-15 (Nilüfer Creek, Çekrice Village, Nilüfer/Bursa) SU-14 (Nilüfer Creek, Osmangazi/Bursa)
Sakarya Basin	SKY-05 (Porsuk Creek, Kütahya) SKY-08 (Porsuk Creek, Eskişehir Exit) SKY-12 (Ankara Creek, Polatlı) SKY-13 (Sakarya River, Beypazarı) SKY-14 (Sakarya River, Eskişehir)

When pollution trends in the basins are examined it is seen that, in 2014 compared to 2013; in Ergene Basin, there was a decrease in chemical oxygen demand (COD), biochemical oxygen demand (BOD) and an increase in dissolved oxygen (DO), nitrite nitrogen, ammonium nitrogen and Total Kjeldahl Nitrogen (TKN) parameters; in Gediz Basin, there was a decrease in DO parameter and increase in all other parameters; in Northern Aegean Basin, there was a decrease in DO, conductivity, sulphate, nitrate and heavy metals parameters and increase in all other parameters; in Küçük Menderes Basin, there was a decrease in DO and heavy metals parameters and increase in all other parameters.

Moreover, within the scope of Basin Monitoring Programs prepared by the Ministry of Forestry and Water Affairs, water quality monitoring activities started by the General Directorate of State Hydraulic Works in 6 basins (Closed basins of Akarçay, Susurluk, Ergene, Büyük Menderes, Sakarya, Konya) as of 1 October 2014 and in 7 basins (Asi, Seyhan, Ceyhan, Western Mediterranean, Western Black Sea, Eastern Mediterranean and Yeşilırmak Basins) as of 1 January 2015. And the monitoring activities will continue in 2016. Monitoring activities will also start in 12 basins (Marmara, Küçük Menderes, Burdur, Antalya, Gediz, Northern Aegean, Aras, Çoruh, Lake Van, Fırat-Dicle, Eastern Black Sea and Kızılırmak basins) as of 1 January 2016.

Within the scope of the Project on Building a National Water Quality Ecological Assessment System, chemical, biological and hydromorphological quality factors have been monitored for 1 year in 8 basins (Lower Fırat, Western Black Sea, Eastern Black Sea, Aras, Sakarya, Northern Aegean, Western Mediterranean, Ceyhan basins) that represent various climatic and geographic conditions of our country and at the end of the project, an ecological assessment system, including biological indexes, reference conditions and class threshold values, will be founded. Thanks to this system, all monitoring results will be assessed chemically and biologically and water quality status of the basins will be identified more accurately.

C.6.4. Water Leakage Control

Depending upon the increase in population and level of income, consumption of the water intended for human consumption also increased, and the demand for water is rising more and more in our country. It is a costly and toilsome work, both economically and technically, to find new water resources, treat the water from the source in order to bring it into a quality of drinkable water and supply this water to consumers in residential areas through water supply network. Thus it is of great importance to reduce leakages and water loss in water supply network, use water economically and give priority to works on water efficiency before

searching for new resources in the process of satisfying the demands for drink water. According to current data, there is a 44% water loss through the network for water intended for human consumption. This situation of losing water in the process of delivery after a long treatment process due to various reasons and thus failing a targeted and efficient use not only increases the unnecessary pressure on water resources but it also causes increase in prices of water.

Works on tracking, control and prevention of water leakages has started in our country. Within this direction, the "By Law on the Control of Water Leakages on Drinking Water Supply and Distribution System" was prepared and published in the Official Gazette N. 28994 dated 8 May 2014. The purpose of the By Law is designating the procedures and principles on the control of water leakages on supply and distribution system of water intended for human consumption in order to ensure an effective use of water intended for human consumption and prevent water waste, in line with the purpose of protecting water resources and increasing the efficiency. Within the By Law; duties and responsibilities of water administrations in supply, delivery and distribution of water were determined; and water administrations became obliged to reduce water leakages to specific levels according to their populations between specified years from the effective date of this By Law.

Within the scope of the By Law; issues about concentrating on infrastructure investments and control and monitoring systems were addressed in order to reduce water leakages to reasonable levels in our country; principles on using continuous flow rate and volume measurement devices, continuous monitoring and control of the network through digitization of the network, building necessary technological infrastructure, technical maintenance and renewal works and building necessary technical capacity were determined; preparing an annual report to prepare an inventory of water leakages became compulsory. Within the process of combatting with water leakages in our country, important duties fall to the municipalities that are responsible for management of water supply networks.

A Communique on Technical Procedures was prepared with a view to guide water administrations and municipalities and elaborate the principles stated in By Law on the Control of Water Leakages on drinking Water Supply and Distribution System and the communique entered in force after being published in the Official Gazette N. 29418 dated 16 July 2015. Through the communique, issues on management of supply and distribution of water intended for human purposes, measures towards reducing water leakages in water supply networks, locating the leakages and reduction methods will be explained and some standards will be brought to these issues.

In addition to leakages from drink water supply network, there are also substantial amount of leakages from irrigation water used in agricultural sector which has the highest share of 74% water use. The "Draft By Law on the Control of Water Use in Irrigation Systems and Reducing Water Leakages" was prepared by a work group consisting of expert from the Ministry of Food, Agriculture and Livestock, General Directorate for State Hydraulic Works as well as the Ministry of Forestry and Water Affairs.

This By Law will include provisions on; duties and responsibilities of any organization, facility and legal and natural entity that operates irrigation facilities to provide services of irrigation water supply, towards improving irrigation water efficiency; increasing efficiency in providing, delivering and distributing irrigation water and in rehabilitation and utilization of present networks; reducing the leakages and administrative sanctions.

C.6.5. Water Footprint

Water footprint is a parameter that shows the amount of water consumed by humans. Average annual water foot print of the world is around 1,24 million liters and Turkey is over the average value with a water footprint of 1,61 million liters. Eliciting water footprint of our country is important with regards to provide an efficient use of water resources. Thus, "Project of Turkey›s Water Footprint", which started on 13 February 2013, was completed in March 2014. Within the scope of this project, conducted to reveal our water need and the effects of human consumption on our water resources; Turkey's water footprint was calculated (Table 3 and Table 4), virtual water flow was quantified, water footprint values were calculated for four products, water footprint for import/export and production/consumption was calculated and recommendations were made to key stakeholders according to the obtained results. Moreover, it is planned to calculate sectoral water footprint in selected pilot basin and the results will be included in the processes of basin management plans.

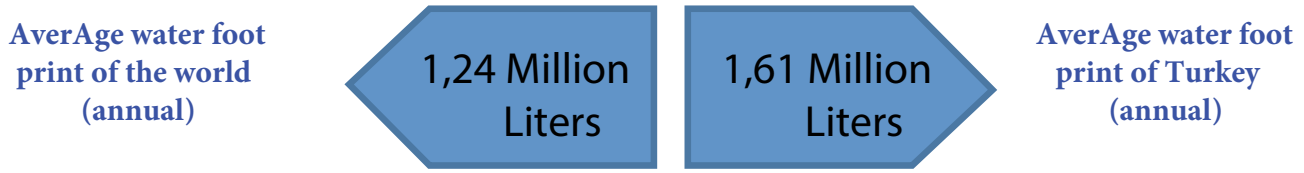


Figure 3 - Average Annual Water Foot Print of the World and Turkey (Ministry of Forestry and Water Affairs, 2016)

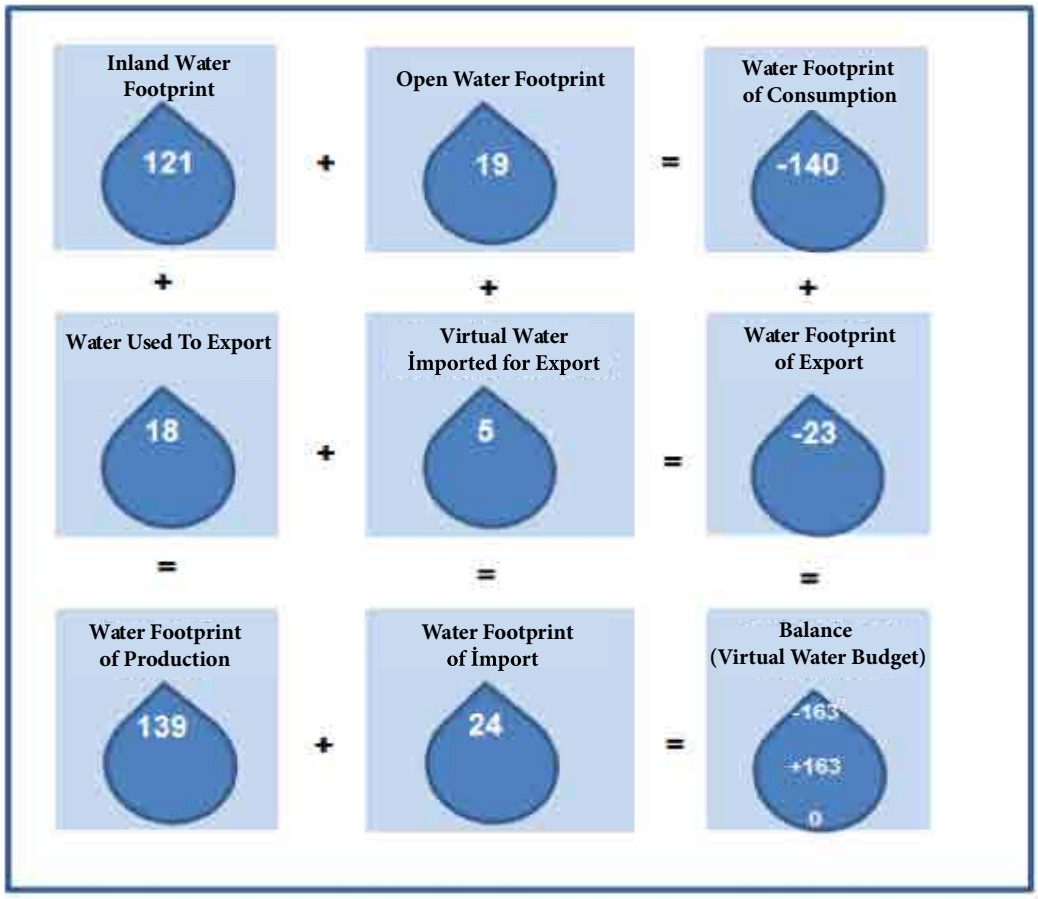


Figure 4 - Water foot print of Turkey (million m³/year) (Turkey's Water Footprint Report) (Ministry of Forestry and Water Affairs, 2016)

C.6.6. Sectoral Water Allocation Plan

Increased demand and need for water resources have made it necessary to utilize present water resources in the most efficient way within economic, environmental and social interests. Within this context, works on preparing the "Project for Preparing Sectoral Water Allocation Plan for Seyhan Basin" started on 29 April 2015, with the intent of ensuring a balanced and fair utilization of water resources in the basin and providing water for all sectors. Basin-based sectoral water allocation works will be carried out for the first time in our country thanks to this project and it will serve as a model for other sectoral allocation plans that will be prepared for other basins.

Within the project, hydrologic structure of Seyhan Basin will be documented on the basis of water year and potential of water resources will be determined in order to provide a guide document for authorized and responsible institutions during the process of implementing the decisions on water management. It is aimed to provide a balance for sustainable utilization of water resources and, in line with this aim, various water allocation scenarios on meeting the demands of such sectors as human consumption, environment, agriculture, energy and industry will be handled through environmental and economic analysis.

Optimization of sectoral water use in the basin will be enabled thanks to this approach. Within this context, by considering the present condition, a sectoral water allocation plan will be prepared, and social, economic and environmental aims and expectations and interaction of these aims will be taken into consideration within the plan.

C.6.7. Flood Management Plans

Directive 2007/60/EC on the Assessment and Management of Flood Risks (Flood Directive) entered into force in 2007 in European Union and aims to create an environment that aspires to reduce the adverse effects of floods on human health, environment, cultural heritage and economic activities by enabling flood risk assessment and management. Works on adaptation to Flood Directive within the frame of membership process to European Union and preparation of flood management plans for 25 basins are under progress. Within this scope, "EU Twinning Project for Capacity Building to Implement the Flood Directive", which was the first step in management of flood risks in basins, was carried out between 2012-2014. Within the project, legal and institutional gaps were analyzed, provisions of Flood Directive were implemented in a pilot basin and works on preparing a national draft implementation plan for implementation of Flood Directive were carried out.

Preparation works of Flood Management Plans for all basins in the country started in 2013 and within this process, pre-assessment of flood risk in basins have been carried out; Flood Hazard Maps and Flood Risk Maps have been prepared for risky areas that are selected within flood risk pre-assessment; all the data is evaluated and Flood Management Plans that includes necessary measures for risk management have been prepared. In line with this process, Flood Management Plan have been completed for Yeşilırmak Basin, and plan for Antalya Basin will be prepared in 2016 and for Susurluk, Sakarya and Ceyhan Basins in 2018. It is targeted to complete flood management plans for all basins in the country until 2021.

C.6.8. Drought Management Plans

Preparation works of Drought Management Plans for all basins in the country started in 2013. Within this purpose, works on drought and risk analysis, preparation of drought maps, identification of possible changes in water resources depending on water budget climate change projections, sector impact analysis and preparation of drought database have been carried out.

All the information obtained through these works are evaluated and Drought Management Plan, which includes measures to be taken before, during and after the drought, is prepared in order to reduce adverse effects of drought on economy, society and environment. Drought Management Plans for Akarçay Basin and Konya Basin was completed in 2015 and it is aimed to complete drought management plans for all basins in the country until 2023.

C.6.9. Works on Determining the Effects of Climate Change on Water Resources

Turkey is located on Mediterranean basin which is known to be the most affected region by climate change and thus it is among the countries that are under high risk of being affected from adverse effects of climate change. First of all, it should be understood what the effects are in order to reduce and manage these effects. Due to its vast geography, effects of the climate change will vary temporally and spatially. Thus, it is of top priority to investigate the effects of climate change on water resources in the basins and sub-basins.

Within this framework, the "Project for Investigating the Effects of Climate Change on Water Resources" was initiated by the Ministry of Forestry and Water Affairs in 2013. Within the project, effects of climate change on surface and ground waters in the basins will be identified for 2015-2100 period and adaptation activities will be determined. The project has been implemented in 25 basins in a way to cover the whole country.

Within the project; climate projections in 10x10 km resolution have been prepared by using HadGEM2-ES, MPI-ESM-MR and CNRM-CM5 models that have been selected from CMIP5 archive which provides the basis for 5th Assessment Report of Intergovernmental Panel on Climate Change (IPCC) and changes in surface and groundwater budget in basins and groundwater potentials are determined by converting projected precipitation values into flow values thanks to hydrologic modelling approach. Through the use of hydrologic modelling method, information on changes in water levels in river system and tributaries is obtained.

Moreover, works on determining the effects of climate changes on 4 main sectors (water for human consumption, agriculture, industry and ecosystem) in terms of water resources in three pilot basins including Büyük Menderes, Ceyhan and Meriç-Ergene have been carried out and identification of adaptation activities for these sectors have been performed.

C.7. Soil Pollution and Control

An international project for "Determination of Plant Nutrient and Potential Toxic Element Scopes of Farmlands in Turkey, Creation of Database and Mapping" have been conducted by the General Directorate of Agricultural Research and Policies, within the works towards Soil Pollution and Control.

The project aims to; determine fertility condition of farmlands in Turkey at local, regional and national level and their potential toxic element content, prepare maps for distribution of lands according to their parametric features, and form a basis for a reliable-inquirable national soil database. Within this scope, 50.000 soil samples taken according to 2,5 km x 2,5 grid system representing all farmlands in Turkey will be analyzed for fertility parameters (structure, water saturation, soil reaction, electrical conductivity, lime, organic matter, available phosphorus, total N, extractable K, Ca, Mg, Na and B, available Fe, Cu, Zn, Mn Al, Pb, Cd, Cr, Cu, Ni, Co and potential toxic element content Cu, Zn, Ni, Cd, Cr, Fe, Mn, Mg, Ca, Na, K, P, Pb and Co).

The most important outputs of this project will be: the database which will include information on fertility status of Turkey's lands and scope of macro and micro plant nutrients and potential toxic element content, GIS supported national 1/100000 scale maps on distribution of soils according to their features, monitoring temporal changes in soil features and gaining softwares that enable entering new point data into the system.

Efficient utilization and protection of national soil resources is possible only through determination of natural source inventory and the potential and monitoring the temporal changes.

Additionally, environmental protection is supported through sewer pipe laying works within the scope of outsourced projects. In line with this process, sewerage works were carried out in 30 villages under Sivas Erzincan Development Project (SEDP) and sewerage service was provided for 10.878 residents. Also, 1.200 residents benefited from sewerage works carried out in 13 villages under Diyarbakır Batman Siirt Development Project.

Farmer training programs have been held in areas within the project and through these training programs it is aimed to prevent misuse and overuse of fertilizers and pesticides. Within the frame of this aim, 81 farmer training sessions were held for 2088 farmers under Diyarbakır Batman Siirt Development Project (DBSDP). Awareness raising trainings and tours were organized for 15.881 under SEDP.

C.7.1. Point Source Pollution Areas

Soil is a natural mass which is formed through disintegration and weathering of parent material in time under the effect of climate and living organisms and various topographic conditions. It is an animate mass due to important physical, chemical and biological events taking place inside and it is a natural mass that provides physical support and nutrient for plants.

Soil is not only an economic resource, but it is also one of the most important natural resources due to its ecological elements such as climate, soil, flora and fauna. Achievement of balanced economic and social development is closely related with identification of these resources under the light of scientific data by considering the national needs.

Within the By Law on Control of Soil Pollution and Areas of Point Source Pollution that entered into force after being published in the Official Gazette N. 27605 dated 08 June 2010, point source soil pollution is defined as; pollution from point sources such as spills and leakages that happens as a result of the accidents during collection, transportation, temporary or interim storage, recycling, reuse and disposal of hazardous wastes, or as a result of implementing above mentioned activities on hazardous wastes without considering the legislation, or as a result of the disasters or accidents during storage and transportation of some hazardous chemical substances in industrial facilities; and area of point source pollution is defined as an area which is deemed to pose important threat for human and environmental health at the end of evaluations considering the provisions of

the legislation, present land use and possible future land use and where pollutive substances resulting from human activities are found and decided to be cleaned.

Class VII areas have the biggest share in Turkey with a surface of 6.631.209 ha followed by Class II with a surface of 5.078.363. Class V and VIII have the smallest share in farmlands of the country. The potential of the area where treatment sludge can be used is 19.738.211 ha (except the areas of Class I, II, and VIII)

C.7.2. Use of Treatment Sludge in Soil

Domestic and urban treatment sludge is a valuable resource for supporting soils with low nutrient content when used in a controlled manner. In sludge applications, organic substances increase total porosity substantially and provides a good soil structure.

It is not an effective solution to use inorganic nitrogenous fertilizers in land improvement activities since these fertilizers may totally dissolve and have a high level of efficiency. Therefore, instead of satisfying the nitrogen need of soil at once, it is better to provide soil with nitrogen at different times during the year so as to prevent possible leakage problems. A great amount of the nitrogen and phosphorus in treatment sludge is in organic from and turns into a suitable form for plants as a result of mineralization. So, the nitrogen need of the land is satisfied through the application of treatment sludge into the soil at once.
Within the scope of the By Law on Utilization of Domestic and Urban Treatment Sludge in Soil, it was permitted to use 62.579 tons of treatment sludge over 7.091 decares of land in 12 provinces. Table 56 provides information on the number of Stabilized Treatment Sludge Permit Licenses and the amount of treatment sludge used in soil.

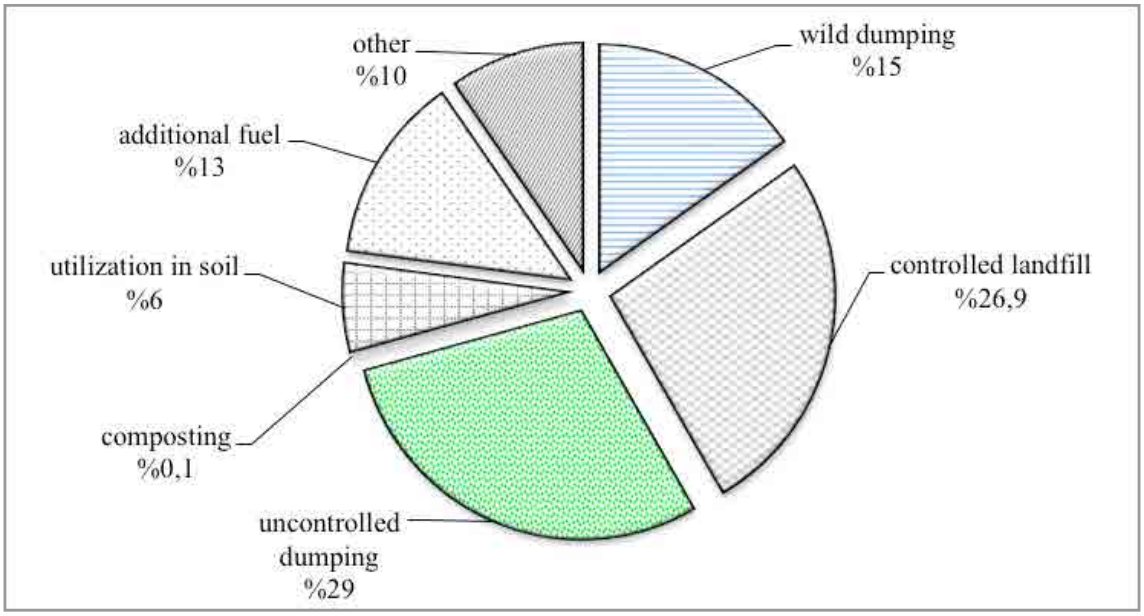
Table 56 - Treatment sludge permits and area of soil with treatment sludge application (Ministry of Environment and Urbanisation, 2016)

YEAR	Number of Treatment Sludge Producers	Amount of Treatment Sludge Applied in Soil (ton)	Area of Soil with Treatment Sludge Application (da)
2002	1	42	30
2003	2	1.036	480
2004	3	623	502
2005	4	422	451
2006	4	1.464	1.022
2007	2	238	525
2008	3	161	1.729
2009	1	54	27
2011	1	59	45
2012	1	10.400	1.040
2013	1	80	40
2014	1	48.000	1.200
Toplam	**24**	**62.579**	**7.091**

Information on the year 2015 is not provided since it was not permitted to use treatment sludge in soil in 2015 within the scope of the By Law on Utilization of Domestic and Urban Treatment Sludge in Soil.

Within the scope of the works under the TÜBİTAK KAMAG Project N.108G167 for Domestic/Urban Treatment Waste, treatment sludge disposal methods in domestic/urban wastewater treatment facilities in Turkey was determined according to amounts of sludge and the distribution of disposal methods is provided on Graph 23 according to sludge amounts.

It is calculated by using the data obtained through researches within the project that the annual amount of treatment sludge produced in domestic and urban wastewater treatment facilities in 2014 is 620.907,09 tons of dry matter and it is foreseen that this amount will reach to 895.581,92 tons of dry matter in 2023.



Graph 23 - Management methods of municipal treatment sludge (Results of KAMAG Project numbered 108G167) (Ministry of Environment and Urbanisation, 2015)

C.7.3. Works on Control and Prevention of Pollution from Agricultural Activities

Within the scope of the works on harmonization with European Union by the Ministry of Food, Agriculture and Livestock, Directive 91/676/EEC concerning the Protection of Waters against Pollution caused by Nitrates from Agricultural Sources was published on 18 February 2004.

Provisions of the by-law covers:

- Determination of waters that are polluted or under the risk of pollution,
- Determination of nitrate sensitive areas,
- Preparing codes of good agricultural practices,
- Preparing agricultural action plans for sensitive areas,
- Establishing monitoring network and reporting system,
- Conducting activities for raising awareness of farmers and public.

Within the scope of the projects carried out by the Ministry of Food, Agriculture and Livestock for implementation of by-law provisions and improving institutional capacity;

1- 20 mobile laboratory was purchased and it was made possible to carry out monitoring on site.

2- Nitrate monitoring network has been enhanced and water monitoring activities have been carried out at 2.947 points. Number of monitoring points will be increased in order to increase representational accuracy of water monitoring network.

3- Obtained data has been entered onto Nitrate Information System at real time.

4- Potential Nitrate Sensitive Areas have been determined. Nitrate Sensitive Areas (NSA) for the year 2015 will be announced according to monitoring results.

5- Training sessions were held for Ministry Central Organization and provincial organizations staff so as to increase capacity on Implementation of Nitrate Directive, and 1.305 people were trained during these sessions.

6- "Codes of Good agricultural practices" draft, which included measures towards preventing pollution caused by agricultural activities in Nitrate Sensitive Areas, was prepared. Works on the draft are still in progress and it will be published in 2015.

7- Necessary legislative regulations for supporting measures towards prevention of pollution caused by agricultural activities will be performed.

8- Farmer and public awareness on Codes of Good Agricultural Practices, aiming to prevent pollution caused by agricultural activities, will be raised through use of written and visual media.

Works on according Turkish agricultural system to European green agricultural practices will be carried out within the scope of the "Project for Adapting Turkish Agricultural System to European Union Green Agricultural Practices and Capacity Building" which will be carried out between 2015 - 2016. These works will focus on agricultural-environmental measures determined under rural development plans, pollution from agricultural activities, climate change and biodiversity.

C.8. Legislative Regulations and Developments on Water Management

1982 Constitution includes basic principles related to water management (Article 168): Natural wealth and resources (water resources) shall be under the authority and at the disposal of the State. The right to explore and exploit these belongs to the State. Environmental rights are presented as human rights in the Article 56: "Everyone has the right to live in a healthy and balanced environment. It is the duty of the State and citizens to improve the natural environment, to protect the environmental health and to prevent environmental pollution." According to the Constitution, water resources are within public sphere and the right to utilize water is ensured provided that public and welfare common prosperity are considered by public institutions.

Civil Code (2001) handles water in two categories: public water resources and water under private law and private property. This categorization is stated in the 715th Article of the Civil Code: unowned places and properties whose benefits belong to the public shall be under the control and disposition of the State. Article 756 codifies resources under private property and states that "any spring is an integral part of the land, the ownership of a spring may be allowed only together with the ownership of the land" (Coşkun, 2003). Civil Code also refers to pollution: in the event of pollution or degradation of water resources, Article 757 stipulates compensation and Article 758 stipulates reinstatement of the resources.

Rights of use accorded by public institutions include right of use, and they are nonsalable and unalienable. Right of water resources use is under private law and property should be registered in land register. Groundwater had been also subjected to this rule, but after 1960, groundwaters became a property of public. However, legislative regulations on use and property right of surface waters are not clear.

The Ministry of Forestry and Water Affairs, established with the Decree law on Organization and Duties of the Ministry of Forestry and Water Affairs numbered 645 and dated 29/6/2011, imposed the following duties on the General Directorate of Water Management operating under The Ministry of Forestry and Water Affairs, in order to ensure coordination in works related to water management, centralize the implementation of planning and policy determination tasks and implement water management;

- Determining policies on protection, improvement and utilization of water resources,
- Coordinating water management at national and international level,
- Preparing river basin management plans or making institutions prepare these plans by considering utilization-protection balance for water resources including coastal water, in order to protect and improve ecological and chemical quality of aquatic environments,
- Determining strategies for management of dry seasons,
- Doing legislation works concerning integrated management river basins,
- Doing works on water efficiency, and determining aims and policies on the topics of reuse of wastewaters, control of leakages and water saving,
- Determining, evaluating, updating and following the measures against preventing pollution in basins in coordination with relevant institutions and organizations,
- Determining aims, principles and receiving environment standards for maintaining quantity and quality of groundwaters and surface waters with relevant institutions and organizations,
- Identifying and monitoring water pollution sensitive areas and nitrate sensitive areas,
- Preparing Flood Management Plans,
- Establishing the water information system,
- Establishing the national monitoring network and preparing monitoring programs.

Water Management Coordination Committee was founded, pursuant to Prime Ministry Circular numbered 2012/7, on the purpose of determining necessary measures towards protection of water resources with integrated basin management approach, ensuring intersectoral cooperation for an efficient water management, accelerating cooperation and water investments, developing strategies, plans and policies towards achieving the aims stated in national and international documents, evaluating the implementation of works stated in basin plans by public institutions and organizations, and ensuring high level coordination and cooperation.

The Ministry of Forestry and Water Affairs have been working on the Draft Law on Water with the purpose of ensuring sustainable protection, utilization, rehabilitation and improvement of water resources and aquatic life, obtaining and monitoring information on water and implementing researches and plans for basins, determining utilization priorities and managing allocations through a single authority, and designating procedures and principles on promoting participation and efficiency in water management. The works have been completed and the draft law gained its final form. It is stated in Action Plan of 64th Government that Law on Water will be enacted until 21/06/2016.

The General Directorate for State Hydraulic Works (SHW) is a special budgeted public entity and investment organization which is responsible for planning, improving and managing all water resources in the country.

The General Directorate for State Hydraulic Works carries out its works under the Ministry of Forestry and Water Affairs that was founded pursuant to the Decree Law No 645 and published in the Official Gazette N. 27984 dated 04/07/2011. The General Directorate for State Hydraulic Works was established in 18 December 1953 pursuant to the Law No 6200 and became organized in 1954.

As a public institution, SHW continues to carry out its duties by working on dams with the aims of preventing flood, promoting irrigated agricultural, producing hydroelectric energy, providing water intended for human consumption to big cities, as well as delivering water intended for human consumption and for industrial purposes to municipal residential areas.

SHW carries out its activities under the Acts No. 6200, 167 and 1053. Some brief information about these laws is provided below:

Law No. 6200 dated 28/02/1954 Relative to Organization and Functions includes the following duties to be carried out by SHW:

- Building dams,
- Building flood control structures,
- Building irrigation facilities,
- Rehabilitating rivers and swamps,
- Producing hydroelectric energy,
- Conducting any kinds of researches, projects and constructions related to above mentioned duties,
- Operating and maintaining above mentioned facilities,

Law No. 167 dated 16/12/1960 Relative to Groundwaters includes the following duties to be carried out by SHW:

- Drilling well or get them drilled for groundwater researches and investigations
- Conducting groundwater allocations,
- Protecting and registering groudwaters,
- Granting licenses for exploration, utilization, rehabilitation and amendment

Law No. 1053 dated 03/07/1968 Relative to Providing Domestic Water to Ankara, İstanbul and Cities with a Population of over 100.000 includes the following duties to be carried out by SHW:

- Building dams and distribution lines,
- Building water purification plants,
- Building water reservoirs.

However, with amendments to the Law No. 5625 dated 18/04/2007 and to Article 10 of the Law No 1053, population criteria was abolished and SHW became the authority in providing domestic and industrial water and building wastewater facilities,

if needed, to all residential areas with a municipal organization. Also, title of the Law No. 1053 was changed as Law on the Domestic and Industrial Water Supply for Settlements with a Municipal Organization.

Moreover, SHW was restructured under the Decree Law No. 662 published in the repeated Official Gazette No. 28103 dated 2 November 2011. In addition to its existing duties, the following duties were also imposed on SHW pursuant to this Decree Law.

- Building necessary facilities for recycling wastewaters or get them built,
- Controlling whether the operationalized hydroelectric power plants are operated in accordance with the agreements on water use right and conducting any calculation and collection activities concerning these facilities,
- Doing works on border-crossing and border making water bodies within its area of responsibility,
- Monitoring quality of surface waters and groundwaters and reporting any pollution of surface waters and groundwaters caused by wastewaters to the Ministry of Forestry and Water Affairs.

According to the **Law No 167 Relative to Groundwaters (1960)**, groundwaters form part of national waters and shall be subject to State ownership and possession. Any spring is an integral part of the land, the ownership of a spring may be allowed only together with the ownership of the land. Groundwaters are the waters for the public weal. Possession of the land shall not lead to possession of groundwaters under it. Special law provision on the type and extend of utilization from groundwaters by land owners are reserved. All kinds of prospecting, utilization, protection and registration of such waters shall be governed by the provisions of this Act. Property right of groundwaters is granted to State through this Act. A person upon whose land water has been discovered as a result of prospection under a license shall be authorized to make use of such water (within the frame of safe aquifer supply limits) and rights of use accorded by public institutions are nonsalable and unalienable.

With the **By Law on SHW Groundwater Measurement Systems** No. 27957 dated 7/6/2011, it is aimed to measure the amount of groundwaters that has been drawn or will be drawn from wells, galleries, tunnels and similar places pursuant to utilization certificates granted under the Law No. 167, by using measurement systems and to take this amount under control. On the other hand, necessary principles on maintaining current status of groundwaters that are in good condition, preventing pollution and degradation of groundwaters and improving the quality of these waters are designated in the “By Law on the Protection of Groundwater against Pollution and Degradation”.

In order to subsidize reconstruction activities of municipalities, Belediyeler Bankası (Bank of Municipalities) was founded in 1933 under the Law No. 2301, but in 1945 its duties were changed in a way to provide technical and financial support for all kind of infrastructure activities of municipalities under the Law No. 4759 and it gained the new title of “İller Bankası (The Bank of Provinces)”.

At the beginning, the duty of building domestic water supply facilities for residential areas with a population between 3.000 and 100.000 was imposed on the Bank of Municipalities, and in 1983, providing domestic water to residential areas with a population of over 1000.000, if city councils authorize the Bank for these activities, was also included in its duties. Within the Law No. 6107 on İller Bankası A.Ş (Bank of Provinces) entered in force after being published in the Official Gazette dated 8.2.2011, its duties were determined as providing consultancy services to provincial special administrations, municipalities and subsidiaries, conducting surveys, projects and construction activities for technical urban projects and infrastructure and superstructure works, and exercising any kind of development and investment banking affairs.

Many authorities and responsibilities, such as building municipal water systems, sewerage systems and treatment facilities, were granted to municipalities pursuant to the Law No. 5393 on Municipalities (2005). Municipalities are generally regarded and evaluated as a whole in order to provide joint revenue for water and transportation services and cross-subsidization for public services. For local administrations that are not metropolitan municipalities, priority is given to water supply services instead of wastewater collection and treatment.

Serious problems about sewerage systems have been faced in metropolitan municipalities since 1980s due to the growth in population. This situation has necessitated development of a new sewerage model that allows to integrate water and wastewater management. Starting with İstanbul, autonomous institutions, which are responsible for planning, project designing and building processes of water and sewerage systems, have been founded in metropolitan municipalities since İstanbul Water and Sewerage Administration (İSKİ) was founded in 1981. İSKİ was founded as an independent institution from

İstanbul Municipality at the beginning. However, after the municipality was restructured in 1984 as a metropolitan municipality, İSKi became an institution under İstanbul Metropolitan Municipality but with an autonomous budget. Water and sewerage administrations model was created for Ankara in 1987, for İzmir and other metropolitan municipalities in 1989.

Duties of General Directorate for Environmental Management, which was established pursuant to the Decree Law No. 644 on Organization and Responsibilities of the Ministry of Environment and Urbanisation which was published in the Official Gazette No. 27984 dated 4 July 2011, include the following topics concerning water management:

- Preparing the legislation, developing standards, determining measurement, detection and quality criteria for prevention and control of environmental pollution; issue opinions on environmental pollution according to receiving environment,
- Determining and monitoring the implementation of procedures and principles on pollutive factors and elimination and control of pollution with the purpose of protecting the groundwaters, surface waters, seas and soil, preventing and removing pollution; preparing emergency response plans and getting them prepared; determining appropriate technologies towards protecting the environment and determining the features of facilities that will be established within this purpose and taking necessary measures within this frame.
- Determining design principles and criteria for wastewater treatment plants with the Ministry of Forestry and Water Affairs and conducting approval activities.

Duties of General Directorate of Environmental Impact Assessment, Permit and Inspection which was established under the Decree Law No. 644, included:

- Monitoring the receiving environments, building necessary infrastructure, determining measurement and analysis criteria concerning environmental pollution, implementing and ensuring implementation of these criteria; establishing laboratories to carry out any kind of measurement, monitoring, analysis and control or making them established, doing accreditation works for these laboratories; determining the institutions that will carry out measurements for receiving environments.
- Monitoring any activities and facilities with a view to prevent environmental pollution and improve environmental quality, taking the necessary measures and ensure that other facilities take necessary measures, inspecting the facilities and granting environmental permit and license.
- Monitoring and inspecting pollution causing activities, and discharge, treatment and disposal systems of facilities.

The Ministry of Foreign Affairs takes decisions on transboundary waters in coordination with relevant ministries, especially with the Ministry of Forestry and Water Affairs.

The Ministry of Health has responsibilities concerning domestic waters (municipal water), packaged waters (spring waters, drink waters and natural mineral water), bathing waters and geothermal waters that are used for health purposes. Public Health Agency of Turkey designates quality standards for these waters with a view to protect public health and conducts necessary permit and monitoring works concerning concordance with these standards. Public Health Agency of Turkey, Department of Environmental Health has the following duties concerning water security:

- Attending to necessary research and development activities for supplying sufficient and healthy domestic water to residential areas, ensuring that necessary measures are taken, regulating these measures and training the people that will take the measures.
- Conducting works on spring, domestic and natural mineral waters, bathing waters, pool waters and thermal waters.
- Identifying the indications of peloids in thermal waters and thermal facilities.

The Ministry of Health monitors domestic waters (municipal water) and packaged waters (spring waters, drink waters and natural mineral water) under the “By Law on Waters Intended for Human Consumption” and the “By Law on Natural Mineral Waters”, monitors swimming pool waters under the “By Law on Health Principles to be Imposed on Swimming Pools”, monitors bathing waters under the “By Law on Bathing Water Quality” and monitors geothermal waters, used for health purposes, under the “By Law on Thermal Waters”.

General Directorate of Mineral Research and Exploration (MTA) carries out works on exploring geothermal and mineral water resources.

Turkish Statistical Institute (TURKSTAT) gathers data on domestic waters and waste waters from municipalities through surveys, and publishes the obtained data. In addition to municipalities, TURKSTAT gathers data also from manufacturing industry facilities, thermal power plants, directorate of organized industrial zones and mining enterprises through surveys it conducted. It also makes predictions about villages, by grounding on the data from provincial special administrations.

Duties of implementing and supporting projects for land consolidation, utilization of farmlands, improving water resources and irrigation facilities were imposed on the General Directorate of Agricultural Reform pursuant to the Decree Law No. 639 on Restructuring the Ministry of Food, Agriculture and Livestock. Duties of the Department of Land Reclamation and Irrigation Systems operating under the General Directorate of Agricultural Reform in respect of improving water resources in rural areas are as follows:

- Conducting investigation and implementation of irrigation projects and ensuring that these activities are done,
- Monitoring and evaluating irrigation results of present irrigation systems in terms of plant production, irrigation and soil protection and taking rehabilitative measures,
- Increasing the efficiency in agricultural irrigation, ensuring the use of appropriate irrigation methods and building appropriate irrigation facilities,
- Determining ministry policies and strategies on irrigation
- Conducting, ensuring and supporting activities to promote modern irrigation systems that will save water in irrigation areas
- Cooperating with organizations that use water and encouraging and ensuring activities that will increase irrigation efficiency

Within the process of restructuring of the Ministry of Food, Agriculture and Livestock, also the Department of Soil and Water Resources Research was established under the General Directorate of Agricultural Research and Policies. Duties of this department includes preparing research projects for developing new techniques to ensure an efficient and proper use of soil and water resources, ensuring preparation and implementation of these projects and monitoring and evaluating them.

Ministry of Culture and Tourism is authorized on the affairs of supplying domestic water in touristic areas and disposal of wastewaters.

Regional Development Administrations for Southeastern Anatolia Project, Eastern Anatolia Project, Eastern Black Sea Project and Konya Plain Project operate under the Ministry of Development, and they carry out works on ensuring coordination between investor institutions, monitoring and assessment.

Turkish Water Institute (SUEN) was established pursuant to a decision taken by the Council of Ministers on 10/10/2011. Duties of SUEN include: following the works, researches and statistical activities of other national and international organizations on water and following the international developments, performing necessary activities for providing a cooperation between national and international water sector, conducting projects with people and organizations that have become prominent in national and international sectors with their works, contributing to development of opportunities and tools that are necessary for developing sustainable water policies and strategies towards solving global water problems, making scientific researches on developing national and international water policies and supporting such researches, supporting international forums, conferences, meetings, seminars, symposiums and similar activities, organizing national and international training programs, cooperating with foreign organizations and institutions.

By Law on Water Pollution Control: By Law on Water Pollution Control entered in force after being published in the Official Gazette No. 25687 dated 31.12.2004 with the purpose of ensuring protection of groundwater and surface water potential of Turkey and ensuring an effective utilization of this potential, determining necessary legal and technical procedures for providing a harmony between pollution prevention activities and sustainable development aims.

The By Law includes the principles on protection of waters, planning principles and prohibitions on maintaining water quality, prohibitions on marine pollution, principles on wastewater discharge, principles on wastewater infrastructure facilities, procedures and principles on monitoring and inspection for preventing water pollution.

By Law on Procedures and Principles to Be Abided in Determining Tariffs for Wastewater Infrastructure and Domestic Solid Waste Disposal Facilities: according to the Article 11 of the Environmental Law No. 2872 amended by the Law No. 5491 dated 26 April 2006 on Amendments to Environmental Law and Article 11 of The Environmental Law No. 2872, those who use/will use wastewater infrastructure, regardless of whether they have a connection line or not, are obliged to pay for all the expenses made by administrations that are responsible for investment, operation, maintenance, rehabilitation and clearance of treatment systems in proportion to their pollution load and wastewater amount. Wastewater collection, treatment and disposal fees are obtained from those who benefit from these services according to tariffs designated by city council and other administrations authorized through this article. The money collected under this article cannot be used for purposes other than wastewater services.

Metropolitan municipalities and municipalities are responsible for establishing and operating or ensuring the establishment or operation of domestic solid waste disposal facilities. Those who benefit/will benefit from this service are liable to pay for the expenses made by responsible administrations on investment, operation, maintenance, and rehabilitation activities. Solid waste collection and disposal fee is obtained from those who benefit from this service according to the amount of fee determined by municipal council. The money collected under this article cannot be used for purposes other than solid waste services.

The provisions, procedures and principles concerning facilities, operations and residential areas that are responsible for waste treatment and disposal, treatment and disposal systems to be established under this responsibility, establishing, maintaining, rehabilitating and operating wastewaters treatment systems, preliminary treatment systems and wastewater infrastructure systems, and determining amount of contributions to expenses, are regulated by the Ministry through By Laws.

The “By Law on Determining Tariffs for Wastewater Infrastructure and Domestic Solid Waste Disposal Facilities” entered into force after being published in the Official Gazette on 27 October 2010. The By Law was published under the above mentioned provisions of the Environmental Law, with the aim of generating the minimum income that is necessary to provide a sustainable and efficient environmental protection and wastewater infrastructure service. The aim of this By Law was to establish, maintain, operate, monitor and close wastewater infrastructure facilities and domestic solid waste disposal facilities, and to ensure sustainability of environmental infrastructure services by enjoining wastewater infrastructure administrations, metropolitan municipalities and municipalities to determine, designate and apply tariffs in order to meet the full costs of services provided by these facilities.

Provisional Article 4 of the Environmental Law defines the maximum period in which wastewater treatment facilities shall start to operate. Obligations of establishing wastewater treatment facilities are imposed on Organized Industrial Areas. Thanks to this By Law, it will be ensured that wastewater infrastructure administrations impose tariffs on waste water services in order to continue wastewater infrastructure services in a sustainable and efficient way.

By Law on Control of Pollution by Dangerous Substances in Water and its Environment: The by-law was published in the Official Gazette No. 26040 dated 31 December 2005 with the purpose of identifying, preventing and gradually reducing the pollution by dangerous substances in water and its environment.

Council Directive 76/464/EEC on Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment dated 4 May 1976 was revised and Directive 2006/11/EC on Pollution Caused by Certain Dangerous Substances Discharged into The Aquatic Environment was published on 15 February 2006.

The By Law Control of Pollution by Dangerous Substances in Water and its Environment was revised and published in the Official Gazette on 30 March 2010 in order to facilitate implementation of the relevant directive in Turkey’s condition. This By Law includes technical and administrative principles on determining hazardous substances causing pollution in surface waters, estuary waters and regional waters, preparing pollution control programs, preventing and monitoring pollution, preparing the inventory for hazardous substances discharged into water and determining discharge standards and criteria.

Water Pollution Control By Law, Communique on Sampling and Analysis Methods: The purpose of this communique, which was published in the Official Gazette No. 27372 dated 10 October 2009, was to designate procedures and principles on determining the quality of aquatic environments, taking samples from water continuously or periodically when domestic

and industrial wastewaters are discharged into wastewater infrastructure facilities or into receiving environments, and on measurement/analysis methods of quality parameters that are stipulated to be monitored pursuant to the provisions of Water Pollution Control By Law.

This Communique covers; the principles of sampling and storage, sample protection techniques, sample storage methods, sampling procedures for wastewater analysis, principles on taking samples from groundwaters, surface waters and seas, and analysis principles of samples that are taken from seas and ships in order to identify pollution caused by ships.

Water Pollution Control By Law, Administrative Procedure Communique: This communique was prepared with the aim of regulating the administrative procedures and applications regarding responsibilities and getting permission stipulated by Water Control By Law that was published in the Official Gazette No. 25687 dated 31/12/2004 and the communique was published in the Official Gazette No. 27372 dated 10 October 2009.

The communique covers the procedures on getting permission for direct discharge of any kind of domestic, urban and/or industrial wastewaters into receiving environments.

Circular on Approval of the Projects for Wastewater Treatment/Deep Sea Discharge: the Ministry has carried out approval works and operations for wastewater treatment facilities since 2004, in order to ensure that low investment and operational cost wastewater treatment technologies that will provide a desirable level of treatment efficiency are selected during the process of building wastewater treatment facilities. Through these applications, the ministry aims to ensure protection and sustainable utilization of water resources in Turkey for the benefit of the country. Project approval works for 2.975 wastewater treatment facilities were completed between 2004-2015.

Circular on Technical Procedures to be followed in Management of Wastewaters Produced in Olive Oil Facilities: The Circular No. 2015/10 on Technical Procedures to be followed in Management of Wastewaters Produced in Olive Oil Facilities entered in force after being published on 17.11.2015. It is aimed with this circular to enable management of black olive water and other wastewaters resulting from olive oil production.

Circular on Integrated Pollution Prevention and Control in Textile Sector: The Circular on Integrated Pollution Prevention and Control in Textile Sector was published in the Official Gazette No. 28142 dated 14 December 2011, and the purpose of the circular is to provide control of any kind of emissions, discharges and wastes into water/air/soil during production, provide efficient utilization of raw material and energy and ensure accommodation of the best techniques in order to minimize adverse effects of textile sector on the environment and provide an environmental friendly management.

The circular applies to textile facilities that have an installed capacity of over 10 tons/day of sizing, washing, desizing, mercerisation, bleaching, coloring, printing, finishing and other finishing applications. These facilities are obliged to accommodate the best available techniques within the circular, submit production plans and report the developments experienced within the frame of targets stated in production plans.

However, due to some provisions in the Circular that were difficult to implement economically and technically, a need to revise the circular arose and the Circular on making Amendments to the Circular on Integrated Pollution Prevention and Control in Textile Sector entered in force after being published in the Official Gazette No. 29291 dated 10.03.2015. With the amendments made on the circular, the facilities that apply mercerization over 1 ton/day became liable to recover alkali so as to contribute the process of solving problems of conductivity and salinity in waters.

Additionally, it was also made possible thanks to the amendments to the Circular to use Best Available Techniques (BAT) that are included in Clean Production Plans (CPP) but not stated in the Circular.

Circular on Limitation to Standards of Discharges into Ergene River: The Circular No. 2011/10 dated 01.11.2011 on Limitation to Standards of Discharges into Ergene River which was published by grounding on the 38th Article of the Water Control By Law which stipulates that “the Ministry shall impose necessary restrictions to wastewater discharge limits in order to prevent misuse or improve the quality of a receiving environment until Basin Protection Plan is prepared for the receiving

environment at the end of scientific studies, by considering minimum flow and pollution rate of the water resources in the receiving environment and by considering the limit values given in Table 1 in the annex of the By Law." was abrogated and the Circular No. 5124 dated 22.04.2014 was published in place of it. Limitations were imposed at different levels (30-50%) on COD parameter, within the frame of Table 5- Table 25 of the By Law on Water Quality Control, for industrial facilities and domestic wastewater treatment plants that make discharges into Ergene Basin. Standards for the other parameters in the tables are still valid. The facilities have been given time until 6 May 2016 in order to meet the new COD standards.

By Law on Urban Wastewater Treatment, Circular on Sensitive and Less Sensitive Water Areas: The By Law on Urban Wastewater Treatment, Circular on Sensitive and Less Sensitive Water Areas was prepared under the By Law on Urban Wastewater Treatment, with the purpose of determining sensitive and less sensitive water areas within domestic water basins and lakes, coves and bays that are under the risk of eutrophication in our country. The circular entered in force after being published in the Official Gazette No. 27271 dated 27 June 2009.

The circular was prepared with the purpose of determining and monitoring sensitive and less sensitive water areas, and designating the procedures and principles to be applied for urban wastewater discharges into these areas. Sensitive Basins include closed basins of Konya, Burdur, Lake Van and Akarçay and Ilısu Catchment. Basins of some surface waters, which are used for domestic water purposes or included in an investment plan in order to be used for domestic water purposes, were also determined as sensitive areas in the circular. Sensitive coves, bays and coasts are presented in a table. It is required to inspect sensitive, less sensitive, normal and gray areas every 4 years according to the results of monitoring activities.

Circular on Giving Identity Documents to Wastewater Treatment Plants: Pursuant to the Circular No. 2015/6 on Giving Identity Documents to Wastewater Treatment Plants published on 05.05.2015, all wastewater treatment plants, whose wastewater is discharged into receiving environments or utilized as recycled water, will be given an identity document by the Ministry of Environment and Urbanisation. Thus, the processes of permitting, monitoring, inspecting and preparing inventory of treatment facilities will be conducted more efficiently.

Thanks to the circular, Wastewater Treatment Plants Identity Document System have been put into use on www.online.cevre.gov.tr.

Within this scope, all treatment plant operators will be informed through the circular with the help of Provincial Directorates of Environment and Urbanisation, and operators will be asked to fill the form annexed to the circular and apply to Provincial Directorates. Provincial Directorates will enter the information on these forms into the system and identity documents created by the system will be provided to treatment plant operators.

The identity documents will substitute the Wastewater Treatment Plant Certificates that have been given to wastewater treatment plants so that they can be regarded as industrial enterprises. These identity documents will also be included in environmental permit process later on.

By Law on Surface Water Quality, was prepared with the objective to designate the procedures and principles on; determining and classifying biological, chemical, physico-chemical and hydromorpholical qualities of surface waters, coastal waters and transitional waters, monitoring the amounts and qualities of waters, determining utilization purposes for these waters in accordance with sustainable development aims by considering the balance between utilization and protection, protecting these waters and taking measures to improve the quality of waters to a level of good water. The By Law entered in force after being published in the Official Gazette No. 28483 dated 30.11.2012.

Thanks to this By Law, harmonization with EU Water Framework Directive No. 2000/60/EC and the Directive No. 2013/39/EU was provided in line with national requirements. With regard to water quality and classification, the harmonization focused on environmental aims, certain pollutives, environmental quality standards, measures program, assessment of pressures and effects, protected areas and priority substances.

By Law on Procedures and Principles to be applied for Incentive Measures for Wastewater Treatment Plants pursuant to Article 29 of the Environmental Law: Since the energy need of wastewater treatment plants is too high, operational

expenses increase and negatively affects the operation of the plant. Thus, the "By Law on Procedures and Principles to be applied for Incentive Measures for Wastewater Treatment Plants pursuant to Article 29 of the Environmental Law" came into force after being published in the Official Gazette No. 27716 dated 01.10.2010 with a view to provide effective operation of wastewater treatment plants, improve the water quality of receiving environments and protect natural resources.

Within the scope of the By Law, up to %50 of energy expenses of waste water treatment plants, which are operated in compliance with the legislation, can be refunded. According to the statistics of the end of 2015, 437 facilities obtained Repayment Documents in order to benefit from Electricity Incentive. Within the scope of the legislation, 22,8 million TL was refunded to 172 facilities in 2011, 26,6 Million TL to 212 facilities in 2012, 30,2 Million TL to 207 facilities in 2013, 30,4 Million TL to 225 facilities in 2014 and 46,4 Million TL to 294 facilities in 2015.

By Law on Agricultural Use of Domestic and Urban Wastewater Treatment Sludge: The By Law includes technical and administrative principles concerning domestic and urban wastewater treatment sludge for agricultural purposes without doing harm to soil, flora, fauna and human.

As prescribed by provisions of the By Law, wastewater treatment sludge shall be stabilized before using for agricultural purposes.

Utilization of stabilized treatment sludge that is produced out of urban and domestic wastewater treatment is subject to permit. The By Law includes provisions on limitations and prohibitions to use of stabilized treatment sludge. In order to be able to use treatment sludge for agricultural purposes, private and public institutions that operate treatment plants are responsible for fulfilling the permit procedures designated in the By Law. It is forbidden to use treatment sludge on unpermitted lands.

The By Law also covers the treatment sludge from food sector that is included in Annex III of the By Law on Urban Wastewater Treatment that took effect after being published in the Official Gazette No. 26047 dated 08 January 2006.

By Law on Soil Pollution Control and Areas of Point Source Pollution: The existing By Law on Soil Pollution Control had been published in the Official Gazette No. 25831 dated 31 May 2005 was revised and republished with the title of "By Law on Soil Pollution Control and Areas of Point Source Pollution" in the Official Gazette No. 27605 dated 08 June 2010. The By Law covers the topics of preventing soil pollution, determining the areas and sectors that are polluted or under risk of pollution, making records of these areas and sectors and cleaning and monitoring polluted lands and areas.

With the objective to use in implementation of the By Law, Polluted Areas Information System (web based software), Technical Guide for Surveys on Polluted Areas, Technical Guide for Risk Assessment of Polluted Areas, Technical Guide for Cleaning and Monitoring Polluted Areas were prepared, and the Circular on Granting Qualification Certificate for By Law on Soil Pollution Control and Areas of Point Source Pollution which designates procedures and principles on determining minimum qualifications of institutions and organizations that will carry out assessment and cleaning for polluted areas pursuant to the By Law were published.

Through the By Law on Protection of Groundwaters against Pollution and Deterioration (OG No. 28257 dated 07.04.2012) necessary principles were designated on maintaining current status of the waters that are in good condition, protection of groundwaters against pollution and deterioration and improving the quality of these waters. The By Law was revised pursuant to the By Law on Making Amendments to the By Law on Protection of Groundwaters against Pollution and Deterioration that was published in the Official Gazette No. 29363 dated 22.05.2015.

By Law on Quality of Surface Waters that are Used or Planned to Be Used for Domestic Purposes (published in the Official Gazette No. 28338 dated 29.06.2012): the By Law on Quality of Surface Waters that are Used or Planned to Be Used For Domestic Purposes covers the topics of determining characteristic features of Surface Waters that are Used or Planned to Be Used For Domestic Purposes, determining treatment class to be applied according to category of water, determining sampling and analysis frequency for parameters to be monitored in these waters and determining their quality categories.

Within the By Law;
The surface waters that are used or planned to be used for domestic purposes are separated into three categories (A1, A2

and A3) according to compulsory and reference values of all parameters included in the annex of the By Law and the following treatment classes are determined for each category. Of these quality categories of domestic waters,

a) A1: represents waters that can be used for domestic purposes after a simple physical treatment and disinfection,
b) A2: represents waters that can be used for domestic purposes after physical treatment, chemical treatment and disinfection,
c) A3: represents waters that can be used for domestic purposes after physical and chemical treatment, advanced treatment and disinfection.

The By Law on Protecting and Improving the Waters in which Trout and Carp Fishes Live (published in the OG No. 28880 dated 12.01.2014) designates the procedures and principles on maintaining and improving quality of fresh waters in which naturally diverse fish species live and preparing necessary programs for monitoring and reducing pollution in these waters. This By Law embodies provisions on the topics of determining parameter values of the waters in trout and carp zones that are determined by the Ministry of Food, Agriculture and Livestock and that require improvement and protection, determining conformation of these waters to parameter values, protecting these waters, and preparing and implementing programs for reducing pollution loads. This By Law shall not apply to waters in fish ponds that are used for aquaculture. Works on preparing an action plan for implementation of this By Law are under progress.

By Law on Protecting Water Basins and Preparing Management Plan: The By Law came into force after being published in the Official Gazette No. 28444 dated 17.10.2012. The By Law was promulgated with a view to designate procedures and principles on protecting surface waters and groundwaters in terms of quantity and physical, chemical and ecological quality with an integrated approach and preparing water basin management plans.

Communique on Establishment, Duties and Working Procedures and Principles of Basin Management Commissions: was published in the Official Gazette No. 29361 dated 20.05.2015. The Communique covers necessary procedures and principles on establishing Basin Management Commissions and their duties with the intention of preparing, implementing and monitoring basin protection action plans and basin flood and drought management plans, providing cooperation between institutions and following the implementations.

By Law on Monitoring Surface Waters and Groundwaters: in Turkey, procedures with respect to monitoring the quality receiving environment in groundwaters and surface waters are handled in line with the requirements of Article 8 and Annex-5 of Water Framework Directive within the process of harmonization with EU Legislation. The By Law took effect after being published in the Official Gazette No. 28910 dated 11.02.2014 within the process of harmonizing our legislation with Water Framework Directive. By means of this By Law, provisions of Article 8 and Annex-5 of Water Framework Directive have been integrated into our national legislation.

It is aimed with the By Law to expose current condition of all national surface waters and groundwaters in terms of quantity, quality and hydromorphological factors, monitor the waters by adopting an approach focusing on ecological integrity of waters, provide standardization in monitoring and enable coordination between institutions and organizations that conduct monitoring activities.

The By Law covers the issues on intra-continental surface waters, groundwaters, transitional waters and natural mineral waters including coastal waters on river mouths, except other coastal waters, geothermal waters and seas, regardless of their intended purpose.

The main purpose with the By Law is preparing Monitoring Programs, Establishing National Monitoring Network and collecting all the obtained data under National Water Information System. Within this context, monitoring programs are prepared, pressures on surface waters and groundwaters are identified and works on determining monitoring points, parameters and monitoring frequency are carried out.

The By Law also covers the topic of establishing real time monitoring systems, and currently, water quality is monitored with the help of five real time monitoring stations in Ergene-Meriç Basin and four real time monitoring stations in Büyük Menderes Basin. Works on promoting utilization of real time monitoring stations all over Turkey are in progress.

Monitoring parameters that are included in monitoring programs are incorporated into monitoring programs so as to reflect pressures in basins and to be measured periodically. These parameters include; 116 specific pollutants and 45 priority substances that have been determined particularly for our country, basic chemical and physicochemical parameters and biological and hydromorphological quality factors. Moreover, some hazardous chemicals that have been identified as unique to our country are also included in order to expose pollution caused by pressures in basins.

Works on preparing monitoring programs for our country, which holds 25 river basins, were completed at the end of 2015.

Communique on Surface Waters, Groundwaters, Sediment Sampling and Biological Sampling: The communique was published in the Official Gazette No. 29274 dated 21.02.2015. The communique designates procedures and principles on taking samples from surface waters, groundwaters and sediment, transportation, protection and storage of samples, taking samples from surface waters for biological quality factors and storing these samples.

Within the By Law, all necessary practices, from the process of taking representative samples from receiving environments for analysis of pollution parameters that are included in monitoring programs to analysis of these samples, are defined.

Communique on Continuous Wastewater Monitoring Systems: The aim of the "Communique on Continuous Wastewater Monitoring Systems" published in the Official Gazette No. 29303 dated 22.03.2015 is designating the procedures and principles on determining the features of continuous wastewater monitoring systems and establishing and operating these systems. The Communique includes procedures and principles regarding properties and establishment of continuous wastewater monitoring systems that will be established at the outlet of wastewater treatment plants and preliminary treatment plants with an installed capacity of 10.000 m^3/day and above and at the outlet of facilities that apply deep sea discharge, use water for heat transfer (cooling-heating water) and discharge into receiving environments.

Chemical Oxygen Demand (COD) and Suspended Solids (SS) parameters have been added to monitoring system pursuant to the communique. With these new parameters, automatic sampling devices will be installed. The additional parameters will be used for early warning system during continuous wastewater monitoring works. With the addition of COD and SS, internal monitoring will be abolished and the system will take samples automatically according to warnings, the samples will be analyzed in authorized laboratories and necessary actions will be taken according to analysis results. It is aimed with the communique to install early warning systems and increase inspection capability of the Ministry. It is planned to carry out online monitoring at lower flow rates and in more parameters in 2023.

Integration works of continuous wastewater monitoring systems into facilities started with 30 facilities and the number has reached to 191. These facilities are monitored for 7/24 and response and combat capacity of the Ministry of Environment and Urbanisation, regarding on-site pollution detection, have been increasing.

Additional parameters (COD and SS) in continuous wastewater monitoring activities are used for early warning system. So far, 18 facilities have added these additional parameters (COD and SS) to continuous wastewater monitoring system and have started data transfer. It is expected that around 50 facilities will add these additional parameters to their systems and connect to Continuous Wastewater Monitoring System in the first quarter of 2016.

Both facilities and Provincial Directorates are provided with usernames and passwords to enter the system online and they can access data on water monitoring web site.

"Continuous monitoring systems" that increase inspection and response capacity of the Ministry of Environment and Urbanisation are managed from one center thanks to on-line monitoring center and all the data can be displayed.

Communique on Disinfection Techniques: the communique entered into force after being published in the Official Gazette No. 29457 dated 26 August 2015. The communique was prepared with intent to choose a suitable disinfection method so as to ensure safety of domestic water until it reaches to the last consumer in residential areas with a population of 10.000 and below, ensure proper application of the disinfection method and provide an effective inspection of the process. The communique requires that disinfection method is chosen according to Necessary Criteria for Choosing Disinfection Method by

considering the provisions on method selection and application in the annex of the communique. According to the provisions of the communique, disinfection equipment is operated safely by considering the table including the points to consider.

Communique on Protection of Stagnant Inland Surface Waters against Eutrophication: within the scope of the communique published in the Official Gazette No. 28925 dated 26.02.2014, it is aimed to protect lakes, dam reservoirs and ponds against eutrophication and provide sustainable utilization of these waters.

C.9. Conclusion and Evaluation

Thanks to the Communique on Continuous Wastewater Monitoring Systems, wastewater treatment plants and preliminary treatment plants with an installed capacity of 10.000 m^3/day and above and the facilities that apply deep sea discharge, use water for heat transfer (cooling-heating water) and discharge into receiving environment are monitored 7/24 with the help of continuous wastewater monitoring stations at the outlet of these facilities. Thus, remote and efficient inspection mechanism of the Ministry of Environment and Urbanisation has been developed.

The primary objective of the Ministry of Environment and Urbanisation is to increase the rate of municipal population with access to a wastewater treatment plant in total municipal population to 85% in 2017, and ensure that all municipalities have wastewater treatment plant in 2023, which is the 100th anniversary of the foundation of the Republic.

SOURCES

- Directorate General of EIA, Permit and Inspection
- Ministry of Forestry and Water Affairs
- Ministry of Culture and Tourism
- Ministry of Food, Agriculture and Livestock
- General Directorate for State Hydraulic Works
- Turkish Statistical Institute

D.WASTE

D.WASTE

Various kinds of wastes are produced as a result of industrial and vital activities, consumption of raw materials and production and consumption activities.

One of the major principles of waste management strategies of Turkey is “material recovery”. Within especially the Environmental Law as well as all other legislative regulations constituting the environmental legislation; one of the major management principles is reuse of wastes and recovering them as materials and energy, recovery activities are encouraged; criteria are designated for increasing technical and administrative efficiency of recovery facilities, licenses have been granted to the facilities that match the criteria and their contribution to both economy and the environment have been ensured.

Works on enacting By Laws on general waste management started in 1991 in Turkey and these By Laws have been improved according to waste diversity in line with EU Directives. Works are carried on for preparing By Laws concerning solid wastes, excavation soil, construction and demolition waste, waste batteries and accumulators, hazardous wastes, organic waste oils, medical wastes, end-of-life tires, packaging wastes, polychlorinated biphenyls, polychlorinated terphenyls, restriction of some hazardous substances in electrical and electronic equipment, waste oils, end-of-life vehicles, organized waste storage and chemical management.

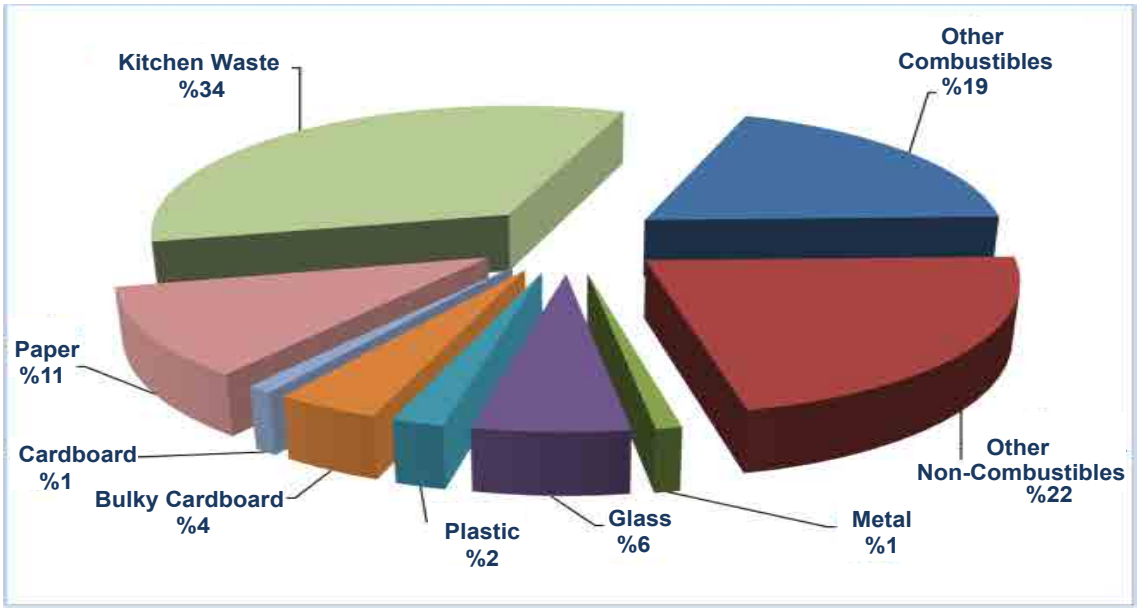
The increase in the amount and types of wastes due to rapid economic growth, Urbanisation, population growth and prosperity have required accommodating an integrated waste management approach that covers all kinds of wastes instead of establishing a different waste management system for each kind of waste.

Integrated waste management can be defined as selection and implementation of appropriate methods, technologies and management procedures that are necessary for recovery and final disposal of wastes. Under the integrated waste management lies a waste management system that is based on waste prevention, waste minimization, reuse, recycling, energy recovery and disposal hierarchy.

Remarkable improvements have been made with regard to environmental legislation since 2003. Within this frame, permanent works and By Laws concerning waste management have been carried out in the presence of EU and international organizations. The enacted legislation on waste managem ent accelerated sectoral investments and created substantial employment opportunities as well as creating a dynamic and strong economic structure. Today, wastes should be regarded as a production input.

D.1. Municipal Wastes (Solid Waste Disposal Facilities)

Municipal wastes generally consist of non-hazardous wastes that mostly come from houses and that are similar in terms of content or structure. Information on general composition of municipal wastes in Turkey is provided on Graph 24.



Graph 24 - Composition of municipal wastes (2006) (Solid Waste Master Plan) (Ministry of Environment and Urbanisation, 2016)

The legal statute on this topic consists of: the Environmental Law No. 2872, Law No. 5216 on Metropolitan Municipalities, Law No. 5393 on Municipalities, By Law on Waste Management, By Law on Organized Storage of Wastes, By Law on the Control of Excavation Soil and Construction and Demolition Waste, By Law on Waste Incineration, Communique on Waste Collection Centers, Communique on Refuse-derived Fuel, Additional Fuel and Alternative Raw Material, Communique on Compost and Communique on Mechanical Sorting, Biodrying and Biomethanization Facilities and Fermented Product Management.

The Circular No 2003/8 by abrogated Ministry of Environment and Forestry started regional cooperation between municipalities on the matter of determining solid waste landfills, and works on closing and rehabilitating unorganized (wild) waste storage areas have started and continue.

Area selection for waste storage is a challenging problem. As there are numerous local government units in the same area, it becomes mandatory to be in cooperation to solve the problem of solid waste storage, as in other infrastructure services. New legal By Laws on encouraging local administrative unions method have facilitated providing environmental services. Activities of the municipalities that are under the same union are important since they use time and finance sources more efficiently. Within this context, it is observed that there is an increase in the number of solid waste projects that are conducted by local administrative unions.

Moreover, it is also planned that service union method will be used in solving regional environmental problems within the scope of regional development policies. Thus, it is recommended to establish service unions in EU supported regional development projects.

According to data of the year 2014, the amount of municipal waste collected in Turkey is 28.010.721 tons/year (TURKSTAT, 2014). Information on total amounts of municipal waste by years is provided on Table 57.

Table 57 – Amount of municipal wastes (TURKSTAT, 2015)

Years	Amount of collected waste (1.000 tons/year)
2003	26.118
2004	25.014
2006	25.280
2008	24.361
2010	25.277
2012	25.845
2014	28.011

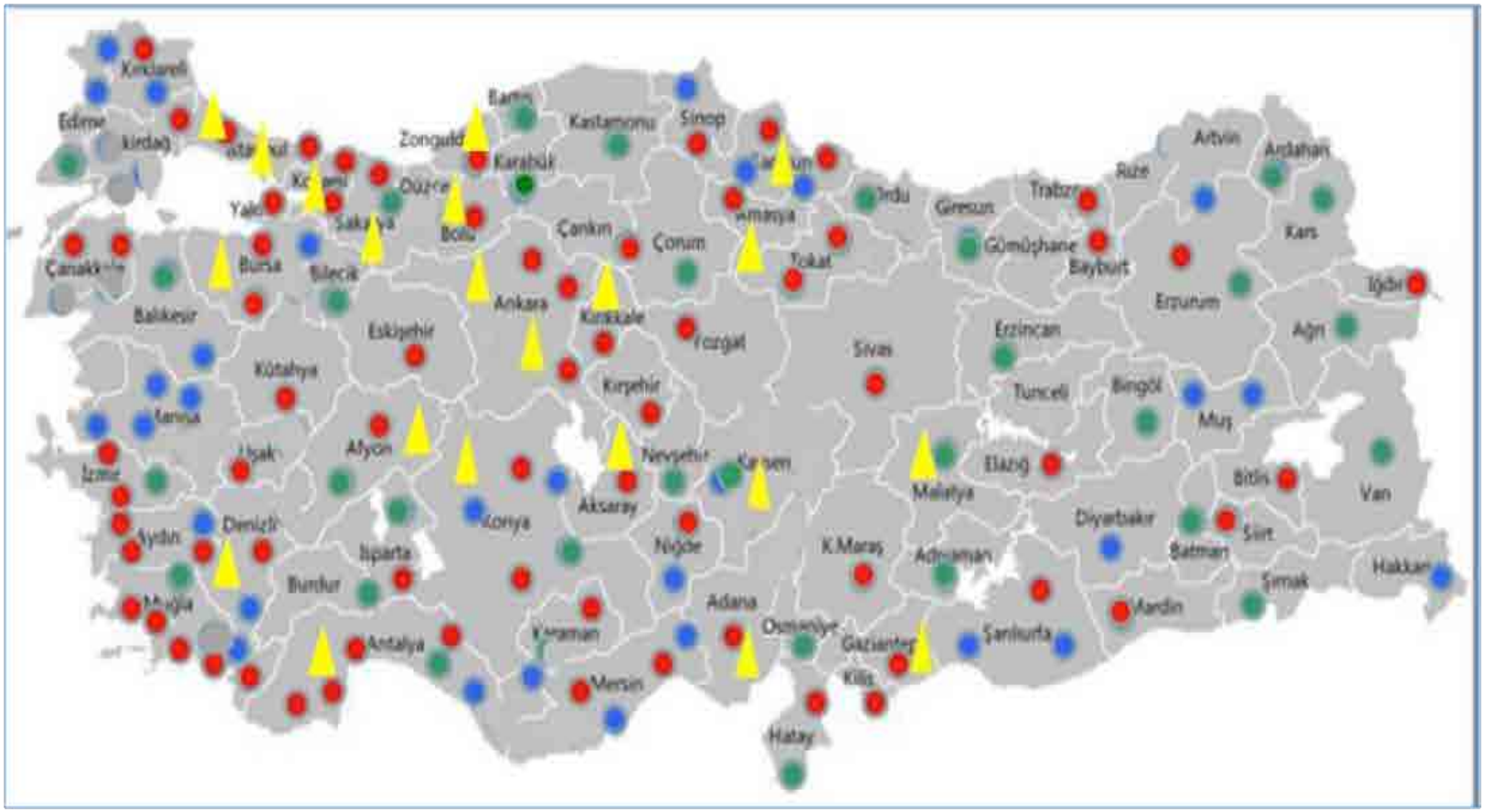
While wastes were dumped into unorganized storage areas in an uncontrolled way in previous years, today, organized storage areas are constructed rapidly and set into operation. It is estimated that there are 2.000 small scale and 50 large scale unorganized waste storage areas. It hasn't been possible to provide many district municipalities with sufficient number and capacity of disposal facilities yet.

Table 58- Number of municipalities provided with organized storage areas and their population rates by years (TURKSTAT, 2015).

YEARS	2003	2008	2010	2012	2014
Number of Municipalities Provided with Organized Storage Areas	147	423	518	664	492
Rate of population provided with material recovery and waste disposal facilities in municipal population (%)	32	47	56	64	65

Table 59 –Waste disposal and material recovery facilities in Turkey (2012-2014) (TURKSTAT, 2015)

	2012		2014	
	Number of Facilities	Treated waste amount (ton/year)	Number of Facilities	Treated waste amount (ton/year)
Waste disposal facilities	83	24.224.635	117	41.324.637
Organized storage facilities	80	24.174.502	113	41.281.755
Incineration facility	3	50.133	4	42.882
Material recovery facilities	589	10.229.133	868	19.724.241
Compost facilities	6	158.922	4	94.019
Co-incineration facilities	32	538.916	39	532.343
Other recovery facilities	551	9.531.295	825	19.097.879



Map 12 - Current condition of organized solid waste storage facilities (Ministry of Environment and Urbanisation, 2016)

Operating	: 81
In construction and bidding stage	: 13
In plan-project stage	: 27 (Facilities without a planned area are not included.
Electricity production from methane	: 21 (Gas storage and electricity production from biomethanization are included.)

According to the "Law on making amendments to the Environmental Law No. 2872", "By Law on Waste Management", "Law No. 5216 on Metropolitan Municipalities", and "Law No. 5393 on Municipalities"; Municipalities in urban areas and the highest civilian authorities of the areas that are out of urban areas, are liable to ensure disposal of domestic solid wastes and industrial solid wastes that are in domestic quality without doing harm to environment and reduce environmental pollution, and they are responsible for sorting and collecting solid wastes among domestic wastes that can be re-utilized with a view to contribute economy and benefit from solid waste storage areas at maximum level, and they are also responsible for taking the necessary measures on these matters.

Thanks to new projects on establishing and rehabilitating facilities, an integrated solid waste storage have been enabled. In other words, all the wastes collected from different sources and transported to storage areas by the municipalities are not dumped into storage areas directly. Instead, packaging wastes go to sorting facilities, medical waste go to sterilization facilities, cells and batteries go to temporary storage areas and each kind of waste is stored and disposed separately according to their features.

D.2. Excavation Soil and Construction and Demolition Waste

Within the legal legislation in Turkey, the duty of determining excavation soil and construction and demolition waste dumping areas is imposed on the metropolitan municipalities pursuant to (i) clause of Article 7 of the Law no. 5216 on Metropolitan Municipalities, and the same duty is imposed on the municipalities pursuant to (o) clause of Article 15 of the Law no. 5393 on Municipalities. Additionally the "By Law on the Control of Excavation Soil and Construction and Demolition Waste" was promulgated after publishing in the Official Gazette No. 25406 dated 18 March 2004 and the By Law includes technical and administrative principles and rules on reducing excavation soil and construction and demolition waste from the source without doing harm to environment, and also collecting, temporary storing, transporting, recovering, re-utilizing and disposing these wastes.

Pursuant to Article 12 of the Environmental Law, mayors can be authorized to carry out inspections and impose fines on the matters of collecting, temporary storing, transporting and recovering these wastes.

Within the scope of the By Law on the Control of Excavation Soil and Construction and Demolition Waste, the authority of controlling excavation soil and construction and demolition waste and imposing fines was delegated to Metropolitan Municipalities of İstanbul, Kocaeli, Sakarya, Gaziantep, Bursa, Ordu and Ankara, pursuant to Article 12 of the Environmental Law.

D.3. Packaging Wastes

Due to changing consumption patterns, population growth, prosperity and increase in sales of packaged products in Turkey, solid waste composition is also changing. All in all, packaging wastes make up 30% of the wastes by weight and 50% of the wastes by volume.

The change in waste composition has resulted from the increase in packaging waste content of the waste such as paper, cardboard, glass, plastic and metal. When it is taken into account that most products are sold in paper, metal, glass and plastic packages, it can be understood that recovery of these materials by collecting the wastes separately from sources is an important step in solid waste management and this will obviously contribute to the economy.

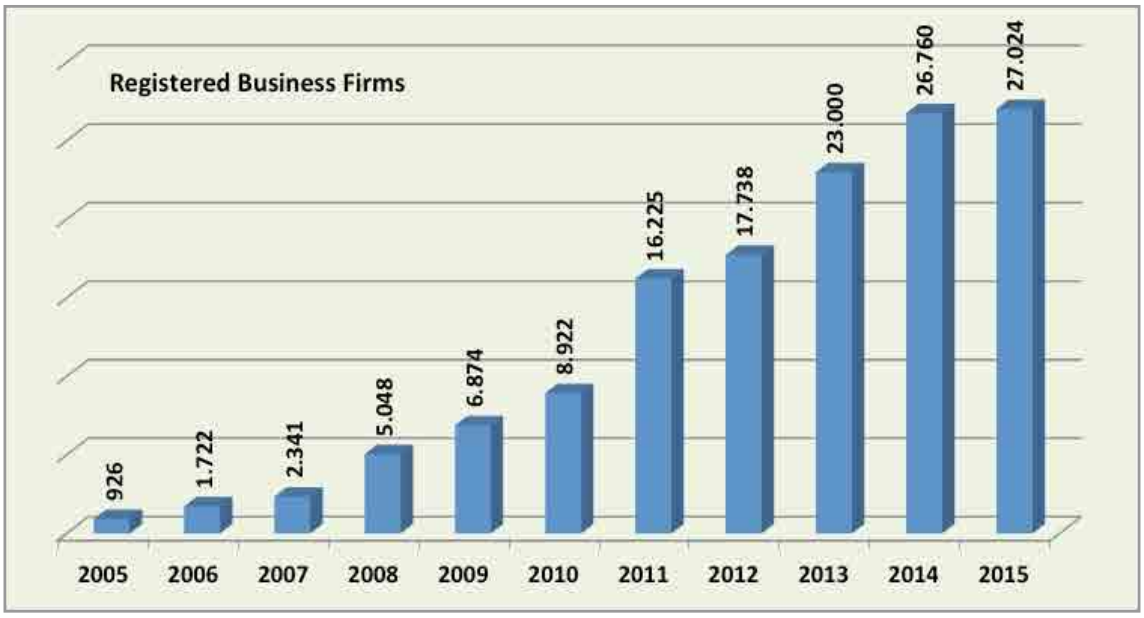
Necessary legal and technical By Laws have been made for reducing the environmental pollution from packaging wastes, which has an important share in solid wastes of Turkey, and recovering the materials to contribute to the economy. Scope of the By Laws had not been broad since 1991 until recently. However, the By Law was harmonized with the European Union Directive 94/62/EC on Packaging and Packaging Waste and started to be implemented in 2005. The By Law was revised in line with the needs and published in the Official Gazette No. 28035 dated 24.08.2011 under the title of "By Law on the Control of Packaging Wastes" and it is still in force.

The By Law designates necessary principles, policies, programs and legal, administrative, and technical procedures on; production of packages with specific features, preventing the harm on the environment from packaging wastes, reducing the amount of inevitable packaging wastes to be disposed through reuse, recycling and recovery, collecting packaging wastes separately from the source systematically and sorting them.

Packaging wastes include all kinds of packages and packaging wastes produced from plastic, metal, glass, paper, cardboard, composite and similar materials regardless of whether they are resulting from domestic, industrial, commercial or workplace purposes. In addition to this, pursuant to the By Law, responsibilities and liabilities are imposed on each entity that has a role in production of packages, selling packaged products, creating packaging waste and collecting and recycling packaging wastes.

In this regard, package producers possess liabilities on the matter of; re-utilizing the packages, designing, producing and releasing them in a way to enable recycling and/or recovery, organizing awareness raising training activities for consumers, obtaining code number or password and entering data of the produced and released packages into online data storage programs.

As can be seen on Graph 25, while the number of package producers and product releasers that are registered to the Ministry was 350 in 2003, this number reached to around 27.000 in 2015. Although municipalities are responsible for collecting packaging waste separately from the source, expenses for these works should be met by the producers according to the By Law. According to the "Polluter Pays Principle", the owner of the waste is the entity that release it into the market and financial liability is imposed on these entities. Some targets have been determined within this scope. These targets are provided on Table 60 by years, as included in the By Law.



Graph 25- Number of commercial enterprises that are registered to packaging system. (Ministry of Environment and Urbanisation, 2016)

Proprietors are liable to ensure collection and recovery of packaging wastes resulting from the consumption of their products in the market, in line with these targets and they are also responsible for meeting related expenses.

Table 60 - Annual packaging waste recovery targets (%) (Ministry of Environment and Urbanisation, 2016)

Years	Glass	Plastic	Metal	Paper/Cardboard	Wood
2011	38	38	38	38	-
2012	40	40	40	40	-
2013	42	42	42	42	5
2014	44	44	44	44	5
2015	48	48	48	48	5
2016	52	52	52	52	7
2017	54	54	54	54	9
2018	56	56	56	56	11
2019	58	58	58	58	13
2020	60	60	60	60	15

The expenses include collecting the packaging wastes from the source, informing consumers on the systems that are used, organizing training activities and supporting packaging waste management plans. Those enterprises which release packages into the market are liable to make contracts with municipalities or licensed businesses and document their activities that are performed for the purpose of achieving their targets.

With the By Law, package producers are also allowed to establish a non- profit foundations with legal entity by uniting together in order to meet their liabilities more efficiently. Pursuant to the By Law, Environmental Protection and Packaging Waste Recovery and Recycling Trust (ÇEVKO) was authorized in 2005, Consumer and Environmental Education Foundation (TÜKÇEV) was authorized in 2010, Turkish Plastics Industry Association (PAGEV) was authorized in 2014 and Waste Paper and Recycling Association (AGED) was authorized in 2015.

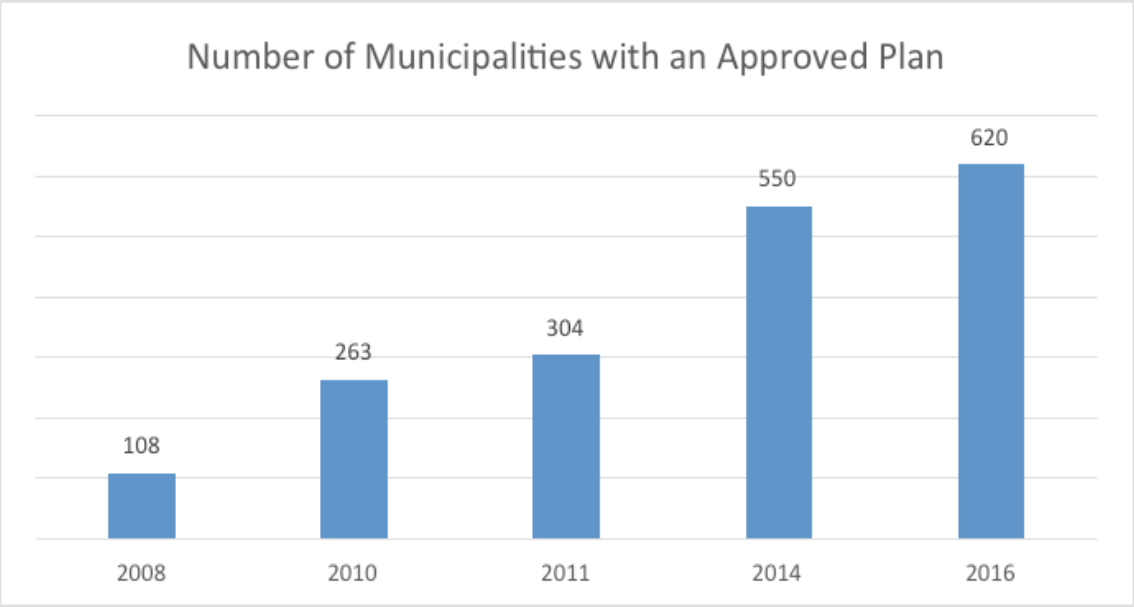
A healthy and sustainable waste management system requires that recyclable wastes are collected separately before they mix into garbage and recycling process is conducted in an organized structure. It is possible through recycling activities to protect natural resources, prevent wasting resources and reduce the amount of solid waste to be disposed. Moreover, not only the amount of waste that goes to storage areas will decrease, but also recyclable wastes will be re-utilized as raw materials and this will contribute to the economy. Within this context, sorting the packaging wastes from the source is the priority of the By Law and a system for separate collection of these wastes is established.

Since municipalities are liable to collect wastes according to the Law no. 5216 on Metropolitan Municipalities and Law no. 5393 on Municipalities, they are also responsible for separate collection of wastes from source.

Municipalities can collect wastes separately from the source by themselves or they can buy the service of collecting these wastes for them. Pursuant to the By Law, only licensed facilities can collect, transport and/or recycle packaging wastes and it is forbidden for other entities. Thus, if the municipalities opt for collecting packaging wastes from source by themselves, they should establish a facility for collecting and sorting wastes and obtain licenses for these facilities from the Provincial Directorates of Environment and Urbanisation. On the other hand, if the municipalities opt for buying the service of collecting packaging wastes from source, they should apply to facilities that have provisional operation certificates/environmental licenses and carry out the duty of separate waste collection together with these facilities.

Municipalities are also liable to prepare packaging waste management plans which include the time, method and modality of packaging waste collection. The application of preparing plans and submitting them to the Ministry first started in 2008 within the project for Packaging Waste Management Plans Format. Currently, the number of municipalities with an approved plan has reached to 629 and the population that is subject to this application has reached to 52 million. In order to prevent paper/time waste and in line with the savings measures, the Ministry of Environment and Urbanisation established an infrastructure so that packaging waste management plans can be submitted online. Information on the number of municipalities with an approved management plan is provided on Graph 26.

Legal and natural entities which aspires to recover packaging wastes are obliged to obtain environmental license from the Provincial Directorates of Environment and Urbanisation. Environmental license is provided in two ways: as license for collecting-sorting facilities and license for recycling.



Graph 26- Number of municipalities with an approved packaging waste management plan (Ministry of Environment and Urbanisation, 2016)

Collected and sorted packaging wastes are transported to recycling facilities and contribution to the economy is made through recovery of these wastes.

As of 2005, the Ministry started to make record of data on produced, sold and recycled amount of package by package producers, sellers of packaged products and licensed facilities.

Additionally, annual data on packages and packaging wastes is published officially as annual bulletins as of 2008.

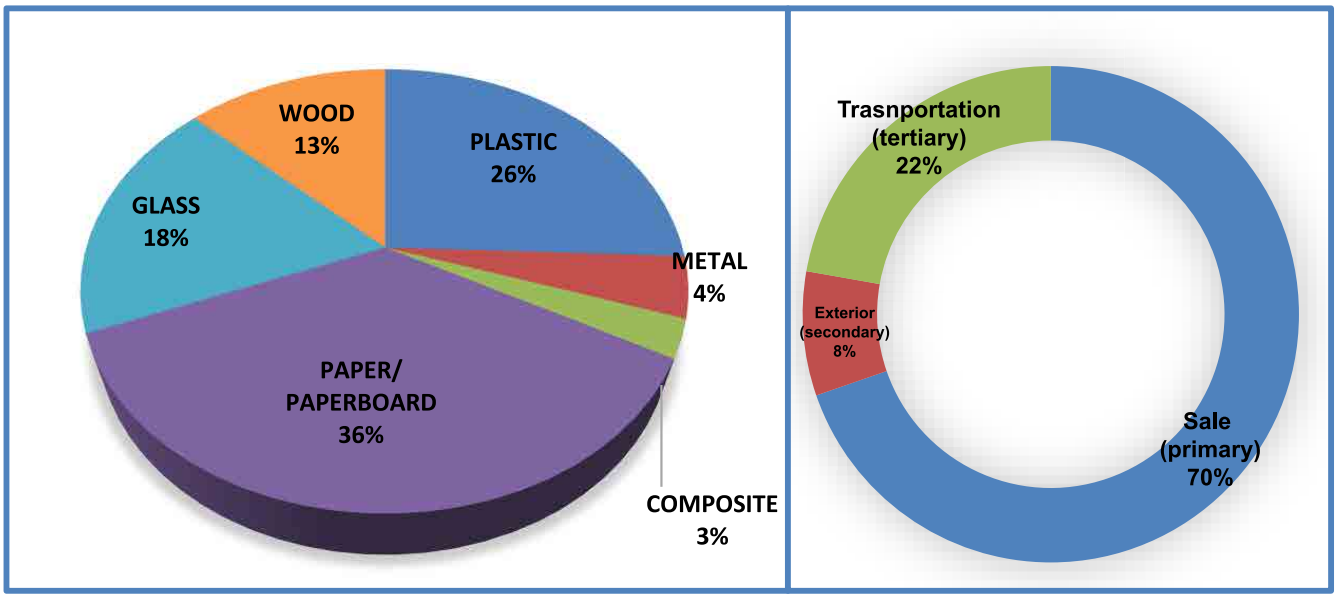
Table 61 - 2013 Statistical results on package and packaging wastes (Ministry of Environment and Urbanisation, 2016)

Waste code	Type	Produced package (tons)	Within the scope of B-1[7]			Sold within the scope of B-2[8] (tons)	Obtained within the scope of C[9] (ton)
			Sold (Tons)	Recycled	Recycling rate (%)		
15.01.02	PLASTIC	1.566.809	904.579	472.890	52	64.048	59.224
15.01.04	METAL	279.177	156.879	82.187	52	52.791	19.497
15.01.05	COMPOSITE	148.184	97.904	71.524	73	121.816	17.123
15.01.01	PAPER /PAPER-BOARD	2.358.591	1.271.906	1.429.091	112	30.370	88.300
15.01.07	GLASS	899.596	641.520	183.053	29	36.863	154.487
15.01.03	WOOD	655.477	456.057	61.600	14	6.186	53.103
	TOTAL	**5.907.834**	**3.528.845**	**2.300.345**	**65**	**312.074**	**391.734**

[7]B-1: Wastes disposed under the PWC By Law

[8]B-2: Wastes disposed under the legistlation other than PWC By Law.

[9]C: Wastes launced into the market as returnable under the PWC By Law



Graph 27 - Types of packages launched to the market under B-1 in 2013 and their rate by utilization (Ministry of Environment and Urbanisation, 2016)

D.4. Hazardous Wastes

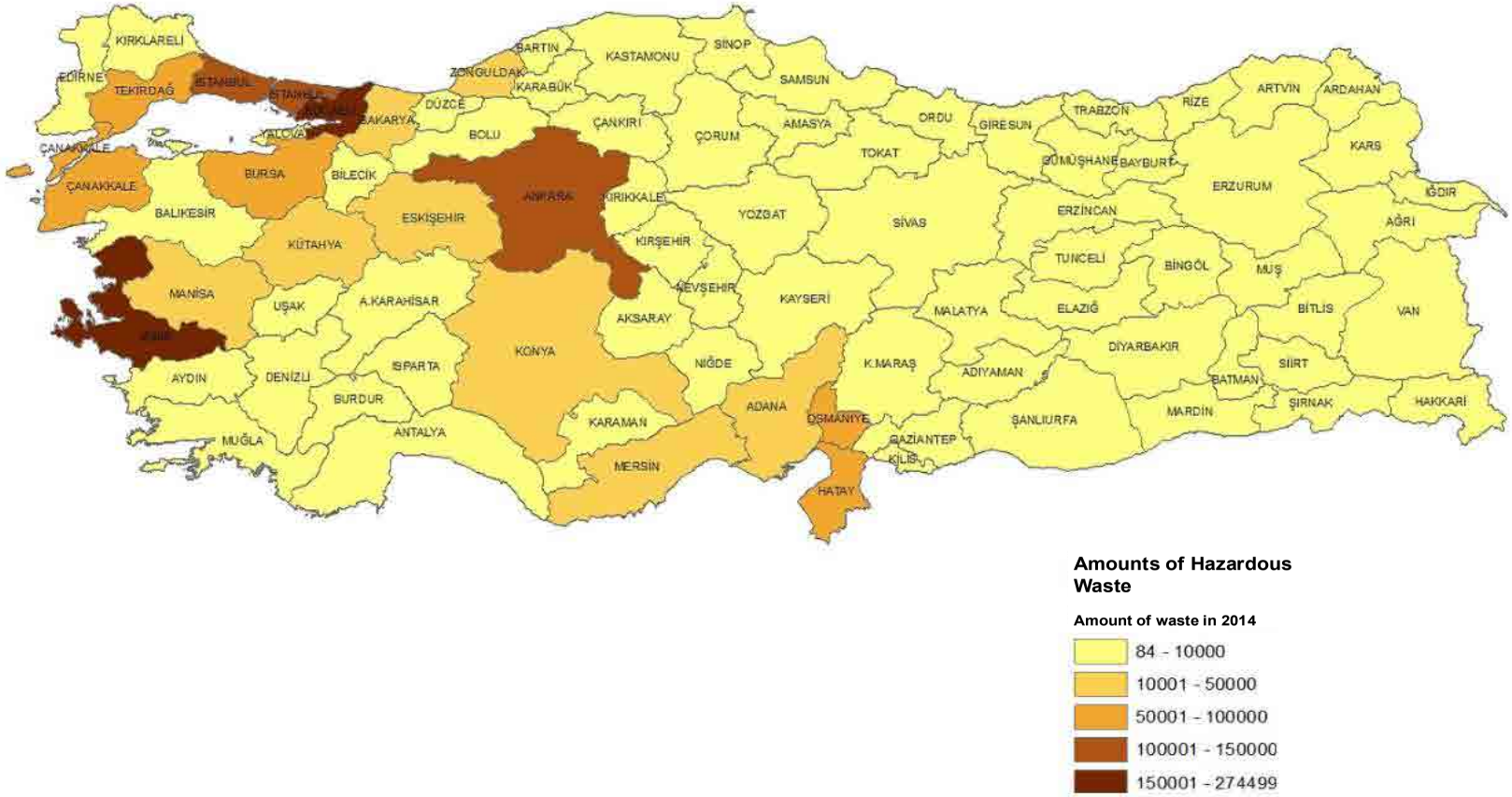
According to the Environmental Law wastes that cause adverse biological and chemical effects on ecological balance and natural structure of humans and other living organisms and substances that are polluted by these wastes are defined as hazardous wastes.

It is required to take necessary measures while recycling and disposing these wastes in order to prevent any harm to human and environmental health. Therefore, facilities that perform hazardous waste recycling and disposal are obliged to obtain licenses from the Ministry of Environment and Urbanisation. Additionally, the firms that will transport hazardous wastes are also required to obtain hazardous waste transportation license.

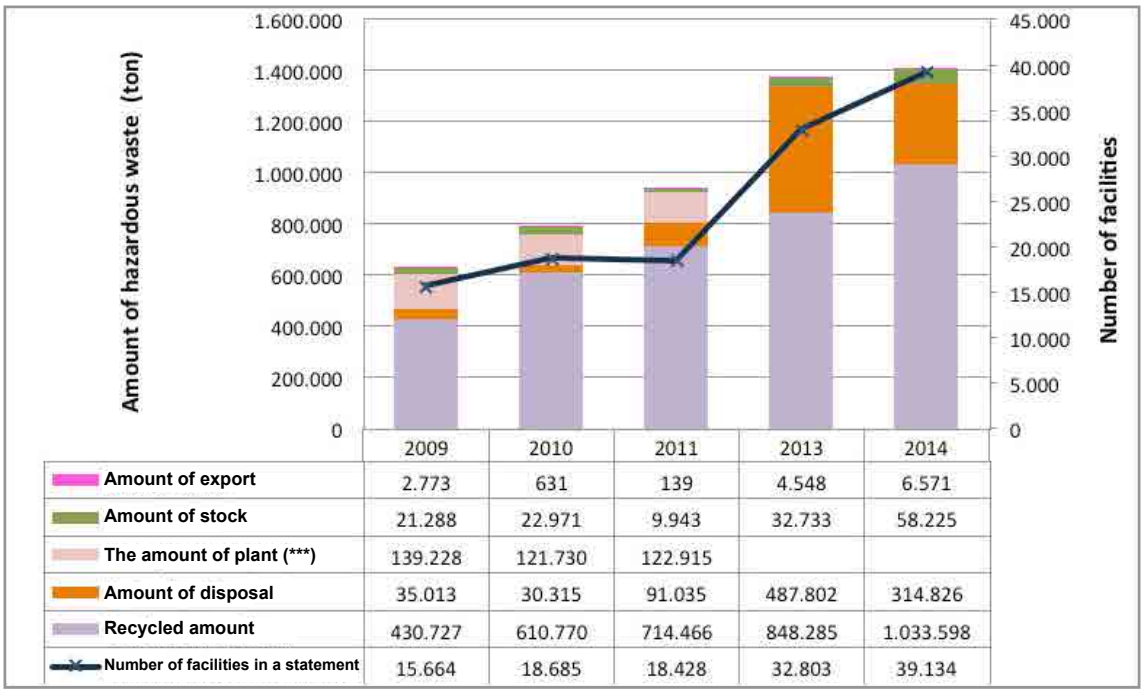
Table 62 - The number of facilities submitting their notices in Hazardous Waste Notification System and the amount of hazardous waste (Ministry of Environment and Urbanisation, 2016)

YEARS	2009	2010	2011	2013	2014
Number of notifier facilities	15.664	18.685	18.428	32.803	39.134
Total amount of hazardous waste (ton)	629.933	786.418	938.498	1.373.368	1.413.798

Amount of hazardous waste from mining sector is not included in the total amount of hazardous waste.



Map 13 –Distribution of hazardous waste production in 2014 in Turkey (Ministry of Environment and Urbanisation, 2016)



Graph 28- Data from hazardous waste notification system (2009-2014)

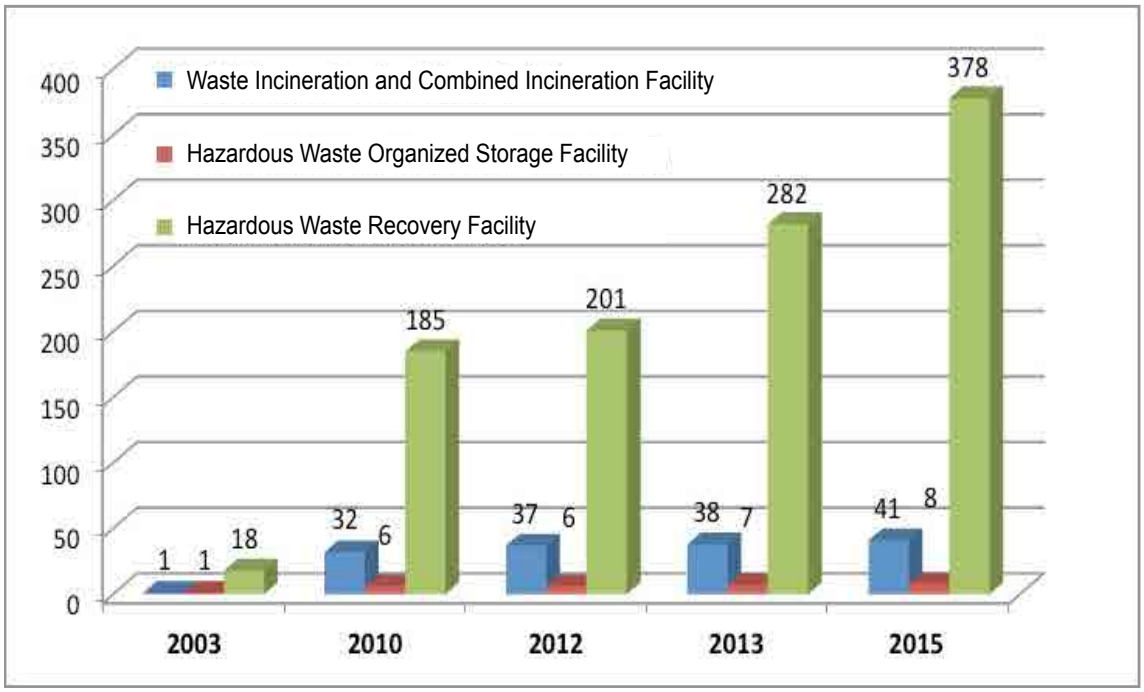
(***) On-site amounts for 2013 and 2014 are included in recycling and disposal amounts.

Table 63 - Distribution of the amounts of selected hazardous waste in 2013 and 2014, according to the data from Hazardous Waste Notification System (tons) (Ministry of Environment and Urbanisation, 2016)

YEARS	Waste Oil	Organic Waste Oil	Medical Waste	Battery - Accumulator	Waste Electrical and Electronic Equipment (WEEE)
2013	68.236	4.022	71.173	13.488	4.911
2014	61.335	7.234	83.190	11.982	6.817

Regions of intensive industrial activity and highest amount of hazardous waste production are Trakya, Marmara, Aegean, Central Anatolia and Eastern Mediterranean. Accordingly, there is an organized storage facility in Kula, Manisa with a capacity of 240.000 tons/year, owned by Süreko Waste Management, Transport Logistics, Power Generation Inc. Co. Also there is an integrated facility with an incineration capacity of 20.000 tons/years and recycling capacity of 20.000 tons/years. Petkim A.Ş provides incineration service in the same area with its facility with an incineration capacity of 17.500 tons/year. İZAYDAŞ A.Ş is located in Kocaeli and provides service to Marmara region with an incineration facility with a capacity of 35.000 tons/year and with its organized storage facility with a storage capacity of 160.000 tons/year.

Furthermore, 1. Class organized storage and interim storage facility of İSTAÇ A.Ş provides service to İstanbul and its neighborhoods with a capacity of 105.000 tons/year. ITC Invest Trading & Consulting AG provides service to Central Anatolian Region, Black Sea Region and Eastern Anatolian Region as an integrated facility with its 1. Class organized storage facility in Ankara with a capacity of 200.000 tons/year and gasification facility with a capacity of 50.800 tons/year. And licensing process for a second unit is under progress.



Graph 29 - Numbers of hazardous waste disposal and recycling facilities by years (Ministry of Environment and Urbanisation, 2016)

An Organized storage facility of Ekolojik Enerji A.Ş. provides service in Karatepe Site - Çorlu/TEKİRDAĞ with a capacity of 41.000 tons/year.

İSKEN A.Ş (with capacity of 11.000 tons/year) operates in Adana and ERDEMİR A.Ş. (with capacity of 6.084 tons/year) operates in Zonguldak and they store their own wastes.

Table 64 provides information on numbers and capacities of disposal and recycling facilities that are granted with licenses by the Ministry of Environment and Urbanisation. But the capacities stated here does not include all kinds of wastes. Licenses are granted to recycling and disposal facilities according to types of wastes and these facilities are only responsible for disposal/recycling of the wastes of which they are licensed. They cannot accept other kinds of wastes. Therefore, they are not able to use all actually available capacity.

Table 64 - Capacities of hazardous waste disposal/recycling facilities (Ministry of Environment and Urbanisation, 2016)

	Number
Hazardous Waste Incineration/Gasification Facility	3
Sanitary Landfill for Hazardous Waste	8
Hazardous Waste Recycling Facility	378
Co-incineration Facilities (energy recovery-cement plants)	38
TOTAL	**427**

D.5. Waste Mineral Oils

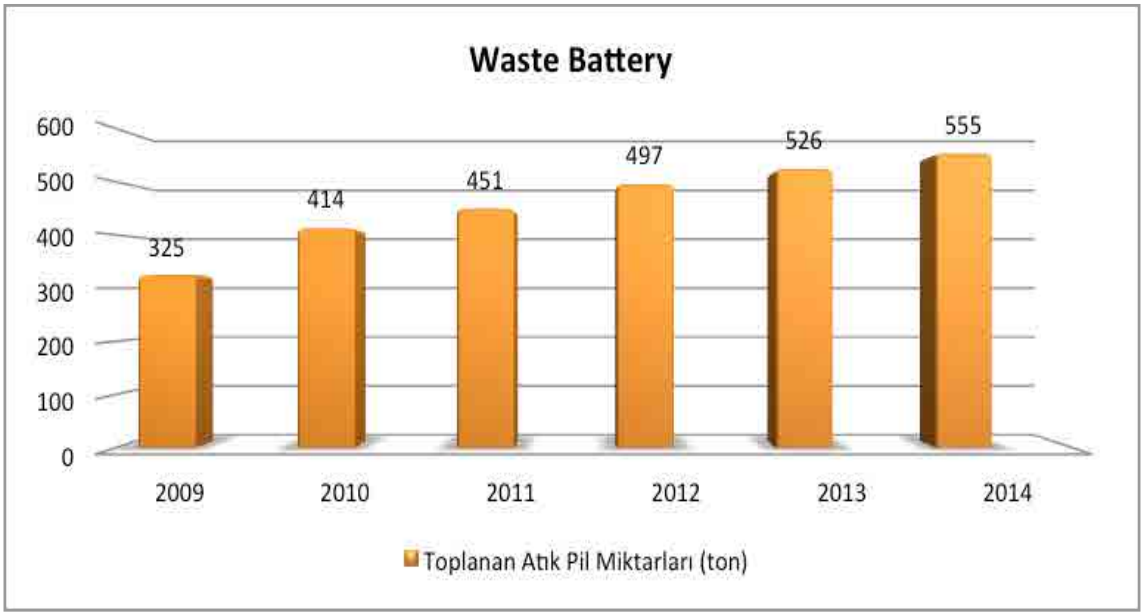
Table 65 – Amount of collected waste oil (tons) (Ministry of Environment and Urbanisation, 2016)

	2009	2010	2011	2012	2013	2014
Waste Engine Oil	17.640	17.775	20.500	20.000	20.870	17.750
Waste Industrial Oil	14.880	16.178	19.600	18.200	18.775	29.710

D.6. Waste Batteries and Accumulators

Table 66– Amount of collected waste accumulators (Ministry of Environment and Urbanisation, 2016)

Years	2011	2012	2013	2014
Amount of collected waste accumulators (ton)	59.400	59.500	61.000	61.300
Amount of recycled lead (ton)	35.640	35.700	36.600	36.780



Graph 30 – Amount of collected waste batteries (ton) (Ministry of Environment and Urbanisation, 2016)

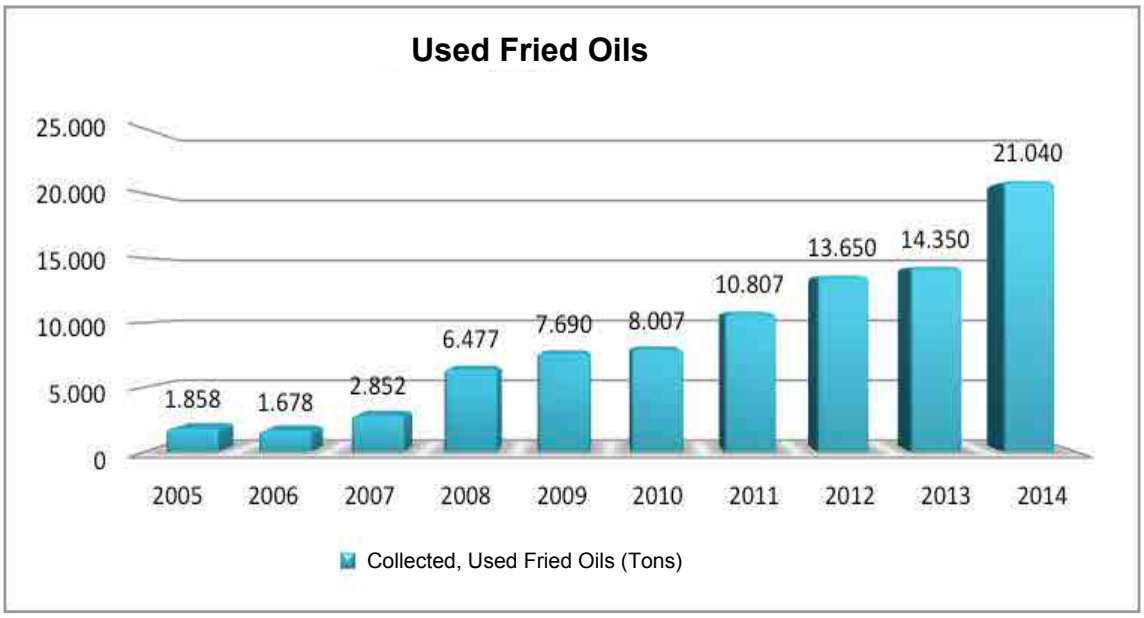
D.7. Organic Waste Oils

With the By Law on the Control of Organic Waste Oils published in the Official Gazette No. 29378 dated 06.06.2015, organic waste oils were regarded as used frying oils and expired organic oils and taken under the scope of the By Law.

Organic waste oils are stored in organic waste oil recycling facilities and organic waste oil interim storage facilities, and they are used for producing biodiesel or biogas.

Table 67 – Amount of collected organic waste oil (Ministry of Environment and Urbanisation, 2016)

	Organic Waste Oil (tons)
2011	10.807
2012	13.650
2013	14.350
2014	21.040



Graph 31 - The amounts of used fried oil, collected between 2005-2014 (tons) (Ministry of Environment and Urbanisation, 2016)

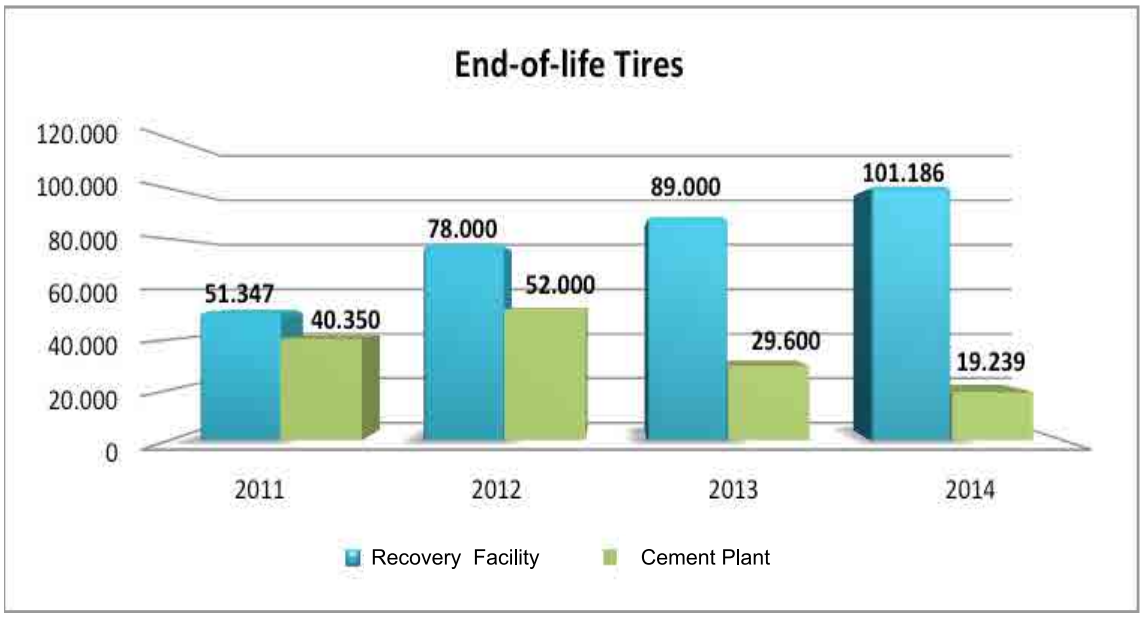
D.8. Polychlorinated Biphenyls and Polychlorinated Terphenyls

Within the scope of the "Project for Environmentally-friendly Management of PCBs in Turkey" which was conducted by the Ministry of Environment and Urbanisation and United Nations Environment Programme / Mediterranean Action Plan (UNEP/MAP) under the Project for UNEP/MAP GEF Strategic Partnership for the Mediterranean Sea Large Marine Ecosystem (MedPartnership) that was supported by Global Environment Fund (GEF); PCB inventory was prepared, capacity was developed and activities for awareness raising on PCBs were organized, and disposal of PCB containing wastes that are out of use or decided to be regarded as out of use was performed. The works on disposal of PCB containing wastes started in May 2015 and completed in December 2015. Around 660 tons of PCB containing waste was disposed and expenses for the disposal was met through project budget. PCB containing liquid wastes were disposed in İZAYDAŞ and PCB containing solid wastes were disposed abroad.

Additionally, there is still 510 tons of PCB containing equipment that was identified during the inventory works of a project in 2013-2014 but not disposed yet since they are in use. Disposal and decontamination of these equipments will be performed under the GEF supported "Project for Removal of Persistent Organic Pollutant Residues and Reducing the Release of Persistent Organic Pollutant" which started in 2015 by the Ministry and United Nations Development Programme (UNDP).

D.9. End-of-life Tires

End-of-life Tires (ELTs) are recycled through physical crushing and pyrolysis method and they are also used in licensed cement plants as additional fuel for energy recovery.



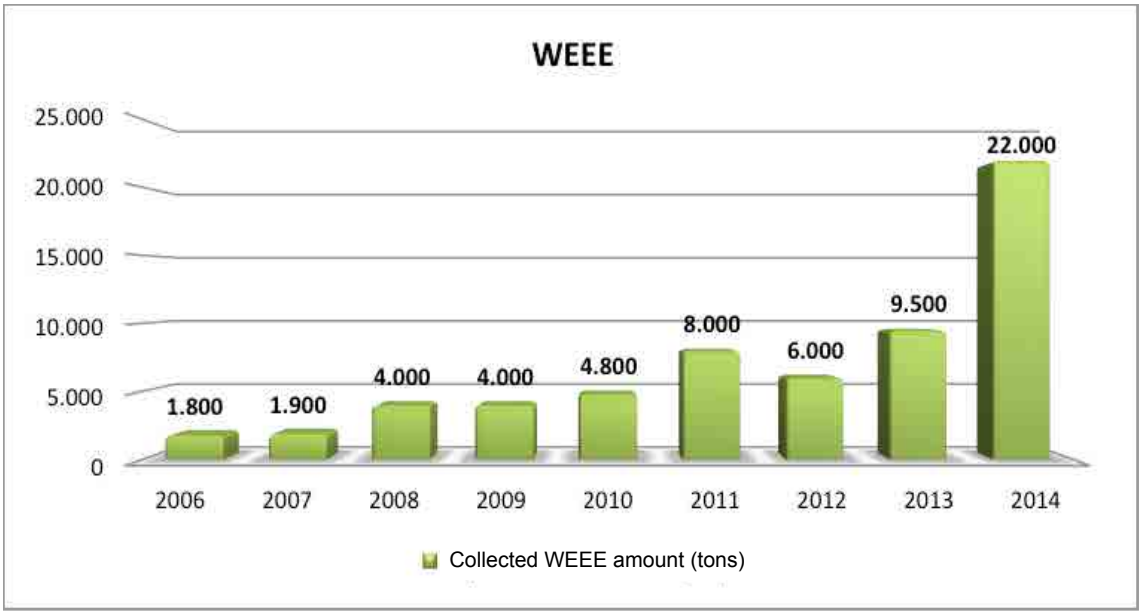
Graph 32 –The amount of recycled and disposed end-of-life tires (tons) (Ministry of Environment and Urbanisation, 2016)

D.10. Waste Electrical and Electronic Equipment

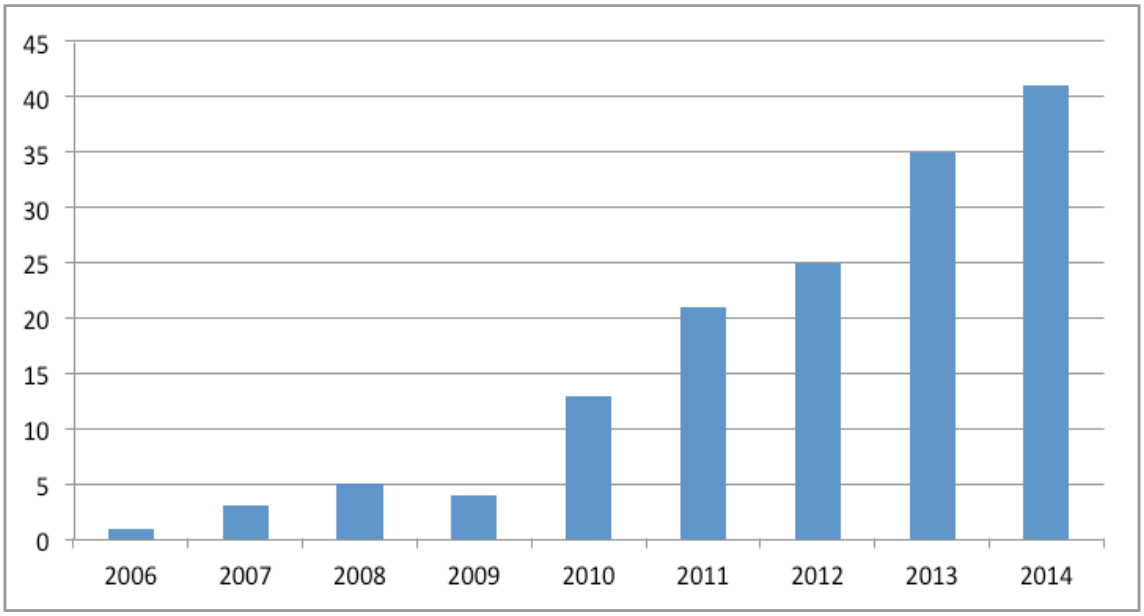
The By Law on the Control of Waste Electrical and Electronic Equipment (WEEE) was enacted after publishing in the Official Gazette No. 28300 dated 22.05.2012, with the purpose of ensuring an environmental-friendly management of waste electrical and electronic equipment (WEEE) during the process from production to final disposal. Pursuant to Article 15 of this By Law, EEE producers / importers are liable to collect domestic EEEs that they launch into the market when they become waste. There has been a remarkable increase in the amount of collected WEEE since the enactment of the By Law in 2012 (Graph 33).

In addition to this, EEE sector is taken under record by the Ministry within the scope of the By Law and thereby the By Law is implemented more effectively by the sector.

When Graph 34 is analyzed, it is observed that there has been a remarkable increase in the number of waste electrical and electronic equipment treatment facilities. While the number of waste electrical and electronic equipment treatment facilities was 1 in 2006, this number reached to 41 in 2014.



Graph 33 – The amount of collected waste electrical and electronic equipment (tons) (Ministry of Environment and Urbanisation, 2016)



Graph 34 - The number of waste electrical and electronic equipment treatment facilities (Ministry of Environment and Urbanisation, 2016)

D.11. End-of-life Vehicles

The "Directive 2000/53 EC on the End of life Vehicles" dated 18 September 2000 of European Union, to which we are in process of becoming a member, is included in "directives to be adopted" section of Turkish National Programme for the adoption of the Acquis.

Within the scope of harmonizing our national legislation with the directive, it is aimed to prevent wastes from vehicles with a view to protect environmental and human health, reuse, recycle and recover end-of-life vehicles and their parts and reduce the amount of waste to be disposed.

The "By Law on the Control of End of life Vehicles" was prepared and published on 30/12/2009 within the scope of harmonizing our national legislation with the Directive 2000/53 EC on the End of life Vehicles.

The By Law applies to vehicles in category M1 (vehicles with maximum 8 seats except driver and intended for passenger transport), category N1 (maximum 3.500 kg motor vehicles intended for cargo transport), three-wheeled vehicles except motorcycles and bicycles and parts of these vehicles.

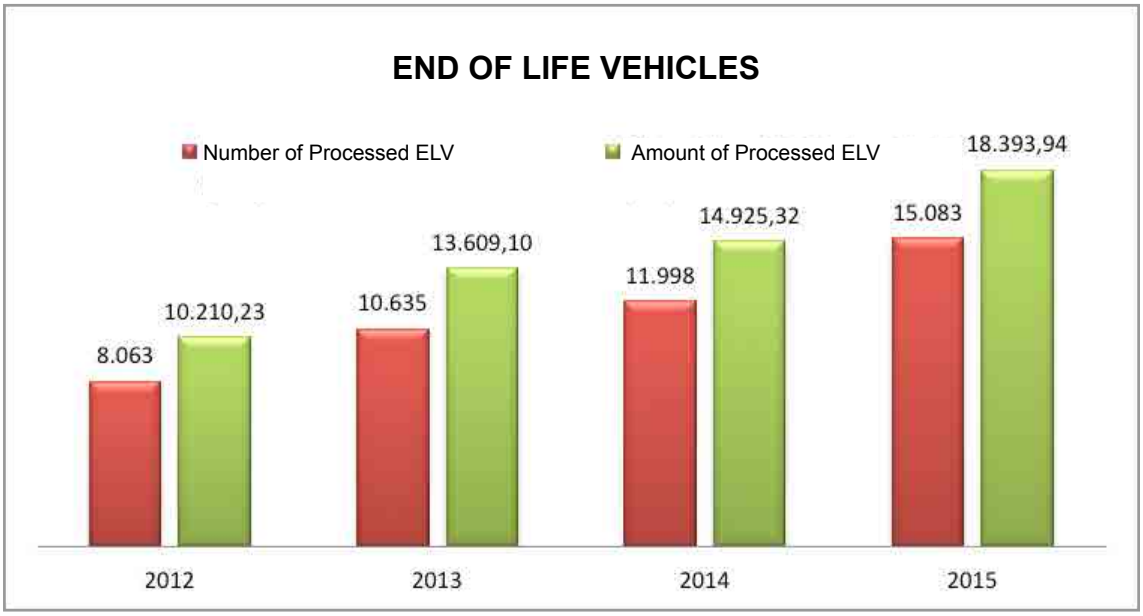
The By Law includes provisions on the matters of;

- Retrieving end-of-life vehicles from the last owners at no cost,
- Establishing licensed collection, fragmentation and recycling systems,
- Recycling at least 85% of scrap vehicles,
- Restricting the use of environmentally hazardous substances such as lead, mercury, cadmium and chromium 6 in new vehicles,
- Establishing an environmentally-friendly scrap vehicle discarding system in cooperation with Turkish National Police

According to data of 2015 from the Ministry of Environment and Urbanisation, there are 722 licensed scrap vehicle delivery points and 97 interim storage facilities with provisional operation document and permit license in Turkey. End of life vehicles are delivered to licensed facilities and registered to "ELV Data System". The number of vehicles discarded and registered to ELV Data System was 8.065 in 2012, 10.560 in 2013, 11.998 in 2014 and 15.083 in 2015. (Table 68 and Graph 35)

Table 68 - The number of vehicles discarded and registered to ELV Data System as scrap vehicles (Ministry of Environment and Urbanisation, 2016)

Year	Number of Processed ELV	Total Processed ELV Weight (ton)	Total reuse (ton)	Total Recycling (ton)	Total Recovery (ton)	Total reuse and Recycling (ton)	Total reuse and Recover (ton)
2012	8.063	10.210,23	4.103,00	2.565,63	2.623,93	6.668,75	6.727,06
2013	10.635	13.609,10	4.991,00	3.427,94	3.482,91	8.418,69	8.473,66
2014	11.998	14.925,32	4.595,00	2.634,12	2.694,37	7.229,00	7.289,24
2015	15.083	18.393,94	3.610,50	2.273,00	2.305,00	5.883,00	5.915,00



Graph 35 – Number and weight of end of life vehicles (Ministry of Environment and Urbanisation, 2016)

Table 69 – Data on vehicles that were discarded as scrap vehicles under the By Law on the Control of End of Life Vehicles (2014 Environmental Indicators, 2015)

YEARS	2011	2012	2013	2014	2015
a. Total Number of Motor Vehicles in Traffic.	16.089.528	17.033.413	17.939.447	18.828.721	19.994.472
b. Total Number of Vehicles Discarded from Traffic	198.801	125.407	223.429	154.500	108.030
c. Number of Vehicles Discarded from Traffic Among Total Number of Vehicles in Traffic (%) (bx100/a)	1,24%	0,74%	1,25%	0,82%	0,54%
d. Total Number of Vehicles Discarded as Scrap Vehicle by Turkish National Police	113.913	73.567	158.879	98.871	80.612
e. Share of Scrap Vehicles among Total Number of Motor Vehicles Discarded from Traffic (%) (dx100/b)	57%	59%	71%	64%	74,62%
f. Total Number of End of life Vehicles Discarded as Scrap Vehicle by Turkish National Police (vehicles in M1 and N1 category)	41.848	19.919	30.254	21.173	15.661
g. Share of End of life Vehicles Discarded as Scrap Vehicle by Turkish National Police (vehicles in M1 and N1 category) in Total Number of Motor Vehicles Discarded from Traffic (%) (fx100/b)	21%	16%	14%	14%	19,4%

D.12. Non-Hazardous Wastes

D.12.1. Iron and Steel Sector and Waste Slag

Currently, Turkish iron and steel sector takes a leading part among developing countries with an annual production of 26 million tons. 20 million tons of this amount is produced in plants with electric arc furnaces and 6 million tons is produced in plants with blast furnace stoves.

Table 70 - Raw material used in iron and steel production, amount of produced slag and disposal method in Turkey. (Provincial Directorates of Environment and Urbanisation, 2016)

Facility Name	Amount of Raw Material Used (tons/year)	Amount of slag (tons/year)	Disposal Method
Çolakoğlu Metalurji A.Ş.	2.540.283	335.472	Organized Storage
Kroman Çelik	1.520.273	290.453	Organized Storage
Diler Demir Çelik A.Ş.	1.288.000	228,500	Recovery
İsdemir A.Ş	6.720.000	840.000	Waiting for permit
Ekinciler A.Ş	1.116.240	139.530	Waiting for permit
Yazıcı Demir Çelik A.Ş.	1.030.899,6	128.862,45	Waiting for permit
Nursan Metalurji A.Ş	1.513.040,4	189.130,05	Waiting for permit
MMK Metalurji A.Ş	2.960.089	370.110,75	Waiting for permit
Egemen Metalurji A.Ş	51.321,6	6.415,2	Waiting for permit
ÇEMTAŞ AŞ	155.821	20.680	Storage
Asil Çelik San. Tic A.Ş.	496.555	28.800	Recycling
HABAŞ Sınai ve Tıbbi Gazlar İst. End. A.Ş.	1.643.101	205.198	Recycled by a recycling facility with an environmental license

Table 70 - Raw material used in iron and steel production, amount of produced slag and disposal method in Turkey. (Provincial Directorates of Environment and Urbanisation, 2016) (Cont.)

Facility Name	Amount of Raw Material Used (tons/year)	Amount of slag (tons/year)	Disposal Method
İzmir Demir Çelik A.Ş.	1.132.353	238.000	Recycled by a recycling facility with an environmental license
Ege Çelik End. San. Ve Tic. A.Ş.	591.000	112.000	Recycled by a recycling facility with an environmental license
Özkan Demir Çelik San. A.Ş.	336.789	26.000	Recycled by a recycling facility with an environmental license
ÇEBİTAŞ Demir Çelik End. A.Ş.	1.643.101	205.198	Recycled by a recycling facility with an environmental license
Sider Dış Ticaret A.Ş.	No data	No data	-
Ede Demir Çelik Paz. San. Ve Tic. Ltd. Şti.	No data	No data	-
ERDEMİR	8.669.327	1.272.475	Slag is delivered to cement plants, used in Sinter Plant
KARDEMİR A.Ş.	2.152.600	254.826	On-site recycling
Bilecik Demir Çelik	Recently started to operate		
Baştuğ Metalurji Sanayi A.Ş	1.746.750	217.075	R12
Tosçelik Profil Ve Saç Endüstrisi A. Ş. Osmaniye Şubesi	1.041.145	109.464	R12
Platinum Demir Çelik Sanayi Ve Ticaret Anonim Şirketi Osmaniye Branch	85.680	14.174	R12
Koççelik Sanayi A.Ş.	621.223	108.391	R12
Yeşilyurt Demir Çelik End. ve Liman İşl. Ltd. Şti.	750.000	60.000	Landfill and Interim Storage
İÇDAŞ Çelik, Enerji, Tersane ve Ulaşım A.Ş.	3.858.669	300.000	10% of the slag is returned for melting and 90% is resized through crushing and screening and becomes artificial aggregate.

According to 2014 survey of TURKSTAT to keep water, wastewater and waste statistics of manufacturing industry, of the 9,6 million tons of waste from iron and steel industry, 5,6 million tons of waste consists of combustion residuals. Combustion residuals include slag and ash resulting from thermal straightening and combustion and flue gas filtering. Combustion wastes are listed under the code of 12.4 in European Waste Classification for Statistics. 61,7% of 5,6 million tons combustion waste has been recycled.

Steel Slag is included in European List of Waste. The slag is listed under 10 02 02 waste code as unprocessed slag. It can be regarded as a product instead of being a waste that undergoes granulation, pelletization, frothing and sorting, crushing screening, grinding processes.

Slag has been used in Europe for various purposes such as cement production, road construction, hydraulic constructions (dam, etc.) and fertilizers for a long time. Reuse of slag through efficient recycling mechanisms is of great importance in Turkey in terms of environmental protection and economic recovery.

D.12.2. Coal Burning Thermal Power Plants and Ash

Tiny particles that float in the air through flue gases as a result of burning pulverized coal at high temperatures in thermal power plants are called as “fly ash”, and bigger particles that cannot float through flue gases and accumulate at the bottom are called as “slag or bottom ash”. Bottom ashes make up 20-25% of the total amount of ash.

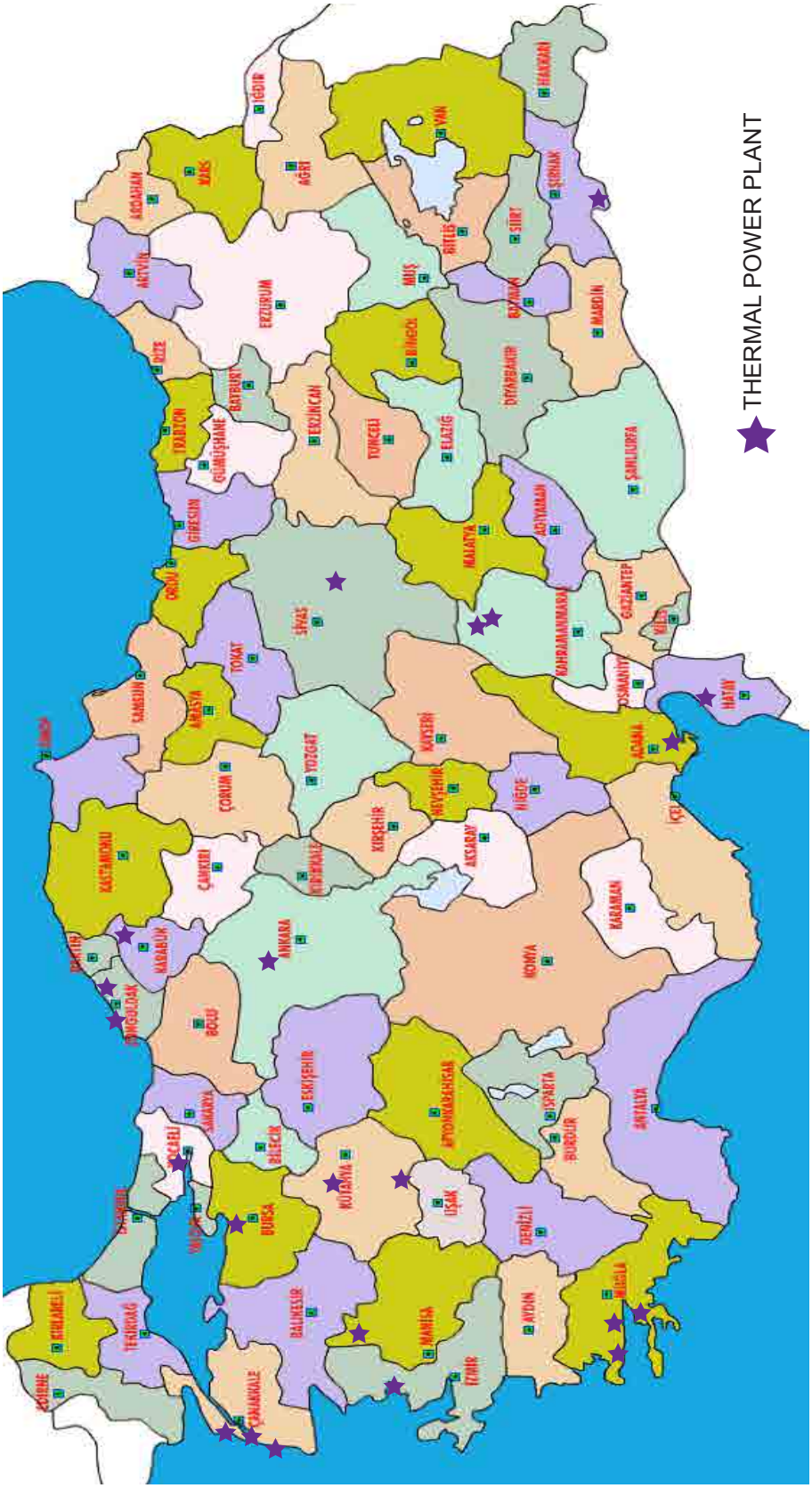
Fly ashes that are prevented from mixing into the air thanks to electrostatic and mechanical methods accumulate in the chambers under the filters. Additionally, gypsum formations occur as a result of desulphurization process that is performed to capture SOx gases in flue gases.

On the other hand, in the U.S.A. and China, where a great amount of fly ash is produced, nearly 32% and 40%, successively, fly ash is used.

At coal burning thermal power plants, flue gasses (SO_x, NO_x, hydrocarbons, CO, CO_2), dust (particular matter) and ash (slag) are produced at the end of the processes.

Calorific value of local lignite used in thermal power plants is around 1.200 kcal although this value differs according to coal production areas in different regions of Turkey. Calorific value of imported coal generally from Russia, Ukraine and South Africa is about 6.000 kcal.

Map 14 shows the places of 22 coal burning thermal power plants operating in Turkey as of 2015.



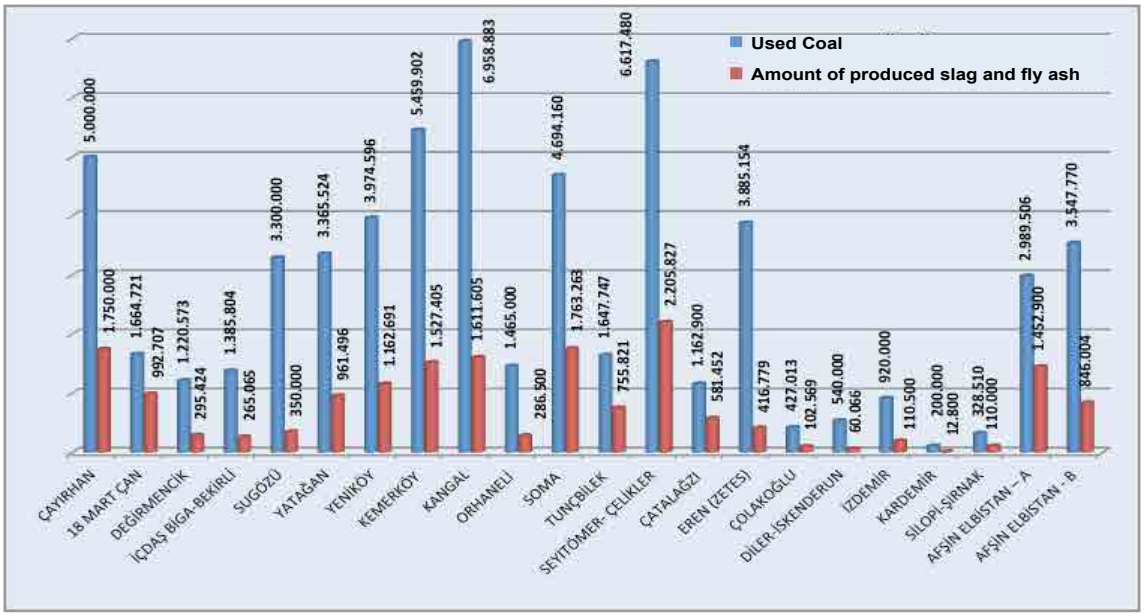
Map 14 - Places of thermal power plants operating in Turkey

According to 2014 statistics from a survey on thermal power plant water, wastewater and waste by TURKSTAT, 18 thermal power plants produced a total amount of 22.102.439 tons of slag and fly ash in 2014.

According to the data from Provincial State of the Environment Reports prepared by Provincial Directorates of Environment and Urbanisation, total amount of coal used in thermal power plants in 2015 is around 60.666.000 tons and amount of produced fly ash and bottom ash (slag) is nearly 17.710.000 tons. These amount may vary each year according to operation status of thermal power plants for electric energy production.

Table 71 – Amount of coal used in thermal power plants and amount of produced slag and fly ash (Provincial Directorates of Environment and Urbanisation, 2015).

Name of Thermal Power Plant	PROVINCE	Amount of Coal usage (ton/year)	Amount of produced slag, fly ash (ton/year)
ÇAYIRHAN	ANKARA	5.000.000	1.750.000
18 MART ÇAN	ÇANAKKALE	1.664.721	992.707
DEĞİRMENCİK	ÇANAKKALE	1.220.573	295.424
İÇDAŞ BİGA-BEKİRLİ	ÇANAKKALE	1.385.804	265.065
SUGÖZÜ	ADANA	3.300.000	350.000
YATAĞAN	MUĞLA	3.365.524	961.496
YENİKÖY	MUĞLA	3.974.596	1.162.691
KEMERKÖY	MUĞLA	5.459.902	1.527.405
KANGAL	SİVAS	6.958.883	1.611.605
ORHANELİ	BURSA	1.465.000	286.500
SOMA	MANİSA	4.694.160	1.763.263
TUNÇBİLEK	KÜTAHYA	1.647.747	755.821
SEYİTÖMER- ÇELİKLER	KÜTAHYA	6.617.480	2.205.827
ÇATALAĞZI	ZONGULDAK	1.162.900	581.452
EREN (ZETES)	ZONGULDAK	3.885.154	416.779
ÇOLAKOĞLU	KOCAELİ	427.013	102.569
DİLER-İSKENDERUN	HATAY	540.000	60.066
İZDEMİR	İZMİR	920.000	200.000
AFŞİN ELBİSTAN – A	KAHRAMANMARAŞ	2.989.506	1.452.900
AFŞİN ELBİSTAN - B	KAHRAMANMARAŞ	3.547.770	846.004
KARDEMİR	KARABÜK	110.500	12.800
SİLOPİ	ŞIRNAK	328.510	110.000
TOTAL		**60.665.743**	**17.710.374**

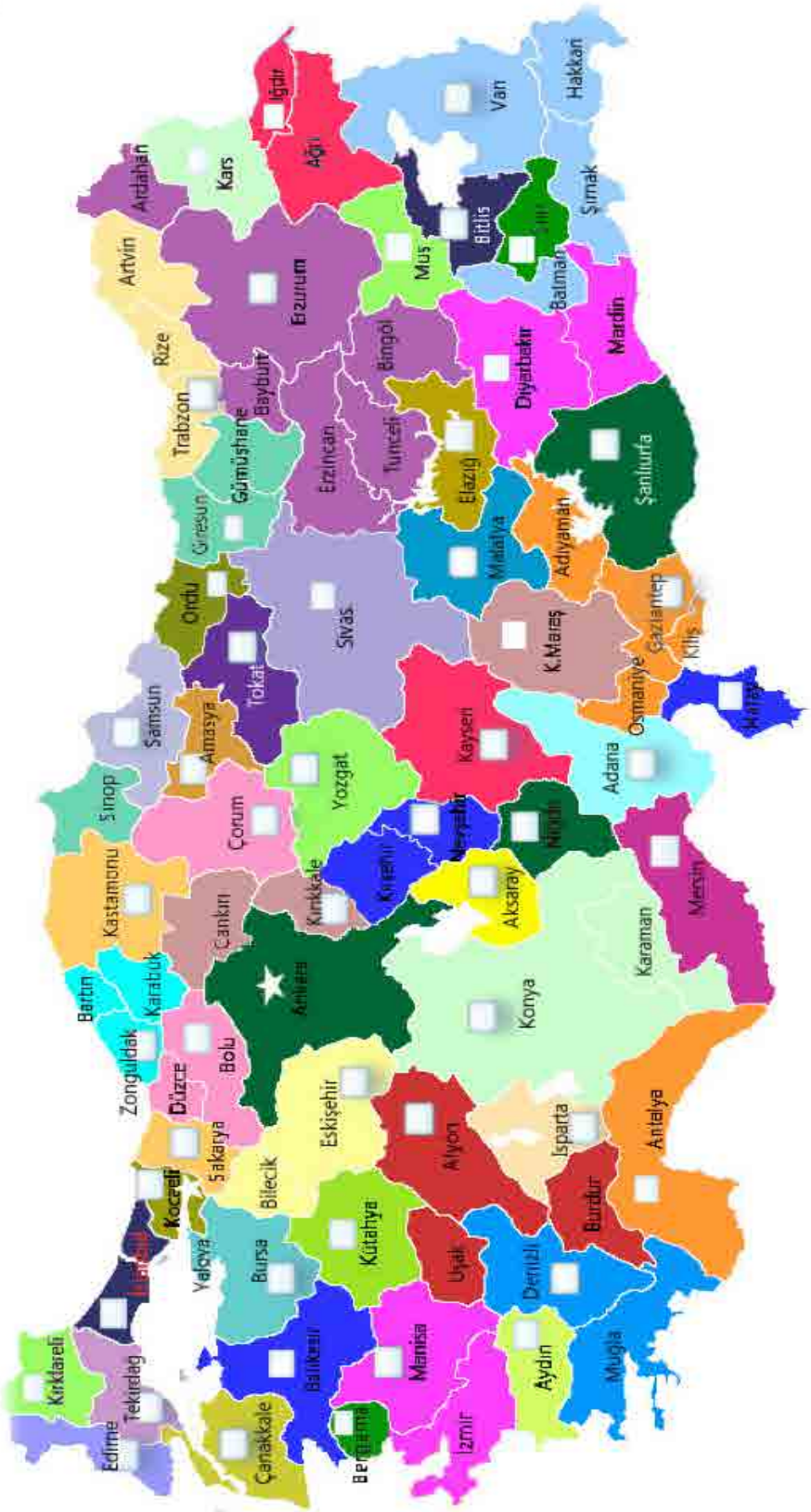


Graph 36 - Coal use and waste production in thermal power plants in Turkey (Provincial Directorates of Environment and Urbanisation, 2015).

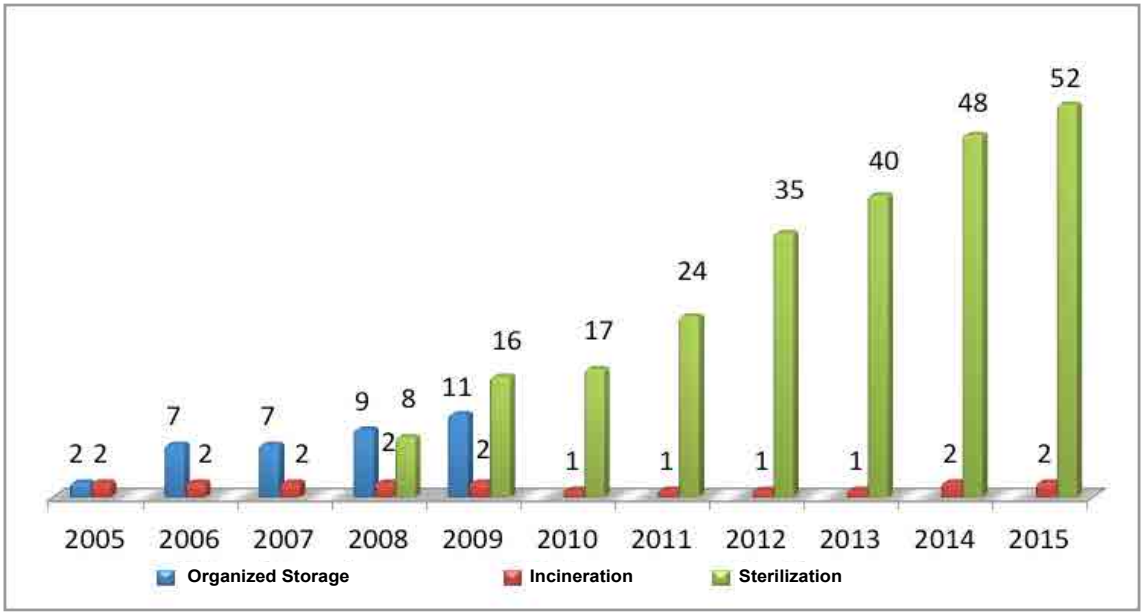
D.13. Medical Wastes

Principles on safe management of medical waste in Turkey are designated by the “By Law on Control of Medical Waste” and it is prohibited to accept waste from health and veterinary institutions, which are regarded as infecting and which are not subjected to any preliminary processing, into organized storage areas.

Thus, medical wastes are disposed through incineration or they are made safe through sterilization process. As of December 2015, 52 medical waste sterilization facilities have been operating in Turkey. There are also 2 incineration facilities for disposal of medical waste.



Map 15 - Medical waste sterilization and incineration facilities in provinces (Ministry of Environment and Urbanisation, December 2015)



Graph 37 –Medical waste disposal methods in Turkey (Ministry of Environment and Urbanisation, 2016)

D.14. Mining Wastes

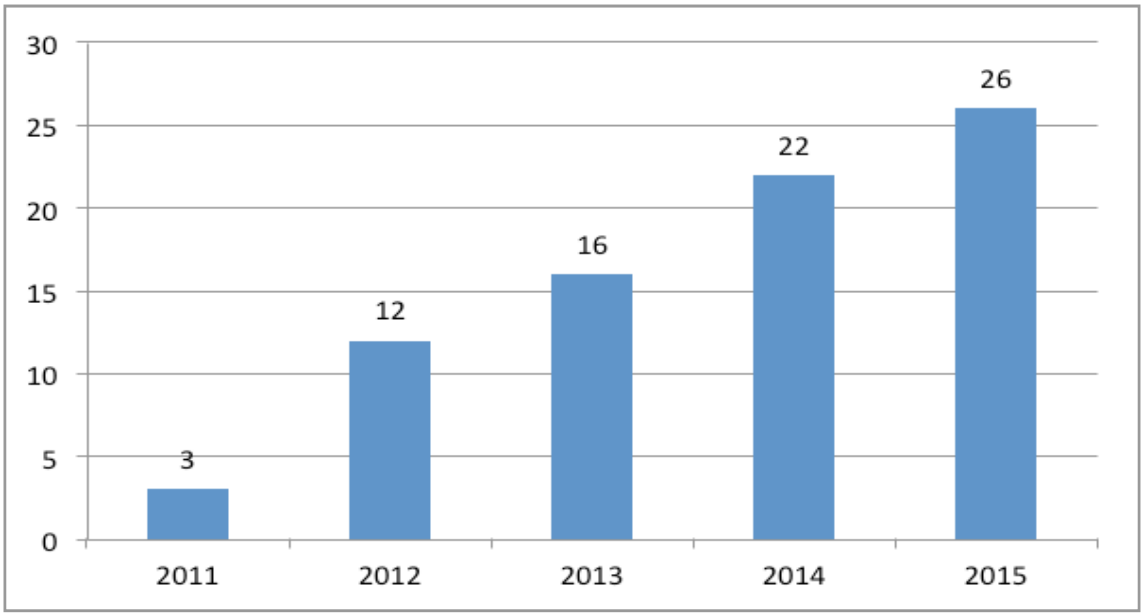
Mining waste is different from other kinds of waste in terms of management since it occurs in high amounts and due to difficulties in providing disposal facilities and its complicated structure resulting from its physical and chemical characteristics. By Law on Mining Wastes, which is a By Law in concordance with realities of Turkey and Directives of the European Union and includes unique disposal methods for mining wastes, was published in the Official Gazette No. 29417 dated 15 July 2015 and it will take effect on 15 July 2016. The By Law clarifies procedures and principles on characterization of mining wastes, classification of disposal facilities, recycling, waste management plan and emergency action plan, permit and license process, environmental monitoring, temporary storage, management of inert waste, drilling sludge, disposal in marine receiving environment, heap leach management, paste filling and tailings management.

Mining activities are carried out on wide areas by nature and drilling waste is produced during exploration process, tailings are produced during extraction process and enrichment waste is produced during processing stage. According to statistics from a survey by TURKSTAT on water, wastewater and waste in mining in 2014, 755 million tons of waste was produced by mining facilities in 2014. 99,77% of this waste consists of mineral wastes. The amount of stripping waste/tailings was 751 million tons and total amount of hazardous waste was 2.355 thousand tons.

Photo 2- Mining activity

Photo 3- Organized storage facility for mining wastes

Enrichment wastes that occur during mineral ore processing are stored in organized storage facilities licensed by the Ministry of Environment and Urbanisation. Mining waste storage facilities are monitored by the Ministry of Environment and Urbanisation from the beginning to the end of construction works and those facilities that complete construction works in concordance with the legislation are provided with certificate of approval for organized storage. As can be seen on Graph 38, 26 facilities have been granted with certificate of approval for organized storage as of 2015.



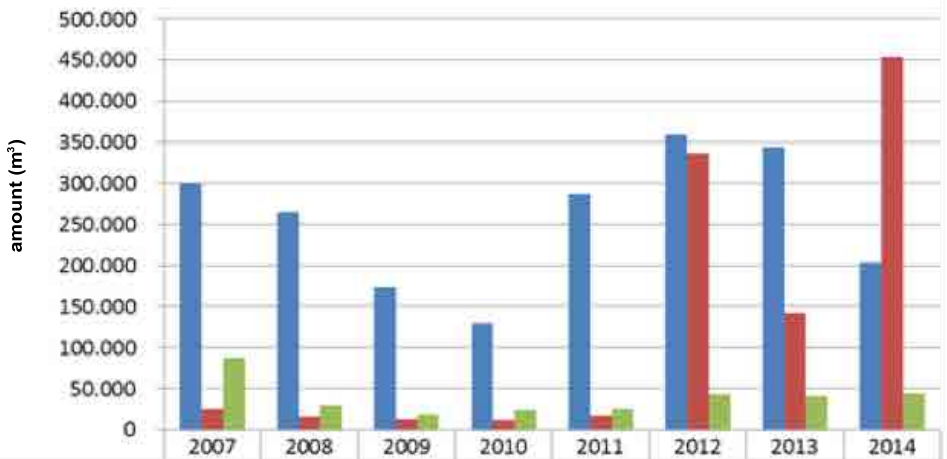
Graph 38 - Mining waste storage facilities with certificate of approval for organized storage (Ministry of Environment and Urbanisation, 2016)

Information is provided on facilities granted with certificate of approval for organized storage by the Ministry of Environment and Urbanisation on the Graph 38. As can be understood from the graph, there was an important increase in number of mining waste organized storage facilities between 2011 and 2015 thanks to positive developments in process of assessment and approval of storage facility projects and constructions conducted by the Ministry of Environment and Urbanisation.

D.15. Wastes from Ships

Waste receiving facilities have been established and operated in order to prevent discharge and dumping of waste and cargo waste from ships within maritime jurisdiction into marine environment and protect marine environment in line with national legislation and the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) acceded by Turkey.

While the number of certified waste receiving facilities that receive wastes from ships at ports was 18 in 2005, this number reached to 247 as of the end of 2014.



	2007	2008	2009	2010	2011	2012	2013	2014
Petrol and Petrol Derivatives	299.960	264.954	173.571	129.483	286.712	359.505	343.585	203.041
Contaminated Water	25.481	15.934	12.777	11.947	17.583	335.530	141.695	453.718
Garbage	88.038	29.950	18.653	23.977	25.255	43.177	41.039	44.007

Graph 39 - Distribution of wastes from ships by years (m^3) (Ministry of Environment and Urbanisation, 2016)

D.16. Conclusion and Evaluation

The increase in the amount and types of wastes due to rapid economic growth, Urbanisation, population growth and prosperity have required accommodating an integrated waste management approach that covers all kinds of wastes instead of establishing a different waste management system for each kind of waste. Integrated waste management can be defined as choosing and implementing necessary methods, technologies and management principles for recycling and disposal of wastes. Under the integrated waste management lies a waste management system that is based on waste prevention, minimizing wastes, reuse, recycling, energy recovery and disposal hierarchy. Remarkable improvements have been made with regard to environmental legislation since 2003. Within this frame, permanent works and By Laws concerning waste management have been carried out in the presence of EU and international organizations. The enacted legislation on waste management accelerated sectoral investments and created substantial employment opportunities as well as creating a dynamic and strong economic structure.

Waste management sector contributes to our country thanks to the increase in capacity for recycling and recovery activities. Important investments made on recycling domestic and industrial waste will help us achieve a modern waste management.

According to the hierarchy in our legislation on waste management, firstly occurrence of wastes should be prevented. The second stage is reducing amount of wastes on the source if prevention is not possible. The third stage includes prevention of new product use by reusing wastes. In the fourth stage, contribution is made to economy through recycling of recyclable wastes by using appropriate recycling methods.

Non-recyclable wastes should be used as fuel for energy recovery. The last (sixth) stage includes final disposal or wastes that cannot be prevented or recycled through above mentioned methods and disposing them by minimizing the effects of disposal process on environment and human health. This approach is in concordance with the directives and applications by the European Union.

One of the most crucial features of waste management strategy in Turkey is “prevention of waste” and “recovery of wastes” if prevention is not possible. Especially in the Environmental Law and in all other legislative regulations that constitute the environmental legislation, one of the major management principles is defined as reuse of wastes and recycling as material or energy; recycling activities are encouraged and criteria are designated in order to increase technical and administrative capacity of recycling facilities and those facilities which fulfill the requirements of these principles have been granted with licenses and encouraged to contribute both to economy and environment.

SOURCES

- Ministry of Environment and Urbanisation – General Directorate of Environmental Management
- Ministry of Environment and Urbanisation – General Directorate of EIA, Permit and Inspection
- Turkish Statistical Institute
- Ministry of Environment and Urbanisation – Hazardous Waste Statistics Bulletin 2010
- Ministry of Environment and Urbanisation - Hazardous Waste Statistics Bulletin - 2011
- Ministry of Environment and Urbanisation - Hazardous Waste Statistics Bulletin - 2013
- Ministry of Environment and Urbanisation - Hazardous Waste Statistics Bulletin - 2014

E. MANAGEMENT OF CHEMICALS

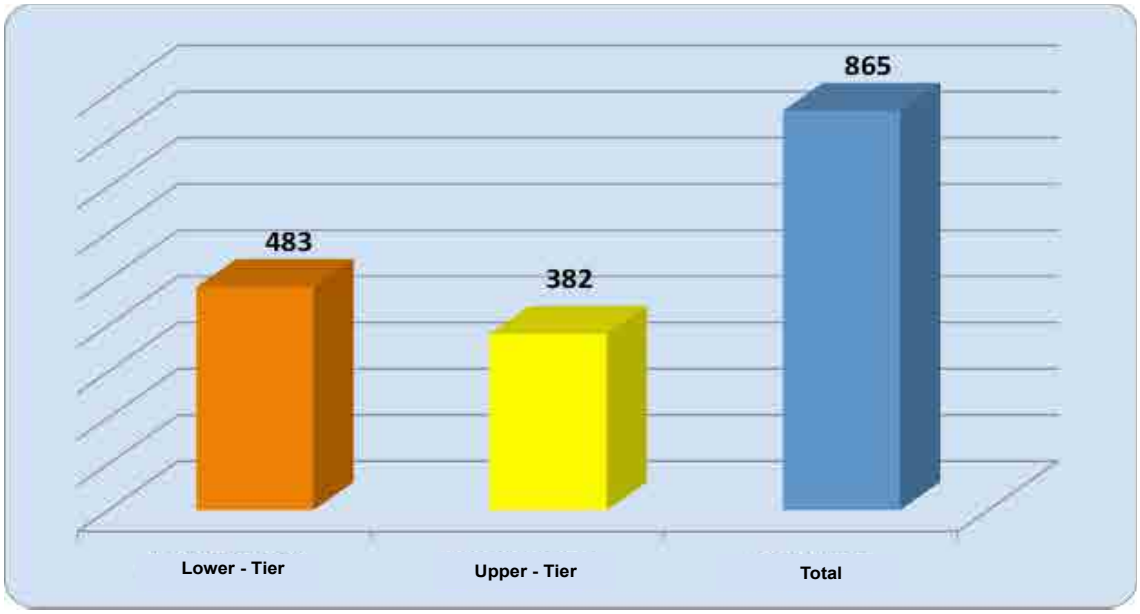
E. MANAGEMENT OF CHEMICALS

E.1. Reducing the Risks of Major Industrial Accidents

As in many parts of the world, major industrial accidents happening in our country are causing serious environmental, social and economic problems. By-Law on Prevention and Mitigation of Major Industrial Accidents was carried into effect after publishing in the Official Gazette No. 28867 dated 30 December 2013 with a view to harmonize legislation with European Union Council Directive on the Control of Major-Accident Hazards Involving Dangerous Substances (Seveso II Directive) which have been implemented in EU with the aim of controlling Major Industrial Accidents.

The By Law aims at designating procedures and principles on measures to be taken to ensure an effective and continuous high protection on the purpose of preventing major industrial accidents in facilities that use hazardous substances and minimizing the effects on human and environment. Provisions of the By-Law on Prevention and Mitigation of Major Industrial Accidents are implemented jointly by the Ministry of Environment and Urbanisation and the Ministry of Labor and Social Security. Facilities that use hazardous substances are liable to send their notices through Seveso (BEKRA) Notification System that was established under the Environmental İnformation System of the Ministry of Environment and Urbanisation. Facilities within the scope of this By Law are determined according to these notifications and categorized as Lower-Tier or Upper-Tier. The Article on notifications took effect on publication date of the By Law, and other provisions took effect in 1 January 2016.

According to Regulatory Impact Analysis prepared by the Regional Environmental Center (REC), there were 518 facilities registered as Seveso (BEKRA) Facility in Turkey in 2012. Whereas, there were 865 Seveso facilities that submit notifications to notification system as of July 2015 and 382 of these facilities were in Upper-Tier and 483 were in Lower-Tier categories (Graph 40).



Graph 40 - Data from Seveso (BEKRA) Notification System as of July 2015 (Ministry of Environment and Urbanisation, 2016)

Map 16 - Geographical distribution of Seveso (BEKRA) facilities as of July 2015 (Ministry of Environment and Urbanisation, 2016)

According to Regulatory Impact Analysis of Seveso II Directive, 75% of these facilities are producing petrochemical, chemical and mineral products, 50,2% is operating in Ankara, İstanbul, İzmir, Kırıkkale, Kocaeli and Tekirdağ.

European Union standards, developments and By Laws related to this matter are being followed and some procedures such as Major Accident Prevention Policy, Safety Report, Security Management System, Risk Assessment, Accident Modelling, Emergency Planning, Processes and Safety Inspection on Major Industrial Accidents etc. that haven't been applied yet, will be implemented in 2016. It is aimed to increase Safety to highest level in these facilities by means of these applications.

E.2. Classification, Packaging and Labelling of Hazardous Substances

It is highly important to classify chemicals according to their hazardous features and inform the consumer on possible adverse effects through safety warnings in order to ensure a safe use of chemicals.

European Council first published directives 67/548/EEC and 99/45/EC on classification, packaging and labelling substances and mixtures, and it published By Law 1272/2008/EC on Classification, Labelling and Packaging of Substances and Mixtures (CLP By Law) on 31 December 2008 with the aim of aligning the European Union system of classification, labelling and packaging of chemical substances and mixtures to the Globally Harmonized System (GHS).

The first step in our country towards an effective management of chemicals and harmonization with EU acquis was publication of the "By Law on Classification, Labelling and Packaging of Dangerous Substances and Preparations" in the 1. Repeated Official Gazette No. 27092 dated 26 December 2008 which was prepared by the Ministry to align our national legislation with directives 67/548/EEC and 99/45/EC.

By this means, By Laws were also made in Turkey on classification, labelling and packaging of chemicals and it was aimed to control hazardous chemical substances and products with a view to protect human and environmental health against short term and long term effects of these chemicals that mix into air, water and soil.

However, harmonization with CLP By Law also came to the fore in order to be able to follow developments in EU legislation. As a result of the meetings with and industrialists and recommendations from relevant institutions and organizations, the "By Law on Classification, Labelling and Packaging of Substances and Mixtures" was published in the 1. Repeated Official Gazette No. 28848 dated 11 December 2013.

The By Law aims at providing a common sense on hazardous substances and ensuring safe use of the chemicals, reducing the expenses for removing environmental and health problems caused by adverse effects of chemicals, minimizing accidents involving chemicals and preventing technical obstacles in commerce.

The CLP By Law will take place of By Law on Classification, Labelling and Packaging of Dangerous Substances and Preparations gradually until 1 June 2016 and CLP By Law will be implemented in our country. By this means, an updated legislation on classifying hazardous substances according to their hazardous features will be provided through communication on hazardousness of chemicals. An important step will have been taken on effective protection of human and environmental health from adverse effects of hazardous chemicals.

Firms that produce or import chemicals classified as hazardous started to send data on classes and labels of their products to the Ministry of Environment and Urbanisation through http://online.cevre.gov.tr by June 2014. As of December 2015, 29.964 classification and labelling notifications on 8.896 substances were made. An inventory list including information about hazardousness of these chemicals will be published for public access on the website of the Ministry of Environment and Urbanisation in the last quarter of 2016.

E.3. Legislative Regulations and Developments about Management of Chemicals

Turkey has made some technical and administrative By Laws since 2008 within the scope of harmonization with European Union acquis on chemicals in order to provide an effective chemicals management.

The By Law on Inventory and Control of Chemicals published in the Official Gazette No. 27092 dated 26/12/2008: Works on preparing an inventory for hazardous chemicals and publishing it online are under progress. Besides this, works on preparing an inventory for chemicals that are produced or imported over 1 tons, and updating the list of chemicals that are determined as priority substances as they may have hazardous effects on human and environmental health are carried out.

The "By Law on Classification, Labelling and Packaging of Substances and Mixtures" published in the 1. Repeated Official Gazette No. 28848 dated 11 December 2013 designates procedures and principles on classifying, labelling and packaging chemicals according to their physicochemical, toxicological and ecotoxicological features.

Within this scope, it is ensured that chemical producers and importers in Turkey determine whether chemicals are hazardous and, if so, launch into the market with a suitable label that includes information of hazards of the chemical.

Chemical Registration System (accessible on http://online.cevre.gov.tr) was established on the purpose of creating a database which includes information on classification and labels of hazardous chemicals that are produced in Turkey or imported to Turkey. Producer or importer firms have been registering information on hazardous chemicals and notify the Ministry through this system since June 2014.

Regulation on safety data sheets for dangerous substances and preparations published in the Official Gazette No. 29204 dated 13/12/2014 designates technical and administrative procedures and principles on preparing safety data sheets that are necessary for a safe use of chemicals and presenting these forms to professional users.

By-law on Restriction of Manufacturing, Placing on the Market and Use of Certain Hazardous Substances, Preparations and Articles published in the OG No. 27092 dated 26/12/2008 place prohibition/restriction on 20 substances and substance groups within the scope of the legislation regarding prohibiting/restricting chemicals that are hazardous for human health and environment.

By-law On Test Methods Applied For Determining The Physicochemical Toxicological And Ecotoxicological Properties Of The Substances And Mixtures published in the OG No. 28848 dated 11/12/2013 designates procedures and principles on tests to be done on chemical substances and mixtures to perform physicochemical, toxicological and ecotoxicological analysis at international standards.

Within the scope of harmonizing legislation with the EU By Law (EC) No 1907/2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH By Law), a draft By Law on Registration, Evaluation, Authorization and Restriction of Chemicals (REARC) has been prepared and it is planned to publish in 2016. When the REARC By Law is published, The By Law on Inventory and Control of Chemicals will be abrogated. Also, the By Law on Restrictions and Prohibition to Hazardous Substances and Mixtures and the Regulation on safety data sheets for dangerous substances and preparations will be abrogated gradually.

On the other hand, within the scope of the Stockholm Convention on Persistent Organic Pollutants (POPs) acceded by Turkey in 2010, it is among our responsibilities to take necessary measures to eliminate or reduce the release and amount of persistent organic pollutants. With the intend of fulfilling these duties, works on preparing and updating National Implementation Plan, preparing an inventory of persistent organic pollutants, taking necessary measures to eliminate or reduce the release and amount of these pollutants, conducting monitoring activities and periodical reporting to Stockholm Convention Secretariat have been carried out.

The Project for Eliminating POP Residuals and Reducing POP Releases started on 17 December 2015 in cooperation with United Nations Development Programme (UNDP) and United Nations Industrial Development Organization(UNIDO) with a large scale support by Global Environmental Fund (GEF). The project aims to Eliminate POP Residuals and Reduce POP Releases and it is expected to be completed in 2019.

It is aimed with the project to eliminate available POP stock, establish a long term capacity for management of future POP uses in line with international standards and applications and integrate POP activities into national chemical management principles.

A draft of “By Law on Persistent Organic Pollutants” has been prepared by the Ministry of Environment and Urbanisation within the scope of harmonization with the EU By Law on Persistent Organic Pollutants and related works are under progress. The draft By Law aims at protecting human health and environment from hazardous effects of persistent organic pollutants. The draft By Law includes provisions on prohibition or restriction of producing, launching into the market and usage of persistent organic pollutants, minimizing the release of these substances and on wastes that are produced by these substances, include these substances or polluted by any of these substances.

Moreover, works on establishing a notification mechanism and harmonization with EU legislation under a project started in December 2015 have been carried out within the scope of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

E.4. Conclusion and Evaluation

The Ministry of Environment and Urbanisation has prepared new By Laws both due to national needs and for harmonization with EU by working in coordination with relevant institutions and organizations and industrial representatives and following international developments and practices closely with the purpose of protecting human health and environment from adverse effects of chemicals. Necessary measures towards reducing chemical risks thanks to these By Laws and new systems have been established to implement them.

On the other hand, it is foreseen that more accurate results and needs may arise during the implementation process of legal legislation. Within this context, legislative gaps will be filled and practical experience will be gained by means of completing the planned projects, following the international activities regularly and considering the recommendations from relevant institutions, organizations and industrialists. By this way, firm steps will be taken towards effective management of chemicals.

SOURCES

- Ministry of Environment and Urbanisation - General Directorate of Environmental Management
- Directorate General of EIA, Permit and Inspection

F. NATURE PROTECTION AND BIOLOGICAL DIVERSITY

F. NATURE PROTECTION AND BIOLOGICAL DIVERSITY

F.1. Biological Diversity in Turkey and Its Importance

Turkey possesses agricultural, forest, mountain, steppe, wetland, coastal and marine ecosystems and also holds different forms and combinations of these ecosystems.

This diversity of ecosystems and habitats accompanies an important diversity of species. When Turkey is compared to other countries in the temperate zone, it is observed that our country has a remarkable amount of fauna biodiversity. In spite of insufficient data, invertebrates has the biggest share within the identified species. There are around 19.000 invertebrate species in Turkey and nearly 4.000 of them is endemic. The total number of vertebrates identified so far is about 1.500. Over 100 of vertebrates – 70 of them are fish species – are endemic species. Since Turkey is located on two migration routes of birds, it is of great importance as a feeding and breeding ground for birds.

It will be sufficient to compare Turkey to European Continent in order to understand its richness in flora species. While there are around 12.500 gymnosperms and angiosperms on the whole European continent, Anatolia holds nearly 11.000 species which is a very close number to European continent.

Genetic diversity in Turkey gains importance especially with genetic resources of flora. Because, Turkey is located on the intersection between Mediterranean and Near East Gene Center. These two regions have an important role in emergence of cereals and garden plants. There are 5 micro-gene centers in Turkey in which over 100 species shows a large variation and which are the source and diversity centers of many important economically valuable plant species such as crop plants, medicinal plants and other important plants. These centers serve as valuable genetic resources for sustainability of numerous plants in agriculture in the future. In terms of genetic resources of fauna, it is accepted that a good number of animal breeds have been raised in Anatolia and spread to other parts of the world from here.

Another important factor in protecting biodiversity is integration of “sustainable use” principles into sectoral applications. Sustainable use means the use of natural resources in a way to maintain its potential to meet the needs and aspirations of present and future generations and provide a protection-utilization balance. By this means, not only optimum benefit is obtained from biodiversity, but biodiversity of species is maintained as well.

While there are around 12.500 identified plant species, this number is nearly the same for plant species in Turkey. 3.000 of these species is endemic to Turkey. Although there are around 60.000 flora and fauna species in Europe, this number is nearly 80.000 in Turkey.

There are around 120 mammal, almost 400 bird, about 130 reptile and nearly 300 fish species in Turkey. 15 of mammal species, 46 of bird species, 18 of reptile species and 5 frog species are endangered species. Wetlands in Turkey cover an area of 1 million hectares. There are over 250 wetlands in the country. It is mandatory to protect these natural resources and natural wealth. Within this purpose, our country has acceded to various international conventions and continue to do so. As a result of degradation and hazards to the ecosystem, many species has become endangered and many of them has become extinct.

Turkey signed and became a part to “Convention on Biodiversity”. At national level, plant genetic resources are under protection. “The By Law on Collection, Conservation and Utilization of Plant Genetic Resources” has been in effect since 1992.

Aegean Agricultural Research Institute operating under General Directorate of Agricultural Research and Policy (TAGEM) is authorized for any kind of material exchange concerning plant genetic resources.

Documentation works are carried out within the scope of research projects and programs on genetic resources in Turkey. The data obtained by means of these projects is registered to an information system. Within this system, database creating, cataloguing and mapping activities are performed. With a new project, present herbarium data has started to be transferred into digital media and is accessible through TAGEM web page.

Turkey is divided into three phytogeographical regions, each with their unique species and ecosystems. These regions are Euro-Siberian, Mediterranean and Irano-Turanian. The diversity of species in Anatolian geography resulted in emergence of many micro gene centers.

While there are micro-gene centers of wheat, barley, chickpea and lentil of which Anatolia is the major place, there are also some other species whose gene center is normally in Central Asia but formed secondary gene centers in Anatolia as they diversify and become common. Apple, pear, cherry, black cherry, melon and watermelon etc. set examples for this condition.

Table 72 –Micro-gene centers in Turkey and common species (Şehirali et al. 2005).

Microgene Center	Common Species
Trakya-Aegean	Bread wheat, durum wheat, Khorasan wheat, club wheat, einkorn wheat, spelt, grain, melon, lentil, chickpea, common vetch, lupins, clovers.
South-Eastern Anatolia	Einkorn wheat, emmer wheat, durum wheat, vegetable marrow, watermelon, melon, cucumber, vine, common bean, lentil, chickpea, broad bean, forage plants.
Samsun -Tokat- Amasya	Amasya fruit genera and species, common bean, lentil, broad bean, forage legumes.
Kayseri and Neighborhood	Apple, almond, pear, fruit species, vine, lentil, chickpea, trefoil, sainfoin.
Ağrı and neighborhood	Apple, apricot, black cherry, cherry, melon, forage legumes.

The richest region in terms of endemic species is Mediterranean followed by Eastern and Central Anatolian Regions, Black Sea, Aegean, Marmara and Southeastern Anatolia.

Table 73 –Distribution of endemic species of Turkey's flora by region (Eken et al, 2006)

Regions	Number of endemic species
Mediterranean Region	862
Aegean Region	171
Eastern Anatolian Region	471
Marmara Region	102
Central Anatolian Region	335
Southeastern Anatolian Region	64
Black Sea Region	277
Total	2.282*

* The other endemic species are found in more than one region.

The number of grain breeds that have been obtained by public in the last thirty years through improvement of national and important breeds is 333 and 150 of this number is wheat breed, 28 corn breed, 35 corn line, 50 barley, 44 rice, 16 sorghum, 8 oat and 1 rye.
National Seed Program is developing new varieties continuously and thus the number of species used in agriculture is increasing. However, today, such field crops as Einkorn wheat, Emmer wheat, bitter vetch and bitter lupin are not used as much as in the past.

TAGEM R&D centers established or under progress for plant genetic diversity:

- The National Gene Bank; Aegean Agricultural Research Institute. Menemen İzmir.
- Turkish Seed Bank; Field Crops Central Research Institute Ankara.
- Field Gene Banks; 17 banks.
- Center for Medicinal and Aromatic Plants; Antalya Western Mediterranean Agricultural Research Institute.
- Herbal Biotechnology Center: Ankara Field Crops Central Research Institute.
- Geophytes Garden of Turkey; Yalova Atatürk Horticultural Central Research Institute.
- National Botanical Garden of Turkey; Ankara.
- Center for Herbal Tissue Culture: Aegean Agricultural Research Institute.
- World Olive Collection Garden; Bornova Olive Cultivation Research Station.

F.1.1. Ecosystems of Turkey

F.1.1.1. Agricultural Ecosystems

Major ecological regions of Turkey in terms of agriculture are Coastal Mediterranean Region, Coastal Aegean Region, Coastal Black Sea Region, Trakya and Marmara Region, Central Anatolian Region, South Eastern Anatolian Region, Eastern Anatolian Region and Passage Regions (Northwestern Pass, Western Pass, Northeastern Pass, Eastern Pass, South Eastern Pass). This regional system is based on main climatic factors such as precipitation and temperature and it covers diversity of agricultural crops and regional and phenological features of agriculture. Coastal regions can be defined as areas of agricultural production that are located in Mediterranean belt. Harsh continental climate dominates Central, Eastern and Southeastern Anatolia and agricultural products reflect the characteristics of the climate. Each Passage Region are areas of farmlands that include some provinces from Central Anatolia to other regions and they are more or less different from one another in terms of agricultural characteristics.

Planted areas cover 35% of total surface area of Turkey and most of these areas are located on steppe regions. Of the total farmlands, 70% consists of grain fields, 5% is orchards, 2,7% is vegetable gardens, 2% is vineyards and 2% is olive fields. The remaining 18% of land is fallowed according to crop rotation applied in these areas. Rangelands take up nearly 19% of Turkey's surface area. Rangelands are divided into two groups as "Coastal Rangelands" and "Steppe Rangelands". Coastal rangelands covers grazing areas in Black Sea, Marmara, Aegean and Mediterranean Regions. 25-30% of the rangelands in Turkey consists of coastal rangelands. Vegetation cover of these rangelands turns into steppe as precipitation declines. Thanks to high amount of precipitation and soil conditions, rangeland vegetation in these areas is in good quality. Rangelands of the regions that receives 200-700mm annual precipitation are called as steppe rangelands. Steppe rangelands are divided into two categories as "mountain rangelands" and "plain rangelands" according to their altitude and topography. Mountain steppes have relatively high altitudes and precipitation, so valuable wheat and grain forage crops are cultivated in these areas.

F.1.1.2. Steppe Ecosystems

Steppes and grasslands are defined as areas covered by herbaceous plants and these areas cover 21 million hectares today. Steppe ecosystems are located on high mountainous areas of Central Anatolia, Aegean and Mediterranean Regions and on a big part of Eastern Anatolia. The most characteristic feature of steppe ecosystems is that annual or perennial herbaceous plants dominates these areas. Floristic composition of steppe vegetation is very rich and holds many endemic plants.

Steppes are divided into two categories as "Plain Steppe" and Mountain Steppe" according to topographic structure of the land. Plain steppes are located at an altitude of 800-1,200 meters on flat or low-pitched terrains and they provides habitat for halophytes, goosefoot family, sedges and cattails, harmal, sagebrush, thyme and sage.

Mountain steppes are generally located at latitudes between 1.300-2.500 and include tragacanth, sainfoin, globe thistle, asphodelus, and thyme species. Different from other regions, Eastern Anatolian mountain steppe is dominated by giant fennels. Alpine and subalpine tundra lies on Northern and north-eastern parts of Eastern Anatolia and high areas of Eastern Black Sea mountains.

F.1.1.3. Forest Ecosystems

Forests of broad leaf trees are more common in Turkey. Coniferous trees can be found at every altitudes from sea level to highest forest line. Humid and semi-humid coniferous trees and dry forests (oak, black pine and red pine) as well as brush and scrub are found in Aegean and Mediterranean Regions.

Forest types according to biogeographic regions are as follows:

Euro-Siberian Biogeographic Region:

- Leaved coniferous forests (Beech, Chestnut, Hornbeam; 500-1.200 m),
- Humid, semi-humid coniferous forests (Black pine, yellow pine, spruce, abies; 1.000-1.500 m),

- Dry oak and pine forests (Oak<1.500 m; black pine>600 m; red pine: 400-500 m)
- Brush (Maquis- pseudomaquis) formation (red pine<500 m)

Mediterranean Biogeographic Region:

- Brush (Maquis and Garrigue) formation (oaks, Mediterranean strawberry tree, terebinth, myrtle etc. 350 m Marmara, 600 m Aegean; 800 m Mediterranean),
- Low Altitude Mediterranean Belt Forests (Red pine<1.000 m; Black pine:800-1500 m),
- Aegean High Altitude Mountain Forests (Chestnut <1000 m; Beech, Lime tree, Hazel tree >1.500 m; Yellow pine>1.600 m; Oak-Black pine>700 m, Red pine<600 m),
- Mediterranean High Altitude Mountain Forests (Oak:500-1.200 m; black pine:1200-200 m; Abies:1.200-1.800 m; Sedar:1.000-2.000 m; Juniper:100-1.800 m; Beech - Hornbeam:1.100-1.900 m)

Irano-Turanian Biogeographic Region:

- Central Anatolian Stepped (Turkey oak and Downy oak, Black Pine, juniper: 800-1.500 m),
- Central Anatolia Dry Black Pine, Oak and Juniper Forests (Oaks: <1.200 m; Black Pine:1.000-1.500 m; Yellow Pine>1500 m),
- Eastern Anatolia Dry Oak Forests (Oak species <850 m).

These wealthy forest ecosystems in Turkey provides habitat for many endemic plant, bird and wild life species. Additionally, many wild forms of crop plants that are valuable for agricultural biodiversity grow in these areas.

Project for Monitoring Forests Ecosystems started in 2006 under coordinationship of General Directorate of Forestry and in cooperation with the abrogated Ministry of Environment and Forestry Department of Research and Development, and as of April 2009, “Forest Ecosystems Monitoring Program” was put into practice with an aim to monitor health and liveliness condition of forests.

F.1.1.4. Mountain Ecosystems

There are mountains in Turkey which are formed by land folding, faulting and volcanic eruptions. Types of mountain ecosystems vary according to biogeographical regions, mountain formation type and altitude.

Mountains resulting from faulting are found in Aegean Region. These mountains are perpendicular and they are rich in water resources. Some important mountains of the region are Kaz dağları (Mount Ida), Mountain chain of Yunt, Boz Dağlar, Aydın and Menteşe Mountains. Kaz Dağları is the natural habitat of Kazdagi Fir (Abies nordmanniana ssp. equi-trojani) which is endemic and of great importance in terms of genetic diversity.

The most important mountain range of Turkey which was formed by land folding are Yıldız, Köroğlu, Küre, Canik, Eastern Black Sea mountains on the north; Western and Central Taurus Mountains on the south, Nur Mountain and South-eastern Taurus Mountains in South-east; Hınzır, Tahtalı, Munzur, Palandöken, Allahüekber and Aras mountains in Central and Eastern Anatolia. The mountains, especially Taurus Mountains, are important ecosystems in terms of high rate of endemism and biological diversity. High altitudes of Eastern Black Sea mountains and northern and north-eastern parts of Eastern Anatolia provides habitat for alpine and subalpine grasslands and steppe and meadow ecosystems dominate high areas of other regions. At low altitudes, forest ecosystems differs from one another again. Additionally, separate lakes at higher parts of the mountains provides unique habitats.

The most important volcanic mountains, which contribute biodiversity with its volcanic lakes, is Mount Ağrı and Tendürek, Nemrut, Süphan, Karacadağ, Erciyes, Hasan and Kula mountains. Volcanic mountains are especially important due to their mineral rich lands and biodiversity.

F.1.1.5. Inland Water Ecosystems

Turkey holds nearly 10.000 km^2 of rivers and lakes and this inland water resources provides a good deal of biological diversity.

So far, 921 natural wetlands have been identified thanks to the works performed in Turkey and these wetlands cover an area of 8 ha.

There are 7 drainage basins in Turkey and they embody 25 river basins. And it is estimated that the amount of groundwaters is around 94 billion km^3, average annual precipitation is around 640 mm and one-third of this amount reaches to water reserves and contribute to survival of wetlands.

The biggest natural lake is Lake Van in Eastern Anatolian Region with high salinity and an area of 374.000 hectares. There are also some salty shallow lakes on Central Anatolian Plateau and the biggest one of them is Salt Lake with an area of 128.000 hectares. Salt Lake becomes desiccated almost completely in summer seasons and during this season, the surface of the lake is covered with a 30 cm thick salt layer. Accordingly, only salt-resistant plants grow in this area. Lakes, swamps, deltas, marshy places and muddy lands are crucial for wild life, especially for birds. More than half of the bird species in Turkey are migratory and these wetlands provide important rest and wintering grounds.

Turkey possesses 9 rivers which are longer than 500 km and these are Kızılırmak, Fırat, Sakarya, Murat, Aras, Seyhan, Dicle, Yeşilırmak and Ceyhan rivers. About 41 billion m^3 water flows into Black Sea and 36 billion m^3 into Mediterranean Sea from the rivers in Turkey. Dicle and Fırat rivers flow into Iraq and Syria successively. Deltas are of great importance for biological diversity, especially for water birds. Since many lakes in Anatolia freeze in winter seasons, Meriç, Gediz, Büyük Menderes and Küçük Menderes deltas formed by the rivers flowing into Aegean Sea and Göksu, Seyhan and Ceyhan deltas formed by the rivers flowing into Mediterranean Sea provide habitat for many species of water birds. The delta formed by Kızılırmak that flows into Black Sea is especially valuable for migratory birds that fly over Black Sea.

Since geographical structure of Turkey is complex and it is divided into regions by mountains, species haven't been able to spread other regions and thus this condition has resulted in endemism and genetic diversity. For this reason, most of the invertebrates living in river ecosystems are endemic species. As salinity of waters in Köyceğiz-Dalyan region varies from zero to hyper-salinity, this area provides a good example to illustrate the relationship between habitat and diversity of species. Lindenia tetraphylla is a new species in Turkey and it has been found out that it is on the verge of extinction in the Balkans. Artodiaptomus burduricus, which lives in Lake Burdur and has adapted to different conditions, is an endemic invertebrate and important in terms of genetic diversity. Another species living in Lake Burdur, Aphanius burduricus, has also adapted to conditions of the lake and is an endemic fish species. Similarly, Alburnus tarichi, another endemic fish species, has also adapted to conditions of Lake Van.

Such plants as cattail (Typha sp.), Common reed (Phragmites sp.) bulrush (Schoenoplectus sp.), rushes (Juncus sp.) are found in wide groups on wetlands of Turkey. Also, some aquatic plants such as wild mandrake (Phodophyllum sp.), duckweed (Wolffia sp.), and Ceratophyllum sp., Myriophyllum sp., Potamogeton sp. living in shallow lakes as well as water lily (Nymphae sp.) covering the water surface are found in Turkey.

As a result of researches conducted so far, 236 fish species/sub-species under 26 family have been identified. Most common species in our wetlands are trout, pike, carp, black cod, gray mullet, rudd, zander and perch. Since it is on the migratory route of birds, Turkey has a key importance for many bird species. It is known that there are around 482 bird species in our country. Some common species on Turkey's wetlands are white stork, flamingo, spoonbill, black-winged stilt, avocet, crane, fish eating birds and ducks.

F.1.1.6. Coastal and Marine Ecosystems

Different characteristics of Black Sea, Marmara, Aegean Sea and Eastern Mediterranean Sea surrounding Turkey resulted in different biological resources in these seas. The richest sea in terms of biological diversity in Turkey is Mediterranean Sea which has the highest salinity and temperature. Many species from Indo-Pacific region also migrated to this area through the Red Sea after Suez Canal was opened. It has been identified that 26 new species have come to this area as a result of migration. Turkey provides habitat for 388 fish species in Mediterranean Sea, 389 in Aegean Sea, 249 in Sea of Marmara and 151 in Black Sea.

Black Sea is the biggest and most ocean-isolated inland sea in the world. Black Sea holds 151 fish species, 1.619 fungi species, algae and tall aquatic plant species and 1983 invertebrate in its waters. 4 marine mammal species and economically valuable fish species such as sturgeon lives in Black Sea. Although their area of coverage has shrank, 6 seagrass species (Zostera marina, Z. Noltii, Potamogeton pectinatus, Ruppia maritima, R. Spiralis and Zannichellia major)that provides spawning ground for 34 fish species grow in Black Sea.

Turkish Straits System including Bosphorus, Dardanelles and the Sea of Marmara acts as an inland sea that provides water flow between Aegean Basin of Eastern Mediterranean and Black Sea and this area acts as a biological corridor for baby bonito, bonito and bluefish etc. It has been observed that surface of the Sea of Marmara is under effect of water from Black Sea coming through Bosphorus. Deep areas of the Sea of Marmara contains Aegean and Mediterranean waters and holds more than 400 species of benthic organisms. The Sea of Marmara is the spawning ground for many pelagic fish species. Gerardia savaglia, a coral species, still survives at a depth of 30 m.

Table 74 – Taxon numbers of species and sub-species, endemism status, number of rare and endangered species and extinct species of some plant groups

Plant Groups	Identified Species/subspecies	Endemic Species	Rare and Endangered Species	Extinct Species
Algae	2.150	…….	unknown	unknown
Lichens	1.000	……..	unknown	unknown
Bryophytes	910	2	2	unknown
Pteridophytes	101	3	1	unknown
Gymnosperms	35	5	1	unknown
Monocotyledons	1.765	420	150	-
Dicotyledons	9.100	3.500	1.100	11

Aegean Sea has a complicated ground topography and coastal geometry with its 180.000 km^2 surface area. Also, there are hundreds of large and small islands in this sea. The basin generally consists of 3 deep trenches. The northern trench has a depth of nearly 1.500 m and it is connected to 1.100 m deep central Aegean trench by a hill at a depth of 200-500 m. The deepest area of Aegean Sea is located at the southernmost part of Aegean Sea with a depth of 2.000 m. Sponges, which are normally black in their natural habitat, can be found in Aegean Sea and they are one of the species that are collected for commercial purposes. However, their population has been in decrease in recent years. As Black Sea, Eastern Mediterranean coasts are connected to a deep basin with a topographic sloping of 10-20 km. Major trenches of Northern Mediterranean are Rodos (4.000 m), Antalya (2.500 m), Çukurova (1.000 m) and Latakya (1.500 m) basins. Çukurova Basin is shallower than Antalya Basin and they are separated by a wall-like topography.

Since coastal ecosystems are important transitional areas between marine and terrestrial ecosystem, they are unique ecosystems. 4,1% of terrestrial resources on the country's surface is made up of coastal ecosystems. Since mountains lie in different positions against seas and coastal topographies are different from one another, there have emerged different coastal ecosystems such as sand dunes, caves, deltas, lagoons, fishponds and calcareous terraces. Among all these coastal areas, Eastern Mediterranean coastal regions have a special place since they are rich ecosystems of flora and fauna diversity. There are thousands of sea caves on the coasts of Turkey. They have different geological structures and provide habitat for numerous fish species and other marine organisms. Some of these caves acts as shelters and breeding areas of Mediterranean seal. There are around 3000 species in our coastal waters. Mediterranean seal, sea turtles, sea grasses and sea birds are important species of biodiversity.

F.1.2.Species Diversity in Turkey

Turkey enjoys an important place in terms plant species since it has abundant amount of seed plant species especially when its climatic zone is taken into consideration

Algae are the most primitive organisms in plant group. Organisms in this group ranges in size from microscopic to 50-60 and even 100 meters. Although researches on algae has gained momentum in recent years, identification of Turkey's algae flora has not been completed yet.

Distribution of endemic plants according to Phytogeographical Regions (including sub-species and varieties)

Euro-Siberian	320
Mediterranean	1.325
Irano –Turanian	1.250
Plants that are not unique to Phytogeographical Regions	1.030
TOTAL	**3.925**

Lichens is a group of organisms that arises from algae living in a symbiotic relationship with fungus. They can be found in almost every part of the world. There around 20.000 known species of lichens. Researches on lichens have gained ground in recent years in Turkey. The number of identified lichen species in Turkey is nearly 1.000 and this number is rising continuously.

Mosses is the group of plants with the most primitive and underdeveloped vascular system. It has been identified that 3 Horny Liverworts, 165 Liverworts and around 740 mosses are distributed over Turkey.

Ferns are the best known group of plants along with seed plants. They can be found in every region of Turkey except dry regions, but this group of plants is most common in Black Sea Region. There are 8 species of Horsetails (Equisetales), 6 species of club mosses, and 80 species of common fern are found in Turkey. The number of identified vascular plants in Turkey is around 11.707 when species and sub-species taxon number is taken into account. This number is increasing day by day as new species are identified. This species richness cannon be found in any other country. Thus, Turkey is like a continent in terms of plant diversity since total number of species in the whole Europe is around 12.500.

F.1.2.1. Endemic/Endangered Plant Species

Due to its geographical belt, Turkey is one of the richest countries in terms of endemic plant species. Endemism rate of cryptogamic plants species is relatively low in Turkey as these species are common in many parts of the world. Additionally, there aren't sufficient amount of researches conducted on cryptogamic plants in Turkey. The best known group of cryptogamic plants is Ferns (Pteridophytes). In Turkey, the number of identified species and sub-species of Ferns is 101 and only 3 of them is endemic. Endemism rate of gymnosperm, which is the most primitive group of seed plants, is also low in Turkey. There are only 5 endemic taxons at variety and sub-species level. There are numerous endemic flowering plant species, a group of seed plants, and the total number of these species is 11.707 when sub-species are included. 3.649 of these species are endemic and endemism rate is around 31,82%. It has been identified that there are about 1.000 endemic species in Greece which has the highest rate of endemism in Europe. And this comparison show richness of Turkey in terms of endemic species.

While some of Turkey's endemic species spread over a small area, some endemic species spread over a wide area. Endemic species with a narrow spread can be found on specific mountains and mountain ranges and in specific habitats. Some of the mountains with high rate of endemism are mountain ranges such as Amanos Mountains, Mount Sandras, Bey Mountains, Bolkar and Aladağlar, Uludağ, Mount Ida, Munzur Mountains. Some other areas with endemism rate are Central Taurus Mountains (Ermenek, Gülnar, Mut, Anamur), Anti-Taurus Mountains (Maraş, Adana, Niğde), gypsum-bearing areas around Sivas and Çankırı provinces, Salt Lake and its neighborhood, high mountains around Rize and Artvin provinces and the area covering Van-Bitlis-Hakkari provinces. The richest family of endemic seed plants is daisy family (Compositae) and it has 435 endemic species. This family is also the most crowded species family in Turkey. The second most crowded family is legume family (Leguminosae) with nearly 400 endemic species. This is the second family in Turkey in terms of the number of species it included. The third richest family is labiatae family with around 310 endemic species. The most crowded genus in terms

of endemic species is milk vetch (Astragalus) with about 250 species. These are followed by mullein (Verbascum) with 175 species, Knapweeds (Centaurea) with 115 endemic species and Hieracium with 66 species. On the other hand, Ebenus and Bolanthus have low numbers of species in Turkey (successively 14 and 6), but all their species are endemic and thus, endemism rate of these plants is 100%.

Turkey is also rich in endemic genera as well as endemic species. The genera that are represented by only one species are Kalidiopsis and Cyathobasis (Chenopodiaceae), Phryna and Thurya (Caryophllaceae), Physocardamum and Tchihatchewia (Cruciferae), Nephelochloa and Pseudophleum (Gramineae), Dorystoechas (Labiatae), Sartoria (Leguminosae), Crenosciadium, Ekimia, Postiella and Aegokeras (Umbelliferae).

The richest phytogeographic region in terms of endemic species is Irano-Turanian phytogeographic region. It is followed by Mediterranean and Euro-Siberian phytogeographic regions. The riches geographical region in terms of endemic species is Mediterranean Region with nearly 800 endemic species, followed by Eastern Anatolia with 380 species and Central Anatolia with 280 species.

Although Turkey is very rich in endemic plant species, some of these species are endangered. According to criteria of International Union for Conservation of Nature (IUCN 2001), nearly 600 of our endemic species are in “Critically Endangered CR” category and nearly 700 species are in “Endangered EN” category. Thanks to a the “Turkish Endemic Plant Project” conducted between 1992-1997 and supported by State Planning Organization, seeds of many endemic plants were collected and taken under protection in Menemen Gene Bank in Aegean Agricultural Research Center.

Turkish flora, with a high rate of endemism, is also rich in medicinal and aromatic plants. Some of the species used for medicinal and aromatic purposes are: Delphinum sp., Digitalis sp., Gypsophila sp., Helichrysum sp., Leucojum aestivum, Linum sp., Liqiudambar orientalis, Malva sp., Matricaria sp., Mentha sp., Nigella sp., Orchis sp., Ophrys sp., Origanum sp., Pimpinella sp., Rosa sp., Salvia sp., Sideritis sp., Teucrium sp. and Thymus sp.

F.1.2.2. Animal Species

While Turkey is rich and interesting in terms of flora, it is rich in fauna as well, due to its geographical location. The main reasons for this are that Turkey acts as a bridge between Europe and Asia; it is located on migratory routes; it enjoys different types of climate and ecosystems; it has a rich flora and thus it is able to provide habitat for many animal species. All these ecological factors have resulted in a rich fauna.

Since many researches have been conducted on vertebrate fauna of Turkey, most of the species have been identified. According to the latest data, there are 460 bird, 161 mammal, 141 reptile, 480 saltwater fish and 236 freshwater fish species in Turkey.

As in many parts of the world, Turkey is also rich in Insects group. However, since there hasn’t been much research on some groups and some researches are insufficient, only estimated numbers can be provided on insect fauna of Turkey. There are 30.000 identified insect species in Turkey so far. But the estimated number is between 60.000-80.000. This numbers shows the insufficiency of researches on insect species in Turkey. Even so, faunistic lists of some insect groups is almost completed. For example, the dragonflies (Odonata) are represented by 114 species, grasshoppers (Orthoptera) by 600 species (270 of them are endemic), coleopteran by 10.000, mollusks (Mollusca) by 522 species (203 of them are endemic), true bugs (Heteroptera) by 1.400 species, homoptera by 1.500 species, butterflies (Lepidoptera) by 6.500 species (600 diurnal others are nocturnal).

Table 75 –Taxon numbers of species and sub-species, endemism status, number of rare and endangered species and extinct species of some animal groups

Fauna Groups	Identified Species	Endemic Species/ Subspecies and Variety	Rare and Endangered Species	Extinct Species
VERTEBRATES				
Reptiles amphibians (Reptilia Ambhibia)	141	16	10	-
Birds (Avez)	460	-	27	-
Mammals(Mammalia)	162	37	23	-
Freshwater fish (Pisces)	236	70	-	-
Saltwater fish (Pizces)	450		-	-
INVERTEBRATES				
Mollusks (Molluzca)	322	203	unknown	unknown
Butterflies (Lepideptera)	6.500	59	59	unknown
Grasshoppers (Orthoptera)	600	270	-	-
Dragonflies (Odonata)	114		-	-
Coleopteran (Coleoptera)	10.000	-3.000	-	-
True bugs (Heteroptera)	-1.400	-2.00		-
Homoptera (Homoptera)	-1.300	-2.00	-	-

Although some habitats in Turkey have been deteriorated and even damaged, Mediterranean and Aegean coasts provide habitats for endangered species such as Mediterranean seals (Monachus monachus), sea turtles (Caretta caretta) and green sea turtles (Chelonia mydas).

F.1.2.3. Endemic /endangered animal species

While Turkey is rich and interesting in terms of flora, it is rich in fauna as well. Many researches have been conducted on vertebrates in Turkey and these researches continue. Thus, more accurate data can be provided on endemism status species, their risk categories and protected species. According to this data, 16 of 141 reptile and amphibian species distributed over Turkey are endemic and 10 of these species are endangered. There is no endemic bird species in Turkey. However, 5 mammal species and 32 sub-species, 16 reptile species/subspecies and 70 freshwater fish species are endemic to Turkey.

Some of the endemic and endangered reptile and amphibian species are:

- Luschan′s salamander (Mertensiella luschani),
- Neurergus (Neurergus crocatus crocatus and N. Strauchii barani),
- Common newt (Triturus vulgaris kosswiigi),
- Banded newt (Triturus vittatus cilicensis),
- Fire-bellied Toad (Bombina bombina arifiyensis),
- Taurus Frog (Rana holtzi),
- Armenian lizard (Lacerta saxicola),
- Anatolian Lizard (Lacerta cappadocica),
- Taurus Lizard (Lacerta danfordi anatolica),
- Balkan Green Lizard (Lacerta trilineata),
- Caucasian Rat Snake (Elaphe hohenackeri),
- Meadow viper (Vipera ursinii),
- Pontic adder (Vipera pontica).

Although they are not endemic species, 17 of 460 bird species are endangered. Some of these endangered species are:

- Dalmatian pelican (Pelecanus crispus),

- Greater white-fronted goose (Anser albifrons),
- Red-breasted goose (Branta ruficollis),
- Ferruginous duck (Aythya nyroca),
- White-headed duck (Oxyura leucocephala),
- Greater spotted eagle (Aquila clanga),
- Eastern imperial eagle (Aquila heliaca),
- Lesser kestrel (Falco naumanni), Corn crake (Crex crex),
- Great bustard (Otis tarda),
- Slender-billed curlew (Numenius tenuirostris).

Northern bald ibis species (Geronticus eremita) is under special protection since its natural population became extinct. A good number of other bird species are among endangered species and they need protection.

Of 161 mammal species identified in Turkey, 37 sub-species and/or varieties are endemic. 23 of these species are endangered and specially protected. Some important species distributed over Turkey are Goitered gazelle (Gazella subgutturosa), Mountain gazelle (Gazella gazella), Fallow deer (Cervus dama) and mouflon (Ovis orientalis). Additionally the striped hyena (Hyena hyena) is a rare species. And it is known that Anatolian leopard (Panthera pardus tulliana), Caspian tiger (Panthera tigris virgata) and Asiatic lion (Panthera leo persica) species became extinct in Anatolia.

There is no endemic and endangered species of saltwater fish but 70 of 236 freshwater species are endemic and 4 species became extinct. Some of the endangered and endemic freshwaters species are:

- Scaleless killifish (Aphanius asquamatus)
- Beyşehir bleak (Alburnus akili)
- Karasu Sha Kuli (Alburnus timarensis)
- Italian barbel (Barbus plebejus kosswiigi)
- Pamphylian scraper (Capoeta antalyensis)
- Cihanbeyli gudgeon (Gobio gobio insuyanus)
- Tigris chub (Leuciscus kurui)
- Brown trout (Salmo trutta abanticus)

Although invertebrates are not known as much as vertebrates, there are 30.000 identified species and 60.000-80.000 estimated species. Endemism rate is very high in invertebrates.

F.1.3. Genetic Diversity in Turkey

Plant genetic diversity is of great importance both for Turkish and world agriculture. Turkey has a special place in terms of plant genetic resources. The Mediterranean and Near Eastern origin and diversity centers that Vavilov identified overlap in Turkey. According to J. Harlan, there are 5 micro-gene centers in Turkey and more than 100 species are distributed in these centers. Turkey is also the center of origin and diversity of numerous important crop plants and other plant species.

Turkey is at the junction of two Vavilovian gene centers, Mediterranean and Near East.

- Trakya-Aegean Region: bread wheat, durum wheat, Poulard wheat, değnek wheat, einkorn, lentil, chickpea, melon, vetch, lupine and clover.
- Southern – South-eastern Anatolia: Emmer (Tritucum dicoccum), einkorn, Aegilops speltoides, marrow, melon, cucumber, common bean, lentil, broad bean, vine and forage plants.
- Samsun, Tokat, Amasya: Many fruit families and species, broad bean, common bean, lentil and various forage grain plants.
- Kayseri and neighborhood: almond, apple, green peas, fruit species, vine, lentil, chickpea, alfalfa and sainfoin.
- Ağrı and neighborhood: apple, apricot, cherry, black cherry, forage grain plants and watermelon.

These two gene and diversity centers overlaps in Turkey and some the crop plants, whose gene and origin center is Turkey, are as follows: Triticum, Hordeum, Secale, Avena, Linum, Allium, Cicer, Lens, Pisum, Medicago and Vicia. In Turkey, there are

25 wild relatives of wheat (Triticum ve Aegilops), 8 wild relatives of barley (Hordeum), 5 wild relatives of rye (Secale) and 8 wild relatives of oat (Avena).

Turkey is also rich in wild relatives of edible legumes and forage plants. There are 4 species of lentil (Lens), 10 species of chickpea (Cicer), 104 species of trefoil (Trifolium; 11 of them are endemic), 34 species of clover (Medicago), 42 species of sainfoin (Onobrychis), 60 species of vetches (Vicia; 6 of them are endemic) in our country. Turkey is also micro-gene center of Amygdalus spp., Cucumis melo, C. sativus, Cucurbita moshata, C. pepo, Malus spp., Pistachio spp., Prunus spp., Pyrus spp. and Vitis vinifera species (Tan, 1998). Additionally, Turkey is the native land of many ornamental plants such as tulip and snowdrop.

Since awareness on the importance of crop plants has risen in Turkey, many species and varieties of these genera is grown in Turkey within the scope of seed production and distribution programs. Field crops include wheat, barley, corn, chickpea, lentil, white beans, sunflower, potato, soy bean, peanut, sesame, tobacco, cotton and sugar beet; and forage plants include Johnson grass, rye, genista and meadow grass. More than 200 plant species are included in this programme. Additionally, there are many local varieties, ecotypes and transitional forms that farmer grow by using their own resources.

The total number of cereal crop species that are developed out of using domestic and imported breeds in the last 30 years is 256 and 95 of this number is wheat, 91 corn, 22 barley, 19 rice, 16 Johnson grass, 11 oat and 2 are rye species. National Seed Program is developing new varieties and the number of cultivated species is increasing. However, some field crops such as einkorn wheat, emmer, bitter rye and bitter broad bean are not cultivated as much as in the past. Thus, these species have started to disappear.

Garden plants includes 50 cultivated species and 100 cultivated and sold varieties. This group includes tomatoe, pepper, aubergine, lettuce, cabbage, broad bean, leek, marrow, cucumber, melon, watermelon, green bean, vegetable marrow, green peas, spinach, carrot, onion, rocket, common purslane, fennel, cauliflower, parsley and gherkin. It is estimated that total number of cultivated variesties in Turkey is around 200 when local varieties and verieties from other resources are taken into account.

This abundance of variety is also the same for fruit plants. 80 of 138 of estimated fruit plants are grown in Turkey. Fruit and nut varieties in Turkey include apple, pear, quince, cherry, black cherry, apricot, peach, fig, pomegranate, mulberry, almond, hazelnut, walnut and pistachio. Vine cultivation also has an important place in Turkish agriculture. Anatolia is the gene center of common grape vine (Vitis silvestris) as well as providing habitat for Hubei grape (Vitis vinifera).

Turkey is also rich in forest gene resources. Some of the nationally and globally important species, which has gene resources in Turkey, are: 5 pine species, 4 abies species, 20 oak species, 8 juniper species as well as Taurus cedar, oriental spruce and oriental beech. Some major forest trees are: pine species (Pinus brutia, P. nigra, P. sylvestris, P. halepensis, and P.pinea) abies species (Abies nordmanniana subsp. nordmanniana, A. nordmanniana subsp. bornmulleriana, A. nordmanniana subsp. equitrojani, A. cilicica subsp. cilicica, A. cilicica subsp. isaurica), Taurus cedar (Cedrus libani), beech (Fagus orientalis), spruce (Picea orientalis), lime tree (Tilia spp.), alder (Alnus spp. 2 species total 6 taxons) juniper (Juniperus spp. 8 species) oak (Quercus around 20 species).

Turkey is an agricultural country where plants and animals have been raised since ancient times. It is acknowledged that South-eastern Anatolia, also known as Mesopotamia, is one of the culture centers where human race first started to practice agricultural activities. Therefore, many civilizations that lived on this region raised many local animal breeds here and these breeds spreaded to other parts of the world.

Crossbreeding domestic livestock with foreign breeds has brought about the danger of losing local gene resources. Nearly all of the local cattle breeds in Black Sea Region have been turned into Jersey breed. On the other hand, only 25% of domestic breeds have been crossbred with developed breeds and 75% is pure breed. Similarly, “kıvırcık” sheep breed in Trakya Region was crossbred with German Ots-Friz breed in order to develop Tahirova breed and this application resulted in genetic erosion of both endemic species.

Some varieties of sheep such as “Karakul” raised in Northern transitional belt and “tuj” raised in Kars are endangered. Another endangered local breed is Angora goat, which is under protection to prevent its extinction.

There isn’t sufficient research on genetic diversity of aquatic species and invertebrates (especially insects).

F.1.4. Agricultural Area and Steppe Biodiversity

Agricultural biodiversity is a broad term that includes all components of biological diversity of relevance to food and agriculture, and all components of biological diversity that constitute the agricultural ecosystems: the variety and variability of animals, plants and micro-organisms, at the genetic, species and ecosystem levels, which are necessary to sustain key functions of the agro-ecosystem, its structure and processes.

For a detailed definition, besides genetic resources of species that are out of rangelands and farmland, and besides trees which are integral parts of agricultural systems, agricultural biodiversity includes plant genetic resources, animal genetic resources including fish and insect genetic resources, micro-biological and fungus genetic resources, ecosystem components of agricultural biodiversity and the abiotic factors that affect them (nutrient cycle, decomposition of organic materials and maintaining fertility of soil, pest and disease management, pollination, developing and maintaining habitats and local wild life in their own landscape, maintaining water cycle, erosion control, climate and carbon balance) and socio-economic and cultural factors (traditional information, cultural factors, agricultural landscape, etc.).

Major agricultural ecological regions of Turkey are Coastal Mediterranean Region, Coastal Aegean Region, Coastal Black Sea Region, Trakya and Marmara Region, Central Anatolian Region, South-eastern Anatolian Region, Eastern Anatolian Region and Passage Regions (Northwestern Pass, Western Pass, Northeastern Pass, Eastern Pass, South Eastern Pass). Although this zoning system depends firstly on main climatic factors such as precipitation and temperature, they also encompass agricultural crop diversity and regional and phenological features of agriculture.

Coastal regions can be broadly defined as agricultural production areas that are located on Mediterranean climate zone. Central, Eastern and South-eastern Anatolian Regions are dominated by harsh continental climate and characteristics of agricultural product reflect the effects of these ecological areas.

Passage Regions are areas of farmlands that include some provinces from Central Anatolia to other regions and they are more or less different from one another in terms of agricultural characteristics.

52,8% of Turkeys surface area is farmland and 34,1% of this land is cultivated, 18,7% is used as grasslands or rangelands. Filed crops are grown on 68,5% of cultivated land area, 18% is fallowed and 13,5% is used for garden plants, as orchard, vineyard and olive grove.

Table 76 – Domestic animal breeds of steppe ecosystem

DOMESTIC ANIMAL BREEDS	RAISING AREA
CATTLE BREEDS	
Anatolian Black	**All Regions except Northeastern Anatolia and Trakya**
East Anatolian Red	**Whole Eastern Anatolia Until Ankara**
Grey Steppe Cattle	**Eskişehir, Kütahya**
Kutlak cattle	**Çorum Region**
Southern Yellow	**Southern and Southeastern Anatolia**
Kilis Cattle	**Gaziantep**
Domestic Buffalo Breeds	**Afyon, Kütahya, Uşak, Denizli, Kayseri**
SHEEP BREEDS	
Akkaraman	**From Eskişehir to Hakkari**
Morkaraman	**Erzurum, Erzincan, Bingöl**

Table 76 – Domestic animal breeds of steppe ecosystem (Cont.)

Ulaş-Kangal karaman	Sivas, Malatya
Güney karamanı	Southern and Southeastern Antolia
Karakaş Sheep	Southeastern Antolia, especially Diyarbakır
Ödemiş Sheep	İzmir
Dağlıç	Bilecik, From Eskişehir to Aegean Region
İvesi	Southeastern Antolia
Herik Sheep	Eastern Black Sea Region
Hemşin Sheep	East part of Eastern Black Sea Region
Tuj Sheep	Kars
Kıvırcık Sheep	Trakya, Southern Marmara
Karakaya Sheep	Eastern Black Sea Region
Sakız Sheep	Aegean Coasts
İmroz Sheep	Çanakkale
Turkish merino	Marmara
Central Anatolian merino	Central Anatolia
Malya Sheep	Central Anatolia
GOAT BREEDS	
Ankara goat	Ankara, Central Anatolia
Hair Goat	All Regions
Kilis Goat	Southeastern Anatolia
White Goat	Central Anatolia
HORSE BREEDS	
Anatolian Horse	Central Anatolia
Çukurova horse	Southern and Southeastern Anatolia
Domestic Arabian horse	Southeastern Anatolia
Uzunyayla horse	Kayseri, Sivas
Canik horse	Black Sea Region
Malakan horse	Kars
Arabian Horse	Southeastern Anatolia
POULTRY	
Domestic chicken	All Regions
Denizli breed	Denizli and neighborhoods
Gerze breed	Sinop
Naked neck	Muğla
Zile breed	Sivas
Domestic turkeys	All over Turkey
Domestic geese	All over Turkey
Domestic ducks	All over Turkey
Ankara rabbit	All over Turkey

Agricultural enterprises in Turkey have small, distributed and fragmented landscapes. This structure has negative effects on agricultural production, but this situation create advantage for biodiversity since it provides small habitats in which wild plant and animal species can live. On the other hand, farmlands are generally in steppe ecosystems and this condition makes it difficult to differentiate between agricultural biodiversity and steppe biodiversity. Therefore, structures of these two ecosystems have been handled together.

F.1.5. Forest Biodiversity

Forest ecosystem in Turkey covers an area of 22.342.935 hectares (closely spaced 9.638.787 hectares) (28,6% of country's surface area). Forests of coniferous trees are more common in Turkey (38% broad-leaved trees, 62% coniferous). Coniferous trees can be found at all altitudes from sea level to highest forest line. In Aegean and Mediterranean Regions humid and semi-humid coniferous and dry forests (oak, black and red pines) are found as well as brushes and scrub.

Turkey's forests are rich in terms of plant diversity due to its topographic structure, climate and soil varieties. One of the main reasons for this wealth is the climate changes that occurred in fourth geological time. Around one third of plant species in Turkey originated in previous geological times and most of them are endemic. Most of the endemic species are distributed in Mediterranean (especially on Taurus Bolkar and Nur Mountains) and Irano-Turanian Plant Geographical Regions.

Numerous ecosystems of forest habitats are present in Turkey depending on ecological and floristic composition and functions of each ecosystem differs from one another. These rich ecosystems in Turkey provide habitats to many endemic plant species, bird species and various wild life species. These ecosystem also accommodate wild forms of many crop plants that are crucial for agricultural biodiversity.

Mediterranean Plant Geographic Region consists of all coastal areas around Mediterranean Sea and western parts of Trakya. Different vegetation series are present in forests ecosystems of these areas, from sea level to highest point of mountains, depending on soil-climate-plant relationship. Different forest ecosystems develop in each vegetation series, depending on ecological parameters.

"Warm Mediterranean and True Mediterranean Vegetation Layer" can be found between 0-1.000 meters in Mediterranean and Aegean regions where Mediterranean climate is dominant. And the ecosystem that can be seen on these layers are Xerophilous scrub (Oaks, Mediterranean Strawberry Tree, Lentisk, Myrtle, etc.) ecosystem, Red Pine (Pinus brutia) forest ecosystem, Aleppo Pine (Pinus halepensis) forest ecosystem, Oriental Sweetgum (Liquidambar orientalis) forest ecosystem, Mediterranean cypress (Cupressus sempervirens) forest ecosystem, Mixed Oaks (Quercus cerris-Q.infectoria-Q.libani-Q. brantii) ecosystem and The stone pine (Pinus pinea) forest ecosystem.

"Upper Mediterranean and Mediterranean Mountain Vegetation Layers" are present between 1.000-2.000 meters. The forest ecosystems that can be seen at these altitudes are Black Pine (Pinus nigra), Taurus fir (Abies cilicica), cedar of Lebanon (Cedrus libani), common beech - common hornbeam (Ostrya carpinifolia-Carpinus orientalis), Mixed Oaks (Quercus petraea-Quercus cerris-Qurcus trojana) forest ecosystems. Unlike Medirrenaean Region, Aegean High Mountain Forests include mostly mixed forest ecosystems of chestnut, common beech, hazelnut, Yellow pine, Oak and Red pine.

Over the altitude 2.000 meters "High Mountain Mediterranean Vegetation Layer" appears. At this altitude mixed juniper (Juniperus excelsa-Juniperus foetidissima) forest ecosystems are found as well as Mediterranean High Mountain Steppe ecosystem consisting of semi-shrub and herbaceous plants.

Irano-Turanian region is the widest one of plant geographical regions and it stretches from Central Anatolia to Mongolia. Continental climate and steppes are dominant in this region. The region includes a wider area and the forest ecosystems in this region consists of arid region forestry and high mountain ecosystems. Some major forest ecosystem are Forest Steppe (Trees)- Central Anatolian (Turkey oak, Black Pine, juniper: 800-1.500 m), Dry Black Pine, Oak and Juniper Forests- Central Anatolian (Oaks: <1.200 m; Black Pine: 1.000 - 1.500 m; Yellow Pine> 1.500 m), Dry forests –Eastern Mediterranean Oak Forests (Oak species < 850 m).

Euro-Siberian plant geographical region stretches all along Northern Anatolia and parts of Trakya Region that are close to Black Sea. This region gets the most precipitation and thus most part of the region is covered with forests. Remarkable forest ecosystems under 1.500 m in this area are Dry Oak and Pine forests (Oak, Black Pine, Red Pine) and scrubs and pseudomaquis. Between 500-1.200 m, there are coniferous forests (common beech -Fagus orientalis-, Sweet chestnut -Castanea sativa, Oriental Hornbeam -Carpinus orientalis-Carpinus betulus, common alder -Alnus glutinosa); between 1.000-1.500 m there are humid and semi-humid coniferous forests (Black Pine, Yellow Pine-Pinus sylvestris, Oriental spruce -Picea orientalis,

Caucasian fir -Abies nordmanniana-). Mixed rhodies (Rhododendron ponticum, Rhododendron luteum, Rhododendron ungernii, Rhododendron smirnowii) and Silver birch (Betula pendula) forest ecosystems are present in higher areas of Eastern Black Sea. On the other hand, mixed floodplain forests ecosystems (Fraxinus angustifolius-Qurcus robur –Fagus orientalis) can be found in alluvial plains of Trakya and Western Black Sea, which have higher groundwater level.

Most of the mammals in Turkey lives in forest ecosystems. Forests provided habitats for mammals such as Brown bear (Ursus arctos), Red fox (Vulpes vulpes), Wolf, Jackal (Canis aureus), Eurasian lynx (Lynx lynx), Hyena (Hyena hyena), Deer (Cervus elaphus), Chamois (Rupicapra rupicapra), Wild goat (Capra aegagrus), Wild boar (Sus scrofa scrofa), European badger (Meles meles), European pine marten (Martes martes), Hedgehog (Erinaceus europea), Rabbit (Lepus capensis), Least weasel (Mustela nivalis), Red squirrel (Sciurus vulgaris); reptiles such as Snake, Chameleon (Chameleo chameleon), Lizard (Lacerta agilis, L. armeniaca, L. parvula, L. derjugini, L. princeps, L. trilineata, L. viridis, Anguis fragilis), Spur-thighed tortoise (Testudo graeca) species; birds such as Ring-necked Pheasant (Phasianus colchicus), Caspian snowcock (Tetraogallus caspius), Caucasian grouse (Tetrao mlokosiewiczi), Woodpecker (Dendrocopus sp.), Accipitriformes (eagle species-Aquila sp., Pandion sp., goshawk species-Accipiter sp., Hen harrier species-Circus sp., hawk species-Buteo sp., Falcon species (Falco sp., Pernis sp. v.s.), strigiformes (Tawny owl -Strix aluco, Long-eared owl -Asio otus, Boreal owl -Aegolius funereus etc.) and many passeriformes species.

Some of these species have been taken under protection pursuant to international conventions. Some of these are Chamois (Rupicapra rupicapra), Wildcat (Felis silvestris), Cinereous vulture (Aegypius monachus), Eastern imperial eagle (Aquila heliaca), Greater spotted eagle (Aquila clanga) and Lesser spotted eagle (Aquila pomarina).

F.1.6. Mountain Biodiversity

Mountain ecosystems accommodate different forest flora and provide habitat for various animal species due to varieties in topoghraphy of Turkey and different factors such as distance from the sea. In terms of ecosystem diversity, mountains are divided into sub-ecosystems such as sub-alpine grasslands and thorn cushion-formed steppes and floristic composition of each ecosystem differs from one another. Information on species richness of mountain steppes is provided on F.1.4. Agricultural Area and Steppe Biodiversity. Fauna species that are mentioned under forest biodiversity above, is applicable to many mountain ecosystems.

Mediterranean Region covers over 25 important mountains which have high mountain ecosystem. This region is followed by Irano-Turanian biogeographical region with 19 mountains, and Euro-Siberian biogeographical region with 11 valuable mountain ecosystems. Mountains provide habitats for birds, plants, commercially valuable species and wild species.

The total number of species and endemic species in most of these mountain ecosystems is unknown. The number of species and endemic species of some mountains is known and some major mountains which have the highest number of endemic species are Bolkar Mountains, Amanus (Nur) Mountains, Munzur Mountains, Sultan Mountains and Tecer Mountains.

Since mountain ecosystems include different ecosystems such as wetlands, steppes, grasslands-pastures and forests, institutional responsibilities of these ecosystems are not imposed on only one institution. For instance, the General Directorate of Forestry is responsible for pastures that are in forests, but management of other pastures is under responsibility of the Ministry of Food, Agriculture and Livestock. Hence, those institutions which are directly or indirectly responsible for biodiversity are also responsible for mountain ecosystems.

F.1.7. Inland Waters Biodiversity

Turkey's rivers and lakes cover an area of 10.000 km^2 (1,6% of Turkey's surface area) and they accommodate valuable inland water ecosystems in terms of biodiversity. Turkey possesses 7 drainage basin including 25 river basins and it is estimated that there is 94 billion km3 of groundwaters in Turkey. Average annual precipitation is around 640 mm and nearly one third of this amount flows into water reserves and contribute to survival of wetlands. However, Turkey is experiencing water shortage when annual amount of water per capita is taken into consideration. The annual amount of water per capita is about 1.500 m^3.

Inland water potential of Turkey consists of 33 rivers (177.714 km), 200 natural lakes (906.118 hectares), 159 dam reservoirs (342.377 hectares) and 750 ponds (15.500 hectares). There are 9 rivers that are longer than 500 km: Kızılırmak, Fırat, Sakarya, Murat, Aras, Seyhan, Dicle, Yeşilırmak and Ceyhan.

Lakes are especially important in terms of inland water ecosystems, because many lakes are surrounded by mountains and they are affected by the environments and thus, waters of lakes are more or less different from one another. Closed basin lakes hold fresh water, saltwater or soda water. Most of them are isolated from each other and aquatic fauna elements of these lakes didn't change since there is no gene exchange with organisms of other lakes. Many lakes accommodate rare and unique fish species. The biggest natural lake is Lake Van in Eastern Anatolian Region with a surface area of 374.000 hectares and with high salinity. Salt Lake becomes desiccated almost completely in summer seasons and during this season, the surface of the lake is covered with a 30 cm thick salt layer. Accordingly, only salt-resistant plants grow in this area.

Rivers are sensitive ecosystems that also separate natural habitats from one another. Valleys, caves, islets and flood plains formed by rivers sometimes enables aquatic organisms to spread and sometimes these places provide accommodation these organisms. Some river in Anatolia contributed to diversity of aquatic fauna due to their physical isolation.

Lakes, swamps, deltas, marshy places and muddy lands are crucial for wild life, especially for birds. More than half of the bird species in Turkey are migratory and these wetlands provide important rest and wintering grounds. Meriç, Gediz, Büyük Menderes and Küçük Menderes deltas formed by the rivers flowing into Aegean Sea and Göksu, Seyhan and Ceyhan deltas formed by the rivers flowing into Mediterranean Sea provide habitats for numerous species especially in winter seasons when some of the lakes in Anatolia freeze. The delta formed by Kızılırmak River flowing into Black Sea is crucial for migratory birds that fly directly over the Black Sea Region.

Protection of inland water ecosystems is the duty of the Ministry of Forestry and Water Affairs. The duties of identification, protection and management of wetlands are carried out by the Directorate of Wetlands operating under the Directorate of Nature Conservation and National Parks. A "National Wetlands Committee" including 13 persons was established under the presidency of undersecretary and/or deputy undersecretary of the Ministry of Forestry And Water Affairs, within the purpose of negotiating and taking decisions on the matters of wetlands, approving protected areas and management plans, following implementations and assuring national and international cooperation and coordination. This committee included the Director of Nature Conservation and National Parks, The Ministry of Food, Agriculture and Livestock General Director of Fisheries and aquaculture, General Director of Water Management, General Director of State Hydraulic Works, The Ministry of Environment and Urbanisation General Director of Environmental Management, General Director of Spatial Planning, General Director of Protection and Control, the Ministry of Culture and Tourism General Director Of Cultural Heritage And Museums, General Director of Cultural and Natural Heritage and two experts from biology and agriculture departments of higher education institutions.

General Directorate of State Hydraulic Works is responsible for planning, managing, improving and operating all water resources in our country.

Fisheries hunting activities are regulated by the Ministry of Food, Agriculture and Livestock and there are four research institutes that carry out research and development activities on fisheries under the Ministry.

F.1.8. Marine Biodiversity in Turkey

Turkey is made up of two peninsulas (Anatolia and Trakya) and it has a coastal length of 8.592 km including Turkish Straits System (Bosphorus and Dardenelles Straits, Sea of Marmara) except islands. 1.865 km of this coastal length is under protection (22%). The seas surrounding Turkey has different characteristics and this leads to abundance of biodiversity in these seas. 3 thousand plant and animal species exist on the coastal line. There are 472 fish species in total in Turkey's seas.

F.1.8.1. Marine Mammals in Turkey

Marine mammals is one of the important marine species groups in Turkey's seas. There are 11 marine mammal species in

these waters. Although there are 21 temporary or permanent mammal species in Mediterranean Sea, this number is only 3 in Black Sea. It is also acknowledged that Mediterranean Seal (Monachus monachus) hasn't been seen in Black Sea since 1994. Marine mammal hunting has been prohibited for all mammal species since 1983.

F.1.9. Turkey's Islands and Island Biodiversity

Islands covers 5% of the world's surface area and there are around 500 islands and islets within national borders of Turkey. With 212 islands and islets, Aegean Sea has the highest number. Some of the islands are rich in biodiversity and provide habitat for endemic species and some others are so isolated from humanitarian intervention that they provide living and breeding grounds for many species and thus contribute to both marine and terrestrial biodiversity. These islands also accommodate endangered species, such as Mediterranean Seal, sea birds and amphibians. Islands also have an important role in bird migration since they provide resting ground for migratory birds. A great number of birds stop over these islands each year. Aegean Islands are living and breeding environments for the globally endangered Audouin′s gull species (Larus audouinii). These islands provide nesting and living sites for Yelkouan shearwater (Puffinus yelkouan), Audouin′s gull (Larus audouinii), Eleonora′s falcon (Falco eleonorae) and Osprey (Pandion haliaetus). For these reasons, islands are regarded as priority areas to be protected.

F.2. Works on Biodiversity Conservation

Ex-situ (the preservation of components of biological diversity outside their natural habitats) and in-situ (protecting an endangered species in its natural habitat) conservation approaches have been adopted to preserve biodiversity. Both approaches are approved programs, each with unique practices. Ex-situ conservation is implemented in institutions such as gene banks, seed banks, zoos, botanical gardens etc. However, species are not able to interact during ex-situ conservation process and thus evolution process stops. On the other hand, there may be inevitable adverse outcomes of trying to protect a species in its natural habitat, therefore it is needed to apply ex-situ conservation. So, ex-situ and in-situ conservation works are carried out as mutually complementary programs.

F.2.1. Ex-situ Conservation

Ex-situ conservation works in Turkey started in 1964 by the Aegean Agricultural Research Institute operating under the Ministry of Food, Agriculture and Livestock, and in 1972, seed samples from plant genetic resources of our country started to be taken under conservation for short term, medium term (active collections) and long term (primary collections) in national seed gene bank founded under the same institute. Primary seed collections are preserved for long term at a temperature of -18/-20˚C and active collections are preserved for medium term at a temperature of 0˚C. The national collection includes field crop breeds, wild and herbaceous plant species (both as seeds and as plants), commercially valuable plant species (such as medicinal, aromatic and herbaceous plant species) and endemic plant species. Some species that are endemic to South-west Asia and some of the world's wheat and barley species are also included in the collection. Additionally, endemic plant seeds that were collected between 1992-1997, within the scope of the "Project for Endemic Plants in Turkey" supported by the Ministry of Development, are also under protection at National Gene Bank. Today, there are around 50.000 materials for nearly 600 genera at National Gene Bank. About 10.000 of these materials pertain to 2.400 wild species. This institution still continues to carry classification, documentation and conservation works for seeds, legumes, forage plants, vegetables, fruits, ornamental plants, medicinal and aromatic plants. Substitutes of the materials in primary collection are kept under preservation at Central Research Institute for Field Crops.

There are also Field Gene Banks in which the materials bred in vegetative ways in 16 research instituted under the Ministry of Food, Agriculture and Livestock are conserved under field conditions. These field gene banks are located in different provinces such as Yalova, İzmir, Tekirdağ, Gaziantep, Malatya and Erzincan, and generally collections of fruit species are kept in these banks.

Other than the Ministry of Food, Agriculture and Livestock, Osman Tosun Gene Bank has been operated by the Department of Field Crops, Faculty of Agriculture at Ankara University since 1936 and it is able to preserve for medium term. This institution holds nearly 11.000 seed samples. Some other universities with an Agricultural Department such as Atatürk and Çukurova universities also carry out similar activities. Some of the places that contribute to ex-situ conservation are Ege University

Botanical Garden, İstanbul University Botanical Garden, İstanbul University Atatürk Arboretum. In addition to these places, new botanical gardens and arboretums have been created by private enterprises recently (Nezahat Gökyiğit Botanical Garden, Karaca Arboretum, etc.).

Ex-situ conservation practices for forest trees (seed orchard, origin trials, offspring trials) are carried out by institutions operating under the Ministry of Forestry and Water Affairs, especially by Research Directorate for Forest Tree Seeds and Tree Breeding. Turkey is a member of European Forest Genetic Resources Programme (EUFORGEN) and preparing a convention between member states on establishing a core collection is under progress. So far, 184 seed orchards for 9 species, 3 seed plantation for 3 species and 16 cloning parks for 5 species have been established.

F.2.2. In-situ Conservation

This in-situ conservation approach is based on the belief that species are dependent on natural environment to be able to continue their lives. In-situ conservation programs have been implemented in Turkey since 1950s and some of these programs are National Parks, Natural Reserve Areas, Natural Parks, Wild Life Improvement Areas, Specially Protected Area, Natural Protected Areas, Natural Assets, Gene Preservation and Management Areas (GPMA). While the share of protected areas in Turkey's surface area was 4% before 2000, this rate increased to 6% after the year 2000.

F.2.3. National Parks, Natural Reserves, Natural Parks and Natural Monuments

Protected areas are named as National Parks, Natural Reserve Areas, Natural Parks and Natural Monuments pursuant to the Law no. 2873 on National Parks.

National parks are defined as "a natural area having, from scientific and aesthetic standpoints, both natural and cultural values of rare national and international stand, and natural, recreational and touristic sites. Turkey possesses 40 National Parks as of 2015 (Table 77). National parks have great importance in protecting biodiversity in forest, steppe, wetland and coastal ecosystems.

The "Law on National Parks" entered in force in 1983 and the term "natural areas" was also used in the law as well as the term "forest". This means that the law can be applied to other areas to be protected besides forests. Since the main purpose is to conserve nature, "Natural Reserve Areas" phrase was also added to the law. Natural Reserve Areas are defined in the law as "natural areas that are designated to be used only for scientific and educational purposes containing rare, threatened or endangered ecosystems and/or species and outstanding samples brought about by natural phenomena, and which should definitely be protected". There are 31 Natural Reserve Areas in Turkey as of 2015.

Natural Parks are natural areas containing characteristic vegetation and wildlife features, and is suitable for recreation activities and repose of public in its scenic wholeness. According to 2015 statistics there were 204 Natural Parks in Turkey, and this number rose to 208 in 2016.

Table 77 – National Parks in Turkey (Ministry of Forestry and Water Affairs, 2015)

No	Province	Name of the National Park	Area (decares)	Year of Declaration
1	Yozgat	Yozgat Forests National Park	2.669,02	1958
2	Osmaniye	Karatepe - Aslantaş National Park	41.429,10	1958
3	Ankara	Soğuksu National Park	11.870,70	1959
4	Balıkesir	Kuşcenneti National Park	170.583,70	1959
5	Bursa	Uludağ National Park	130.240,70	1961
6	Bolu	Yedigöller National Park	16.230,70	1965
7	Aydın	Dilek Peninsula – B. Menderes Delta National Park	275.981,62	1966
8	Manisa	Mount Spil National Park	68.010,30	1968

Table 77 – National Parks in Turkey (Ministry of Forestry and Water Affairs, 2015) (Cont.)

No	Province	Name of the National Park	Area (decares)	Year of Declaration
9	Isparta	Kızıldağ National Park	551.059,10	1969
10	Antalya	Mount Güllük - Termessos National Park	66.999,80	1970
11	Isparta	Lake Kovada National Park	65.507,10	1970
12	Tunceli	Munzur Valley National Park	426.744,90	1971
13	Antalya	Beydağları Coastal National Park	311.658,80	1972
14	Antalya	Köprülü Kanyon National Park	357.191,60	1973
15	Kastamonu	Mount Ilgaz National Park	11.177,00	1976
16	Afyon	Başkomutan Historical National Park	409.477,83	1981
17	Nevşehir	Göreme Historical National Park	96.136,52	1986
18	Trabzon	Altındere Valley National Park	44.677,14	1987
19	Çorum	Boğazköy – Alacahöyük National Park	26.004,40	1988
20	Adıyaman	Mount Nemrut National Park	138.272,80	1988
21	Konya	Lake Beyşehir National Park	868.551,40	1993
22	Balıkesir	Kazdağı National Park	209.348,33	1994
23	Rize	Kaçkar Mountains National Park	529.700,80	1994
24	Artvin	Hatila Valley National Park	169.437,80	1994
25	Artvin	Karagöl – Sahara National Park	32.509,72	1994
26	Antalya	Altınbeşik Cave National Park	11.466,50	1994
27	Niğde	Aladağlar National Park	550.644,10	1995
28	Muğla	Marmaris National Park	292.060,22	1996
29	Muğla	Saklıkent National Park	16.433,00	1996
30	Çanakkale	Troya National National Park	135.171,90	1996
31	Denizli	Mount Honaz National Park	94.289,80	1998
32	Kastamonu	Küre Mountains National Park	377.533,80	2000
33	Kars	Sarıkamış-Allahuekber Mountains National Park	225.198,90	2004
34	Ağrı	Mount Ağrı National Park	880.148,04	2004
35	Edirne	Lake Gala National Park	60.868,44	2005
36	Kayseri	Sultan Sazlığı National Park	243.577,00	2006
37	Şanlıurfa	Tek Tek Mountains National Park	193.352,41	2007
38	Kırklareli	İğneada Floodplain Forests National Park	31.550,02	2007
39	Erzurum	Nene Hatun Historical National Park	3.874,23	2009
40	Ankara	Pitched Battle of Sakarya Historical National Park	138.504,64	2015
		TOTAL AREA	**8.147.638,49**	

Natural monuments are defined as natural areas having the characteristics and scientific values brought about by nature or natural phenomena and protected within the framework of the principles on national parks. As of 2015, 112 areas are under conservation as Natural Monuments.

F.2.4. Wild Life Improvement Areas and Breeding Stations

Natural habitats of endangered wild animals are taken under protection pursuant to the Law no. 4915 on Land Hunting, with a view to conserve these species with their habitats without damaging their ecosystems. Breeding activities for some species are also carried out in some areas. 81 areas have been declared as Wild Life Improvement Areas so far. Some projects are carried out in order to protect endangered species such as Anatolian Wild Sheep, Cinereous Vulture, Great bustard, Caucasian grouse,

Gazelle, Hyena, Fallow Deer and Bald Ibis. Anatolian Wild Sheep population (Ovis gmelinii anatolica) is under protection in Bozdağ in Konya, Gazelle (Gazella subgutturosa) population is under protection in Kızılkuyu, Urfa, Bald Ibis (Geronticus eremita) population is under protection in Birecik, Urfa and extinction of these species have been relatively prevented. In order to increase population of endangered animals and support their breeding, breeding stations have been established in İstanbul Bahçeköy, Eskişehir-Mihalıççık, İstanbul-Polenezköy and Samsun-Vezirköprü for Red Deer (Cervus elaphus), in Antalya Eşenadası for Fallow Deer (Dama dama), in Hatay Kırıkhan for Mountain Gazelle (Gazella gazella), in Ankara Nallıhan for Anatolian Wild Sheep (Ovis gmelinii anatolica) and in Gaziantep Erikçe for Goitered gazelle (Gazella subgutturosa).

New species are added to the list of protected animals each year due to rich biodiversity of our country. Their Latin or Turkish names are changed. Thus, it is important to update supplementary lists every year.

4 new bird species were identified in Turkey in 2015 as a result of research activities and these birds have been added to the list of protected animals.

Within this context, the number of wild animal species in Turkey has been calculated as 761 (Table 78). Among them, 150 species are mammals, 481 species are birds and 130 species are reptiles (Annex I). Among these wild animal species, 121 mammal, 378 bird and 130 reptile species (total 629) have been taken under conservation by the Ministry of Forestry and Water Affairs (Annex III) and 113 species including 10 mammals and 103 birds have been declared as game animals (Annex II).

Table 78 – The number of species and protected species in Turkey (Ministry of Forestry and Water Affairs, 2015)

	MAMMALS	BIRDS	REPTILES	TOTAL
NUMBER OF SPECIES IN TURKEY LLH-ANEX I	150	481	130	761
NUMBER OF PROTECTED SPECIES LLH-ANEX III	121*	378	130	629
NUMBER OF SPECIES PERMITTED AS GAME LLH-ANEX II	10*	103	YOK	113

* The number of game species and protected species is not equal to total number because 19 species (i.e. field mouse, rat etc.) are not identified as either game or protected species.
(LLH: Law on Land Hunting)

F.2.5. Specially Protected Areas

Within the Article 9 of the Environmental Law, it is stated that the areas that are vulnerable to environmental pollution and degradation that have country wide and worldwide ecological importance, should be declared as «Special Environmental Protection Area» enabling the necessary arrangements for securing natural elegance for the access of future generations.
Special Environmental Protection Institute was established pursuant to the Decree Law no 383 in 1989 with the purpose of preserving environmental values of Specially Protected Areas, associating them with present environmental problems, conserving and improving their historical values as well as biological and ecological resources they possess. Later, the institute was turned into General Directorate for Preserving Natural Heritage when the Ministry of Environment and Urbanisation was established. There are 16 registered Specially Protected Areas in Turkey. These areas are of great importance in term of preservation and sustainability of biodiversity since they are spawning grounds especially for sea turtles and habitats of Mediterranean seals.

F.2.6. Gene Preservation and Management Areas

The concept of “Gene Preservation and Management Areas” (GPMA) was developed within the scope of the “Project on In-situ Conservation of Plant Genetic Diversity in Turkey” (1993-1998; GEF-1 Project). During this project, necessary capacity building works on in-situ conservation gene resources of wild relatives of field crops were carried out and researches were done on establishing GPMAs. GPMAs are natural or semi-natural areas for in-situ conservation of genetic diversity of chosen plants. GPMAs are also areas that “enable evolutional changes and continuity of these changes in population of plant species that are selected as target species since they are endangered, endemic or commercially valuable”.

F.2.7. RAMSAR Areas

Turkey became a party to the Convention on Wetlands (RAMSAR) which is related to especially internationally important habitats of water birds, and it registered 5 wetlands (some parts of Lake Manyas, Lake Seyfe, Lake Burdur, Sultan Reed bed and Göksu Delta) into the list of the convention. In 1998, the whole of Lake Manyas and Lake Burdur, Gediz Delta, Akyatan Lagoon, Lake Uluabat and Kızılırmak Delta were also added to the convention list. There are currently 14 wetlands under Ramsar Convention in Turkey and these wetlands cover an area of 184.487 hectares (Table 79).

Table 79 – RAMSAR Areas in Turkey (Ministry of Forestry and Water Affairs, 2016)

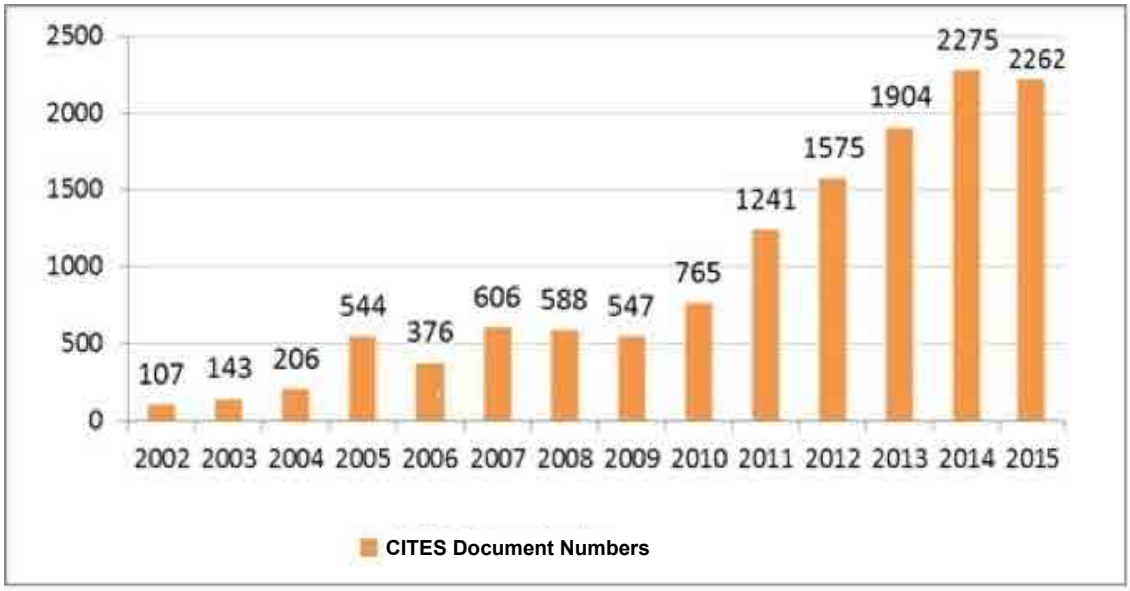
	Wetland	Area (ha)	Province	Date of Declaration as RAMSAR Area
1	Lake Uluabat	19.900	Bursa	Official Gazette No. 23314 dated 15.04.1998
2	Lake Manyas (Bird)	20.400	Balıkesir	Official Gazette No. 21943 dated 28.05.1994 (1998 border change)
3	Göksu Delta	15.000	Mersin	Official Gazette No. 21943 dated 28.05.1994
4	Lake Akyatan	14.700	Adana	Official Gazette No. 23314 dated 15.04.1998
5	Gediz Delta	14.900	İzmir	Official Gazette No. 23314 dated 15.04.1998
6	Lake Burdur	24.800	Burdur	Official Gazette No. 21943 dated 28.05.1994 (1998 border change)
7	Sultan Reed bed	17.200	Kayseri	Official Gazette No. 21943 dated 28.05.1994
8	Lake Seyfe	10.700	Kırşehir	Official Gazette No. 21943 dated 28.05.1994
9	Kızılırmak Delta	21.700	Samsun	Official Gazette No. 23314 dated 15.04.1998
10	Yumurtalık Lagoon	19.853	Adana	Official Gazette No. 25722 dated 09.02.2005
11	Nemrut Caldera	4.589	Bitlis	Official Gazette No. 28545 dated 31.01.2013
12	Lake Kuyucuk	416	Kars	Official Gazette No. 27264 dated 20.06.2009
13	Kızılören Sinkhole	127	Konya	Official Gazette No. 25722 dated 09.02.2005
14	Meke Maar	202	Konya	Official Gazette No. 25722 dated 09.02.2005
	TOTAL	**184.487**		

F.2.8. Works Carried Out under CITES

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was opened for signature 03 March 1973 in Washington and took effect on 01 March 1975, and this convention aims to enable sustainability of wild life by regulating international trade in specimens of wild animals and plants that are threatened by unconscious international trade. Turkey became a party to the convention on 22 December 1996 with a view to contribute sustainability and conservation of endangered species. 183 parties of the convention stipulate that they will meet their liabilities on movements (import, export, re-export, marine transport) of plant and animal species included in the Annex-I, Annex-II and Annex-III lists of the convention. Within the scope of this convention, some legislative regulations were also made in Turkey and the “By Law on Implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora” was carried into effect after publishing in the Official Gazette N. 24623 dated 27 December 2001 and the By Law was revised in 2004.

The convention aims to regulate trade in species in the annex of the convention with a view to provide sustainable utilization of endangered species in order to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

CITES authorities are the institutions that grant permit licenses. CITES authorities in Turkey are the Ministry of Forestry and Water Affairs and the Ministry of Food, Agriculture and Livestock. The General Directorate of Nature Conservation and National Parks under the Ministry of Forestry and Water Affairs is the focus of CITES convention and it provides coordination between the convention secretariat and related institutions. The general directorate prepares annual and biennial reports on behalf of Turkey and sends the reports to convention secretariat. Thanks to these successful works, Turkey is in category 1 (Category A).



Graph 41 - Distribution of the number of CITES documents by years (Ministry of Forestry and Water Affairs, 2016)

Customs and enforcement officers of the Ministry of Customs and Trade are trained on the importance of the matter through training sessions regularly held in Ankara. These trainings aim to raise awareness on species and CITES applications with a view to prevent illegal trafficking of species. Since these trainings on CITES raise awareness, they are important for a better control and prevention of smuggling and preserve the species and contribute to sustainability of biodiversity. Some of the species that are smuggled are endemic species of Turkey and therefore control of the trade in these species is especially important. Additionally, medicines are made out of some of these smuggled species and they are used for important diseases. So, it is of great importance to preserve and ensure sustainability of the species of genetic heritage.

EU Twinning "Project on Building Organization Capacity for Implementation of CITES in Turkey" was carried out by the Ministry of Forestry and Water Affairs between 2011-2013 in order to raise CITES awareness and improve capacity.

F.2.9. Works within the Scope of European Landscape Convention

Turkey occupies an important position in terms of natural and cultural landscape diversity. Therefore, the European Landscape Convention was also signed by Turkey on 20.10.2000 with a view to preserve, plan and manage the natural and cultural landscape of the country as a whole. Implementation of the convention was approved with the Law No 4881 dated 10.06.2003 and published in the Official Gazette No 25181 dated 27.07.2003.

The convention is implemented by the Steering Committee for Culture, Heritage and Landscape (CDCPP) and 38 countries have been party to the convention so far. The convention is the first international agreement to handle the landscapes in Europe with all their features. The convention covers not only the landscapes with outstanding features but also the ordinary and damaged landscapes. The Ministry of Forestry and Water Affairs prepares biennial reports on behalf of Turkey and submits them to the Secretariat of the convention.

According to the European Landscape Convention, parties are liable to,

- Identify their landscapes, analyze their characteristic features and pressures on them, make record of the changes, determine landscape quality targets,
- Develop and implement national landscape policies on protection, management and planning of the landscapes,
- Integrate landscape policies with regional and urban planning policies, cultural, environmental, agricultural, social and economic policies and also with other policies that may have direct or indirect effect on landscapes.

A) The "Project for Landscape Protection, Management and Planning (Training-Survey) stared in Konya on a local scale in

2008 and completed in 2010. Within the scope of the project, the books “Landscape Management”, “Landscape Planning” and “European Landscape Convention and Turkey” booklet were prepared.

B) Between 2010 and 2012, the “Project for Landscape Character Analysis and Assessment in Terms of Tourism and Recreation on a Provincial Scale” (TÜBİTAK- KAMAG) was carried out in Malatya province mutually by the Ministry of Environment and Urbanisation and the Ministry of Internal Affairs. Within the project,

- A method was developed for Landscape Character Analysis and Assessment on a Provincial Scale.
- Landscape character analysis method was integrated to environmental plans of 19 provinces on a regional scale.
- Integration with environmental plan of Malatya province was provided on a sub-regional scale.
- Implementation and promotion works are still continuing within the scope of Project Implementation Plan. Periodical trainings and informative meetings have been held for public institutions and organizations, non-governmental organizations and public, and methods of previous projects have been revised and developed and re-utilized in new projects.

At the end of the project;

- “National Technical Guide for Landscape Character Analysis and Assessment on Regional/Sub-regional Scale “was prepared and the guide included methods and standards related to Landscape character analysis and assessment process.
- Web-Based Landscape Information System was established.

C) Between 2012 and 2014, within the “Project for Landscape Rehabilitation, Restoration and Recreation” carried out in Kırşehir province, the “Technical Guide on Landscape Restoration and Rehabilitation in River Corridors” was prepared in order to develop design projects, landscape restoration criteria and solution recommendations for restoration and rehabilitation of the Poplar Plantation Area that had been neglected and degraded naturally and physically.

D) The works on local and provincial scale were promoted to a basin scale with the “Project for Preparing Landscape Atlas for Yeşilırmak Basin” implemented between 2012-2015, and the first and important steps were taken towards preparing the “National Landscape Atlas” thanks to the “National Landscape Strategy and Action Plan”.

Within the scope of the project, landscape character assessment of the basin was carried out and landscape character types and areas were determined, important places were determined in terms of landscape diversity and biodiversity, landscape quality map was prepared, ecologically sensitive areas and landscape strategies were identified and sectoral landscape guides were prepared.

Moreover, methods and approaches for integration with other conventions and directives stressed in European Landscape Convention (EU Water Framework Directive, Habitat Directive), national works (Basin Improvement Plans, Action Plans for Basin Protection, Strategic Environmental Impact Assessment etc.), spatial planning and sectoral plans were identified.

At the end of the project, “Landscape Atlas for Yeşilırmak Basin” and “Project for Preparing Landscape Atlas for Yeşilırmak Basin” booklets were prepared.

It was also planned to extend the project to other basins.

F.2.10 Works on Species Conservation

After the regional works on preparing action plans for conservation of some species such as Mediterranean seal, sea turtle, black vulture, great bustard, Caucasian grouse, the Ministry of Forestry and Water Affairs has aimed to prepare action plans for 100 species within the scope of their strategical aims for 2013-2017. Action plans were prepared for 21 of these species in 2013 and 2014. Some essential ones of these species are crane, red wood ant, Ajuga xylorrhiza, Piyan (Thermopsis turcica), fallow deer, brown trout, Caucasian grouse, jungle cat, hyacinth plant, Eğirdir longsnout scraper, Madonna lily, Mediterranean seal, striped hyena, Van lizard. Priority species for preparing action plan have been determined and species, for which action plans will be prepared in next 10 years, have been determined and species conservation strategy have been developed.

Mammals, birds, reptiles, amphibians, fishes (inland water fishes and saltwater fishes) and plant species have been prioritized during this process. While determining priority species, it is also important to decide on which scale these species should be protected. Within this context, endangered species were identified under three scales. These are national, regional (ecosystem scale) and provincial scale conservations works. Additionally, status of the species in IUCN red list, Annexes of Berne convention, national conservation status, population of the species, population trends, hunting, fishery industry and collection pressures, ınduslrialization pressure, pressures from agricultural activities, tourism pressure, institutional technical capacity, budged, level of awareness, current conservational condition of the species, inter-institutional coordination were also taken into account while prioritizing the species.

F.2.11. Seed Stands, Seed Orchards and Gene Conservation Forests

Seed Stands are areas which include trees with desired high quality characteristic features under the existing conditions and they are located in specific areas and undergo a specific management and operation process in order to produce seeds. It is aimed with these seed stands to produce high quality and accredited seeds. There are 377 seed stands for 36 species in Turkey.

Seed orchards are areas which are located on more convenient places for seed production, where seed production can be achieved more easily, in abundance and in a cheaper way in short periods since intensive agriculture is applied in these areas. Genetic gain is higher in seed orchards than seed stands because these areas are protected (isolated) from undesirable pollen resources and pollination takes place between only selected individuals. There are 184 seed orchards in our country as of 2016.

Gene conservation forests are natural areas that are selected to apply in-situ conservation of genetic diversity of a species. It is aimed with gene conservation forests to preserve genetic richness in nature and sustain this diversity for future generations. Our country possesses 283 gene conservation forests for 58 species so far.

F.2.12. Other Works

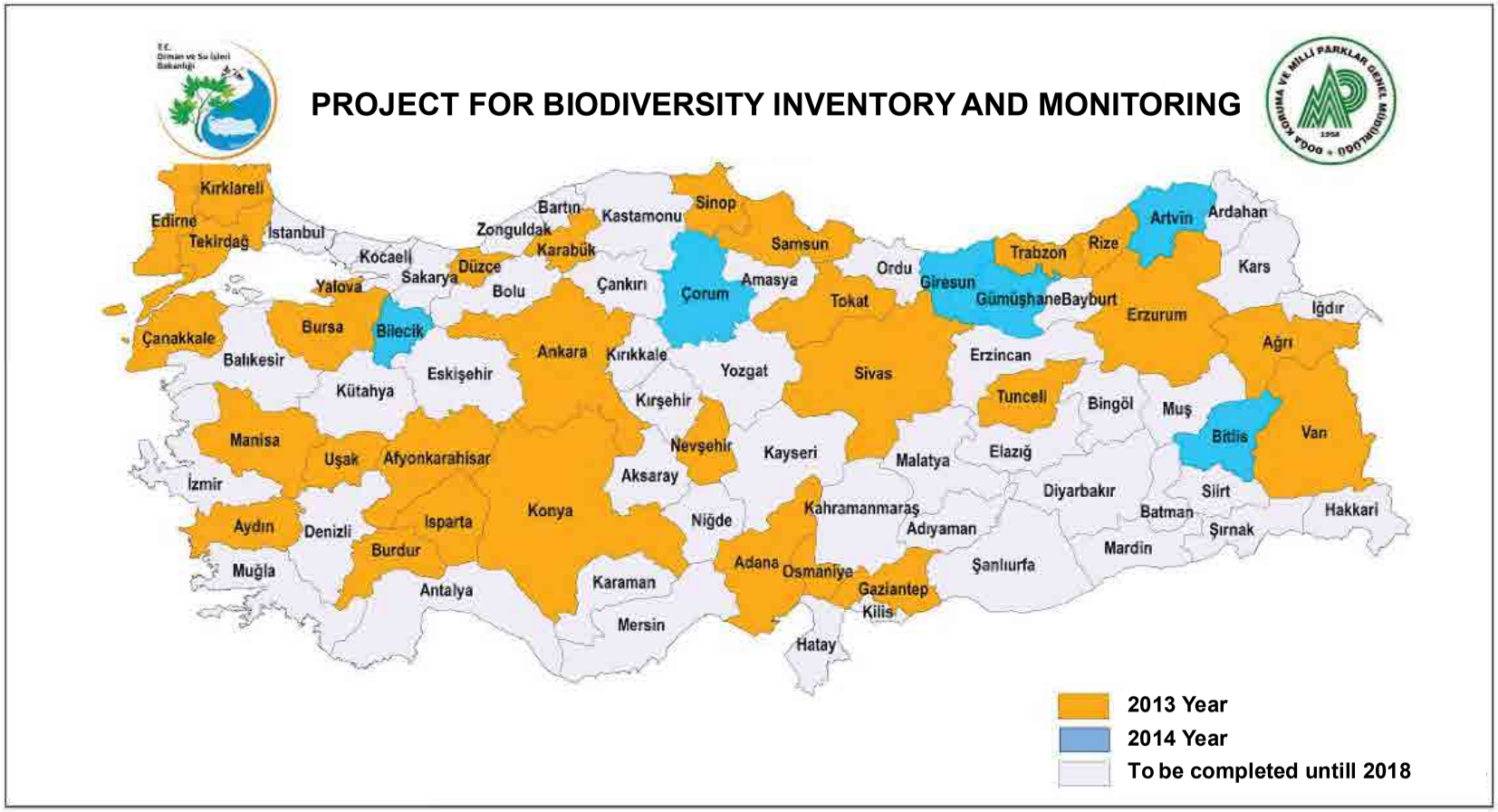
F.2.12.1. Project for National Biodiversity Inventory and Monitoring

Thanks to the works on biodiversity, the number of flora and fauna taxons has reached to remarkable numbers today. In order to benefit from these natural resources in an effective and sustainable way, the first step to be taken is identifying them very well and determining their potentials.

By considering the gaps in biodiversity inventory of our country that were revealed as a result of academic researches, related works started in 36 provinces in 2013 by the Ministry of Development within the scope of the “Project for Biodiversity Inventory and Monitoring” and these works were completed for 25 provinces as of 2015. It is aimed to complete biodiversity inventory and monitoring works for 81 provinces until 2018.

When this project is completed, all the obtained data will be registered into Noah’s Ark Database and all future works will be kept in this database. By this way, the data on biodiversity in our country will be managed from one center.

Within the scope of the project, it is planned to carry out literature and land surveys for vascular plants (Ferns and Angiosperms), vertebrates (mammals, birds, fishes, reptiles, amphibians), and only literature survey will be carried out for gymnosperms (except ferns- bryophytes, Lichens and Macrofungi) and invertebrates. For the species for which only literature survey will be carried out, also information on taxons that are conserved or/and commercially valuable will be obtained so that this information (potential, distribution, utilization-conservation balance recommendations etc.) shall set a background for future works.



Map 17 –Provinces for which necessary works have started under the Project for Biodiversity Inventory and Monitoring and will be completed until the end of 2018. (Ministry of Forestry and Water Affairs, 2016)

Within the project, monitoring indicators, which are crucial for following the changes in taxons and their habitats, are also determined. By monitoring the indicators, the changes in population of the species, condition of their habitats, condition of the ecosystems they represent and inhabit will be followed. Monitoring activities started in 26 provinces, whose projects were completed, by 15 Regional Directorates of the Ministry of Forestry and Water Affairs as of 2016.

During the monitoring activities within the project, data on monitoring biodiversity is obtained, monitoring indicators are determined, monitoring plans are prepared for each species and habitat and these plans include monitoring periods and achievement indicators. Additionally, possible threats are identified and necessary measures are taken against these threats. By this way, course the biodiversity will be followed through monitoring indicators.

Monitoring activities have been carried out on three scales. The first one is on species and population scale, second one on habitat/ecosystem scale and third on regional scale. In regional scale monitoring, monitoring activities are carried out by using biodiversity indexes of EUNIS habitat types that are determined within the project. All data from all over the country will be registered into National Biodiversity Database and stored in this database. By this way, information on biodiversity in Turkey will be searched as tables, graphs and maps and changes related to conservation and sustainability of biodiversity will be followed.

When the inventory preparation works have been completed, systematic monitoring activities will be more efficient, a more efficient conservation of biodiversity will be provided thanks to monitoring activities on species and population, habitat/ecosystem and regional scales, and data from these activities will be useful in decision making processes. Moreover, data on biodiversity from all over the country will contribute to processes of preventing bio-smuggling and assessing economic features of organisms. This will also pave the way for bio-technological works, ensure planning for a sustainable utilization of biodiversity. This information will also be used in trainings on awareness raising for biodiversity and contribute to biotechnological works and rehabilitation works. This obtained data will also be beneficial in developing some wild plants, increasing product diversity and bring various benefits.

F.2.12.2. Project for Combatting with Bio-Smuggling

The Ministry of Forestry and Water Affairs started the “Project for Combatting with Bio-Smuggling” in 2013. With the project, it was aimed to prevent illegal international trade in biological resources of our country and prevent utilization of these resources for different purposes without partnership and control of our country. By this way, it was aimed to ensure that economic, social, scientific, technological, medical, commercial and cultural benefits from these resources be directed for the good of our country.

F.2.12.3. Project for determining plant species that will stay under dam reservoirs

The purpose of the project was determining endemic, local-endemic, rare and endangered plant species which had economic (medical, aromatic) value and which are under risk as they would become endangered as a result of dam reservoirs to be built in 2013-2015 by the General Directorate of State Hydraulic Works.

Surveys will be conducted in 22 dam areas in 2013 and 2015. Surveys was completed for 8 dam areas in 2013 and similar works were completed for 5 dams in 2014 and for 9 dams in 2015.

Within the scope of the project, plants species that would stay under water after the dam reservoirs were filled with water were moved to suitable habitats and production works were carried out. Some of the collected production materials will be sent to Turkish Seed Gene Bank and will be preserved there.

Within the scope of the project, researches were carried in 2013 in Kirazlıköprü, Hamzabey, Başköy, Kars, Morgedik, Pamukluk, Büyük Karaçay, Pazaryolu dam reservoirs and neighborhoods and 1.770 plant species were identified at the end of these researches and 26 of them was regarded as featured species.

In 2014, at the end of the researches conducted in Gökçeler, Artvin, Sorgun, Arsuz-Gönençay and Geben dam reservoirs and neighborhoods, 776 plant species were identified and 23 of them was regarded as featured species. In 2015; Aydınca, Aşağıçavuş, Çay, Gölecik, Büyük Kumla, Karadere, Rahmanlar, Karareis and Girme dam reservoirs and neighborhoods were researched and 1.734 plant species were identified. 13 of them was regarded as featured species.

Monitoring of the featured species that were moved in 2013 and 2014 have been conducted by related Regional Directorates of the Ministry of Forestry and Water Affairs.

The Convention on Biological Diversity was approved in Turkey with the Law No. 4177 dated 29 August 1996 and it took effect in 14 May 1997. The Ministry of Forestry and Water Affairs is the national focal point of the UN Convention on Biological Diversity and it is responsible to provide coordination and cooperation between intuitions for the activities towards conservation and sustainable use of biological diversity in Turkey.

Turkey has been attending to Parties Meetings as a party of the convention since 1998. Within the scope of the 17th Article of the convention, an exchange mechanism has been established to provide information exchange at national and international level and thus www.bcs.gov.tr is in Turkish and www.cbd.gov.tr is in English.

The Action Plan for Biological Diversity Strategy was prepared in 2001 so as to provide a guide in the process fulfilling the obligations stated in the Convention on Biodiversity and solving the problems resulting from loss of biodiversity. The Action Plan was revised and updated in 2008 with the attendance of the stakeholders. After the agreement between related institutions, the plan was approved by the Minister of Environment and Forestry. Thanks to the Action Plan for Biological Diversity Strategy, data on biodiversity in Turkey and data on institutional and legal infrastructure was collected; and a road map was prepared for strategic aims by priotizing the aims of conservation of biodiversity and ensuring sustainability. Additionally, the obstacles and gaps in achieving the aims, discrepancies in application and the needs to be fulfilled for achieving the aims are all identified during the process.

F.3. Protected Areas

According to the data from the International Union for Conservation of Nature, more that 5% of the world's surface area has been deemed as protected areas and this rate rises up to 20% in more conservation sensitive countries.

Protected areas are conserved land, aquatic and marine areas that are managed pursuant to related legislation with the purpose of conserving and biodiversity and related cultural resources and provide their sustainability.

Protected areas in Turkey include various natural ecosystems and formations of seas, coasts, deltas, forests, plateaus, steppes, lakes, rivers, deep valleys, canyons and glaciers.

It is of great importance to conserve biodiversity and adopt sustainability approach in areas which are protected due to their natural, historical and cultural value but under pressure from Urbanisation, tourism and agriculture by adopting integrated area management approach and by providing coordination between sectors through multiple perspectives.

Protecting and monitoring the species and habitats that are crucial components of biodiversity in protected areas and ensuring sustainability of ecosystem services by conserving existing populations are not only important for a better management of protected areas but also important for protecting the nature.

Conservation activities in Turkey are carried out in areas with different status such as specially protected areas, national parks, nature parks, natural reserve areas, natural monuments, wildlife improvement areas, protection forests, seed stands, seed orchards, gene conservation areas, agricultural enterprises, natural and archeological sites, wetlands and biosphere reserve areas.

Table 80 – List of protected areas under the responsibility of the Ministry of Forestry and Water Affairs (Ministry of Forestry and Water Affairs, 2016)

Protected Areas	Number	Area (ha)
National Park	40	828.614
Nature Park	204	99.394
Natural Reserve Area	31	64.224
Natural Monument	112	6.993
Wildlife Improvement Area	81	1.192.794
Wetlands (Ramsar Areas)	14	184.487
Wetlands with National Importance	20	288.427
Protection Forest	55	250.033
Urban Forest	133	10.315
Gene Conservation Forest (in-situ)	283	38.828
Seed Stand (in-situ)	337	44.664
Seed Stand (ex-situ)	184	1.421
TOTAL	**1.494**	**2.999.839**

The Ministry of Forestry and Water Affairs is responsible for identification, planning and management of National Parks, Nature Parks, Natural Reserve Areas and Natural Monuments stated in the Law No. 2873 on National Parks and of the areas stated in the Law No. 4915 on Land Hunting. Statistical data on protected areas is published by the Ministry of Forestry and Water Affairs annually. Additionally, Report on State of the Nature Protection is prepared and published every year.

F.3.1 Specially Protected Areas

Attempts towards protecting biodiversity in Mediterranean Sea and providing international cooperation on regional scale conservation started with the “Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean” which is an annex of the “Convention for Protection of the Mediterranean Sea against Pollution” signed in Barcelona on 16.02.1976 and published in the Official Gazette No. 17368 dated 12.06.1981.

Declaration of Specially Protected Areas (SPA) in Turkey is carried out through a decree of the council of ministers upon proposal of the Ministry of Environment and Urbanisation after on-site examinations and assessments. Turkey possesses 16 Specially Protected Areas and they cover an area of 2.458.749 hectares.

F.3.1.1. Belek Specially Protected Area

Belek Specially Protected Area is made up of 29 km coastal area formed by coastal dunes. Wide dune and forestry areas with regional characteristics make the area rich in biodiversity. Among the important species of the area are endemic Serik Pear (Pyrus serikensis), endemic fish species Lake Tuz toothcarp (Aphanius anatoliae) and Caretta caretta and Chelonia mydas sea turtles.

F.3.1.2. Datça- Bozburun Specially Protected Area

Datça- Bozburun Specially Protected Area is especially rich in vegetation cover. Olive trees, Red pine groups, endemic Cretan date palm (Phoenis theophrast), almond trees, local thymes, oleander, bay laurel and locusts reflect the characteristics of Mediterranean vegetation cover. In this area, 807 species of marine flora and fauna, 1.047 taxons of flora, 167 species of terrestrial invertebrate, 110 fish species, 4 amphibian species, 27 reptile species and 123 bird and mammal species have been identified.

Treasures of archeological, civic, natural and historical importance exist on the peninsula and these treasures are products of historical civilizations and they represent social, economic and architectural features of their age. Thus, these areas are deemed as specially protected areas. They are scattered on the peninsula.

F.3.1.3. Foça Specially Protected Area

Foça was declared as a Specially Protected Area with a view to protect natural and historical wealth of the area. Foça is a well-known area due to Mediterranean seal (Monachus monachus) which is one of the endangered species. Vegetation cover of the area consists of pine trees and maquis and it provides habitats for wolves, foxes, jackals, martens, partridges, pigeons and quails. Gediz Delta located in Foça SPA is quite rich in fish species and it provides a resting ground for migratory birds.

Uninhabited peninsulas that make up the coasts of Foça are natural extensions into the sea and these areas are under protections since they are parts of Foça silhouette and due to environmental values. The coves in the area decorated by figs, a lighthouse, donkeys, Hayırsız Island, Orak Island and Siren Rocks.

F.3.1.4. Gökova Specially Protected Area

Gökova Specially Protected Area is of ecological importance due to its richness in flora and fauna and its vegetation cover reflects the characteristics of Aegean and Mediterranean Region. Boncuk Cove is the breeding ground of sandbar shark (Carcharinus plumbeus) and Akyaka Kadın Creek is the feeding and breeding ground for Eurasian otter (Lutra lutra). Additionally, the area is the natural habitat of Audouin′s gull (Larus audoinii) Mediterranean seal (Monachus monachus) and European shag (Phalacrocorax aristotelis) species.

Another important part of the region is Sedir Island which is also known as Ketra, Setra, Sedir Şehirlioğlu Island. The island is located on southern part of Gökova Bay and it involves writings from Hellenistic and Roman times.

The area is quite rich in fauna. Winged animal species are distributed all over the area and these include turtle dove, quails, partridge, cormorant, heron, Eurasian nightjar, swallow, woodpecker, starling, ouzel, reed bunting, crow, kite, black francolin, mallard, greylag goose, tree sparrow, eagle, hawk, accipiter and owl.

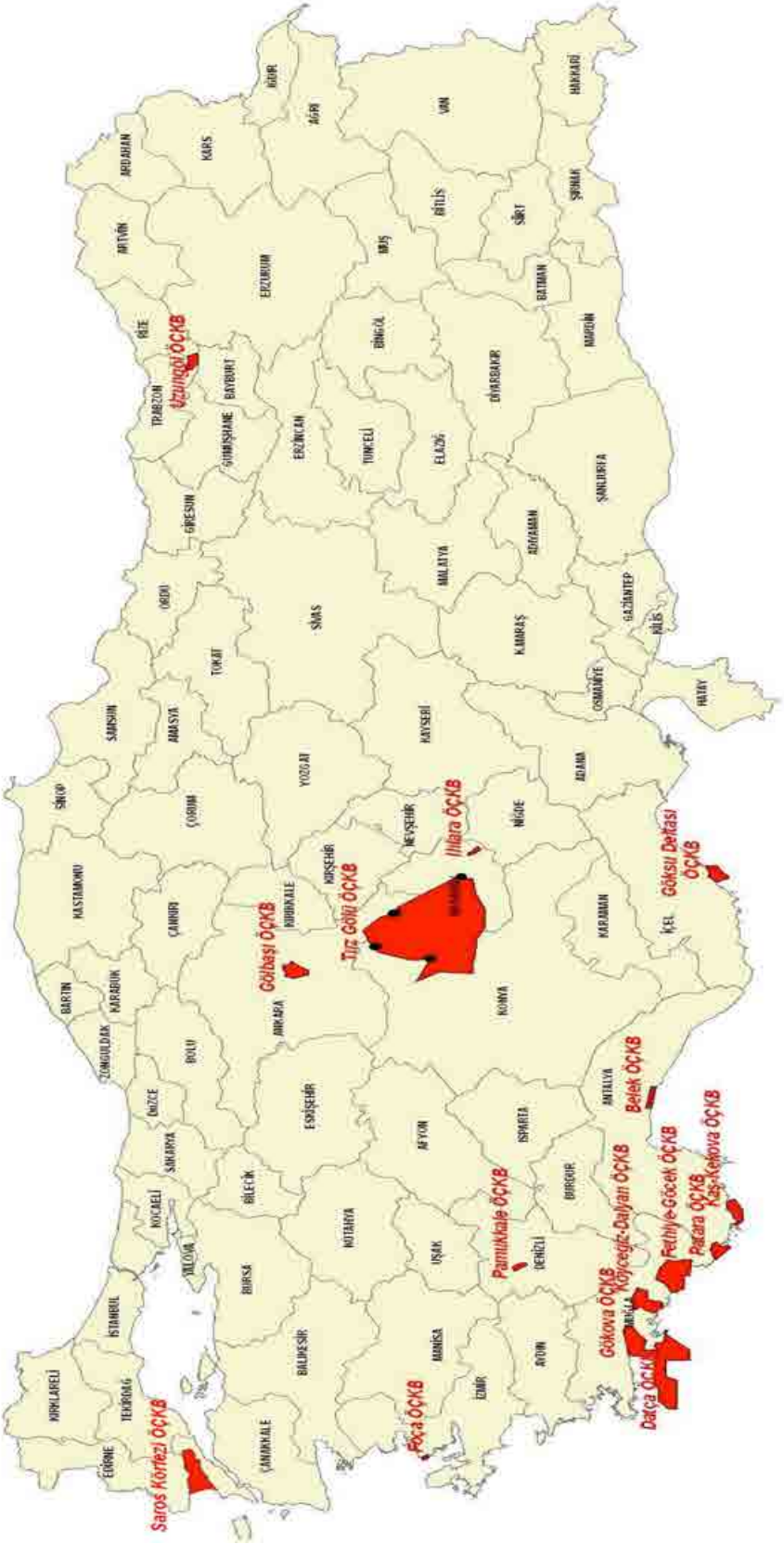
F.3.1.5. Gölbaşı Specially Protected Area

Mogan-Eymir Lakes and wetlands are nesting, breeding and resting areas for birds and this area is one of the important bird areas that was nominated for Ramsar. 83 bird species have been identified in the area. In addition to this, 3 amphibian species, 25 mammal species, 12 reptile species, 13 fish species and 493 plant species exist in the area and 47 of the plant species are endemic to the area. Centaurea tchihatcheffii, which is also known as Peygamber Çiçeği or Yanar Döner is distributed over a limited part of the area.

Wetlands and marshlands in the area provide water and primary production for countless plant and animal species and the area is the cradle of species and species diversity. Therefore, the area is strategically important for various organisms to survive. Mogan-Eymir Lakes and wetlands are used by 227 bird species as nesting, breeding and resting grounds and have been nominated for Ramsar. 40 of these bird species breed in this area. 30 of them can be seen all year while others are observed only during migration periods around the lakes.

F.3.1.6. Fethiye- Göcek Specially Protected Area

Another breeding area for Caretta caretta and Chelonia mydas which have been under protection pursuant to Berne Convention and CITES is Fethiye Beach. Fethiye-Göcek SPA accommodates the endemic oriental sweetgum (Liquidambar orientalis) which lives in creeks, deltas and places where level of groundwater is high. The Levant storax extracted from the oriental sweetgum is used in cosmetics and pharmaceutical industry.



Map 18– Specially Protected Areas in Turkey (Ministry of Environment and Urbanisation, 2016)

Important herbs of the area include thistle, efek, Johnson grass, common couch, nut grass, lamb›s quarters, avena fatua, pennyroyal, common barberry, sage, orchis mascula and orchis militaris, bağ dibi, black thorn, gum tragacanth and eryngium.

Most of the arable soils in Muğla province is located in Fethiye district. The center of the district is surrounded by fertile, first class lands which are convenient for irrigated agricultural.

F.3.1.7. Kaş- Kekova Specially Protected Area

Kekova, which gives its name to the area, is the biggest island in the area. Kekova Island lies in the sea by creating a trait along the Anatolian side. The area accommodates 51 families, 187 genera of these families and 272 species and sub species under these genera and 26 of these species are endemic to the area. Additionally 20 mammal species, 96 bird species, 16 reptile species and 4 amphibian species live there. The plant species Daucus conchitae W. Greuter (wild carrot-Endemic) and Onopordum rhodense was first identified in Turkey.

İç Island, Toprak Island, Aşırlı Island and Kişnali Island are other important islands in the area. Sıcak Peninsula and Kekova Islans, which lie parallel with the coast form Ölüdeniz which is and inland sea.

The area is also attractive for archeology tourism with its antique and historical artifacts as well as natural beauties.

F.3.1.8. Göksu Delta Specially Protected Area

Göksu Delta is also a Ramsar area and it is an important wetland for numerous migratory birds. The area is the most important spawning ground in Mediterranean especially for “Caretta caretta” and “Chelonia mydas” sea turtles. It is also the spawning ground for African softshell turtle (Trionyx triunguis). 507 plant taxons exist in Göksu Delta Specially Protected Area and 10 of them are endemic taxons.

It is observed that generally halophytes and dune vegetation are dominant in Göksu Delta. Especially species of Salicornia and Euphorbia genera are densely distributed on western part of the delta and in neighborhood of Akgöl and Paradeniz. Existence of aquatic plants in lakes depends on water regime and salinity of lagoons.

Various birds that use Göksu Delta as a wintering and nesting ground contributes to create and interesting and colorful landscape nearly every season of the year.

F.3.1.9. Pamukkale Specially Protected Area

Thermal water in the area, which is an important natural resource and has formed Pamukkale Travertines, has effected a wide area and there are 17 hot springs with the temperatures between 35-100^{0}C.

The area is covered with two kinds of soil, brown forest soil and colluvial soil and vegetation cover is observed mostly around streamsides, on the borders between farmlands, in coppices, grazing lands and on the hills that are not suitable for agricultural. Natural green areas and Nerium oleander (oleander), Ficus Inur and Vitex Agnus Castus groups can be seen over the Hierapolis plateau. Some species of herbaceous plants appear with temporary leaf, flower and color effects depending on the season.

F.3.1.10. Ihlara Specially Protected Area

Ihlara Specially Protected Area is a rich area in terms of biodiversity. 364 taxons consisting of 54 families and 218 genera have been identified as a result of the researches carried out in Ihlara Valley. Since the valley is not used by animals as a grazing ground and most part of the area is in the shade, the number of species is quite high. The fact that 43 of these species are endemic reveals the importance of the natural vegetation cover of the area. Other than these, the area is also rich in hot thermal springs and historical remains.

According to the results of researches and observations, 35 bird species from 21 families have been identified in the area 11 of these bird species use the area as an incubation ground. Additionally, 4 fish species have been identified in Melendiz River which is the most important river in the area. The most hunted and economically valuable species is European chub (Leuciscus cephalus) whose local name is “Pullu”.

F.3.1.11. Köyceğiz- Dalyan Specially Protected Area

İztuzu beach in the area is one of the most important breeding grounds for sea turtles (Caretta caretta and Chelonia mydas) and African softshell turtle. 126 bird species, 282 marine fauna and flora species have been identified in the area.

The most dominant type of vegetation in Köyceğiz Specially Protected Area are pine forests and shrubs and bushes of maquis and frigana. Also herbaceous plants exist in wetlands and swamps around Köyceğiz Lake.

The neighborhood of the lake, canals and forests have big potentials as breeding and sheltering ground for various species.

Wild goose, white stork, İzmir kingfisher, swallow, marsh warbler, gull-billed tern, short toed eagle, bee eater, seagull, glossy ibis, little egret and other bird species use the area as wintering and incubation ground.

F.3.1.12. Salt Lake (Tuz Gölü) Specially Protected Area

The lake is the second largest lake in Turkey and second saltiest lake in the world and it is on the temporary list of World Natural Heritage Sites.

Salt Lake basin is an A class wetland according to international criteria and it is of great importance in terms of protecting biodiversity in our country. Salt Lake is one of the richest lake of Turkey in terms of bird existence. The area accommodates 85 bird species, 129 insect species (4 of them are endemic), 15 mammal species and 38 endemic plant species. The lake has also been declared as first degree protected area.

Wide water surface of the lake in winter seasons provides a valuable wintering ground for water birds. The bird species that have adapted to saline environments live in the lake in groups. These groups include flamingos, avocets, European golden plovers, cranes, Greylag goose, mallards and etc. Since the lake environment is relatively uninhabited, the birds are able to feed freely on water bodies, rangelands and cultivated areas, and they can also swim in the lake as it does not freeze in winter times. Islets and marshy areas that appear in spring seasons provide incubation grounds for collared pratincole (Glareola prantincola), common shelduck (Tadorna tadorna), ruddy shelduck (Tadorna ferruginea), Eurasian teal (Anas crecca), pied avocet (Recurvirostra avocetta), Eurasian stone-curlew (Burhinus oedicnemus) and gull (Larus sp.) species.

F.3.1.13. Uzungöl Specially Protected Area

Uzungöl Specially Protected Area harbours various wild animal species such as bears, wolves, wild goats, foxes, Caucasian black grouses in the mountains. 658 plant taxons including 125 sub species and 68 varieties, 90 mammal species, 8 amphibian species, 7 reptile species and 250 bird species live in the area. One of the plant species, Primrose (Primula x uzungolensis) was first identified in this area.

In terms of wild life, the mountains around Uzungöl host different species such as bears, wolves, wild goats, foxes, Caucasian black grouses.

Although water level of the lake differs according to incoming water flow in different seasons, generally the lake is 1.000 meters long, 500 meters wide and it has a depth of 15 meters.

Haldizen creek valley, which lies towards the south, hold great natural beauties. There are around 10 small lakes on higher areas of the mountains and 10-20 km far away from Uzungöl. These small lakes increase the richness of activity in the area.

F.3.1.14. Saros Gulf Specially Protected Area

Saros Gulf is defined as a large natural aquarium by marine biologist and diving enthusiast due to various fish species in the area. During his visit to Turkey in 1970s with his ship “Calipso”, Captain Cousteau dived in the gulf and defined the area as “Northern version of the Red Sea”.
Saros Gulf and coasts have been declared as a Specially Protected Area with a view to protect area’s geomorphological, landscape, ecological, floristic, biogenetic and touristic features.

Mediterranean climate is dominant in the gulf area. The highest point in the basin is Koru Mountain (385 m) which is on Northern/North-eastern edge of the gulf. The only river that provides water to the basin is Kavak Creek.

Complicated whirlpool formations occur in the waters of Saros Gulf which is one of the saltiest parts of Aegean Sea. The gulf is a self cleaning gulf due to these flows with whirlpools.

F.3.1.15. Patara Specially Protected Area

Patara Specially Protected Area is made up of Muğla and Antalya provinces, Fethiye and Kaş districts and 5 boroughs and 4 villages of these districts. Patara, which is located within the borders of Gelemiş Village in Kaş district of Antalya province, is an ancient city that dates back to Lycian Civilization. Additionally, the area is the nesting ground for sea turtles.

The economy of the area generally depends on agriculture and tourism has started to develop in recent years. Modern agricultural activities has started around the Ova Lake and greenhouse cultivation is common in the area. Early vegetable is also cultivated in the area.

The wet line on Patara Beach has a length of 7 km from Eşen Brook to the east and at 25 m length and the line consists of clean fine sand. This area is 1st degree spawning ground for Mediterranean sea turtle species Caretta caretta and Chelonia mydas. Within the scope of the “Sea Turtles Research Project” conducted by the Environmental Protection Agency for Special Areas in cooperation with Dokuz Eylül University, density of sea turtle nests was identified as 2-19 nests/km.

In administrative means, most of the Patara Specially Protected Area is within the borders of Kaş district of Antalya province and the other part is within Fethiye district of Muğla province. According to archeological researches carried out in the area, Patara is one of the oldest sites of Lycian Civilization and it was the main port of the period in 9th century BC. It has been located on a triangular plain on the west of Erendağı in Kalkan throughout the history.

F.3.1.16. Finike Seamounts Specially Protected Area

Finike Seamounts Specially Protected Area is the first marine conservation area of the country which was declared as a specially protected area with a decree of the council of ministers published in the Official Gazette No. 28737 dated 16 August 2013.

Finike Seamounts Specially Protected Area which was added to 15 other specially protected areas on Aegean and Meditarranean coasts and in other regions of Anatolia, has a surface area of 1.124.173 ha and it is of great importance in terms of deep sea biodiversity, rare banks, special ecosystems like seamounts, endangered species and rare ecosystems.

Map 19- Finike Seamounts Specially Protected Area (Ministry of Environment and Urbanisation, 2016)

Moreover, the area is expected to contribute to achievement of Aichi Targets determined under Biodiversity Convention in order to improve condition and management of Marine Protected Areas in the Mediterranean, and the area is also expected to contribute to fulfill the responsibilities of our country resulting from Barcelona Convention, General Fisheries Commission for the Mediterranean (GFCM) and Berne Convention.

F.3.2. Natural Protected Areas

Natural Protected Areas are land, underground and underwater areas that should be protected since they pertain to different geological periods and since they are rare with unsual features.

While these areas were previously graded as 1st degree, 2nd degree and 3rd degree natural protected areas, new status were determined with the "By Law on Procedures and Principles relating Identification, Registration and Approval of Protected Areas" published pursuant to the Decree Law No. 644. New natural protected areas registrations and registrations at the end of re-assessments are carried according to status provided on Table 81.

Sensitive Areas to be Certainly Protected are areas which include extraordinary ecosystems and species on global and national scale and with exceptional geological and geomorphological features, unique ecosystem structure and conserved biodiversity. It is prohibited to build up any structure on these areas by a decree of the council of ministers.

Table 81 – The number of natural protected areas (Ministry of Environment and Urbanisation, 2015)

Categories of Natural Protected Areas	Number of Natural Protected Areas
1. Degree Natural Protected Area	1.165
2. Degree Natural Protected Area	368
3. Degree Natural Protected Area	722
Ungraded Natural Protected Area	109
Sensitive Areas to be Certainly Protected	0
Qualified Natural Protected Areas	3
Areas of Sustainable Protection and Controlled Use	63
TOTAL	**2.430**

Qualified Natural Protected Areas are areas where agricultural activities except greenhouse cultivation, fishery activities except culture fishing can be carried out and which can be used as a ground for camping, establishing bungalows and daily activities in harmony with the natural structure of the area. Natural character of the area is mostly conserved. These areas include hunter-game relationship within food chain including mammals, local animal and plant species and a unique ecosystem structure. They are not effected by modern life and human activities. They are isolated from inconvenient inhabitance and utilization with their rural characteristics.

Areas of Sustainable Protection and Controlled Use are areas which effect Qualified Natural Protected Areas or Sensitive Areas to be Certainly Protected, form an integrity with these areas and contribute to protection of these areas. Areas of Sustainable Protection and Controlled Use permit low density activities, tourism and settlement activities that are naturally and culturally compatible with the area.

F.3.3. Natural Heritage

"Monumental Trees" and "Caves" have been taken under protection since they belong to previous geological, historical and pre-historical periods and they are rarely found and also because they are surface, underground and underwater areas to be protected due to their features and beauties.

A- Monumental Trees; Monumental Trees are trees that are above usual measurements in terms of age, diameter, and height and/or that have a special place in local folklore, culture or history. They also naturally act as a bridge between the past and present and present and the future with their long lives.

Table 82 – Number of registered monumental trees in Turkey (Ministry of Environment and Urbanisation, 2016)

Total Number of registered trees	8.690
The Number of monumental trees registered by the Ministry of Environment and Urbanisation (General Directorate for Protection of Natural Assets)	486

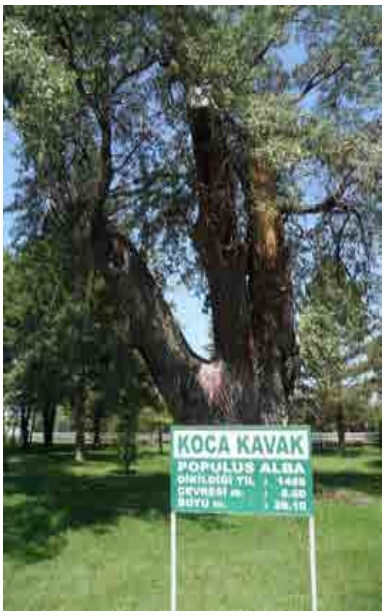


Photo 4 – Koca Kavak (Old Poplar), Turhal – Tokat (Monumental Tree)

B- Caves; The caves, which are naturally formed without human intervention, have a unique cave ecosystem, manifest themselves with their remarkable features, accommodate biomes that are in interaction with one another, hold physical and chemical deposits, develop and continue to live, include a habitat that can be disturbed by any outside intervention, are taken under conservation as natural heritage.

Photo 5– İnsuyu Cave, Burdur

Table 83 – The Number of registered caves in Turkey (Ministry of Environment and Urbanisation, 2016)

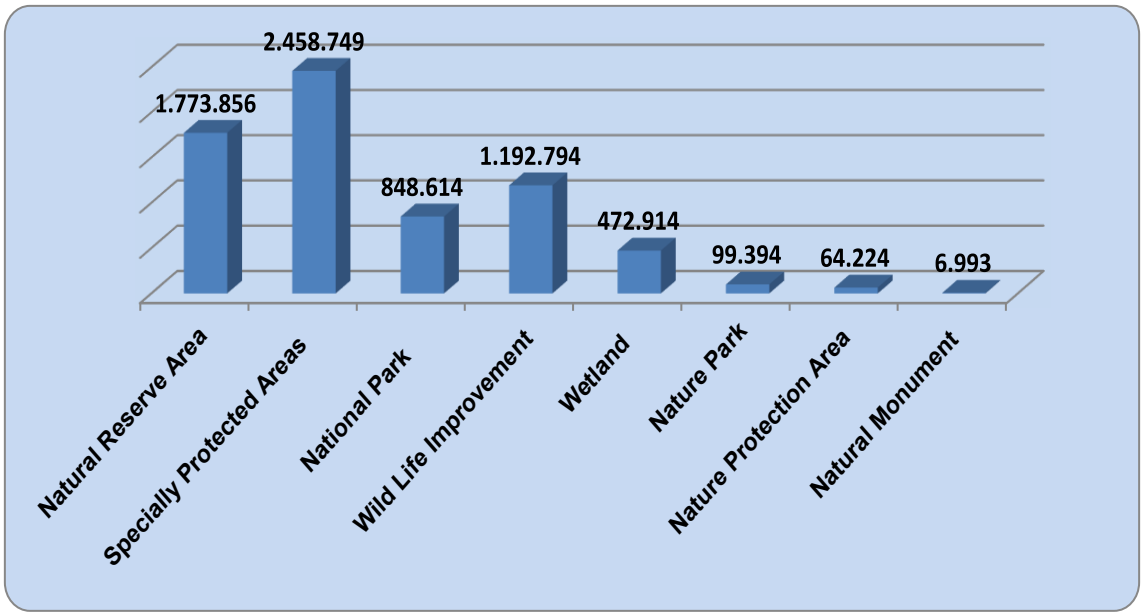
Total Number of caves	234
Number of caves registered by the Ministry of Environment and Urbanisation (General Directorate for Protection of Natural Assets)	5

F.3.4. Number and Surface of Protected Areas

Protected areas in Turkey consist of Natural Protected Areas, Specially Protected Areas, National Parks, Wild Life Improvement Areas, Wetlands, Nature Reserve Areas and Natural Monuments. Total surface area of protected areas in Turkey is 6.287.183 hectares (Table 84).

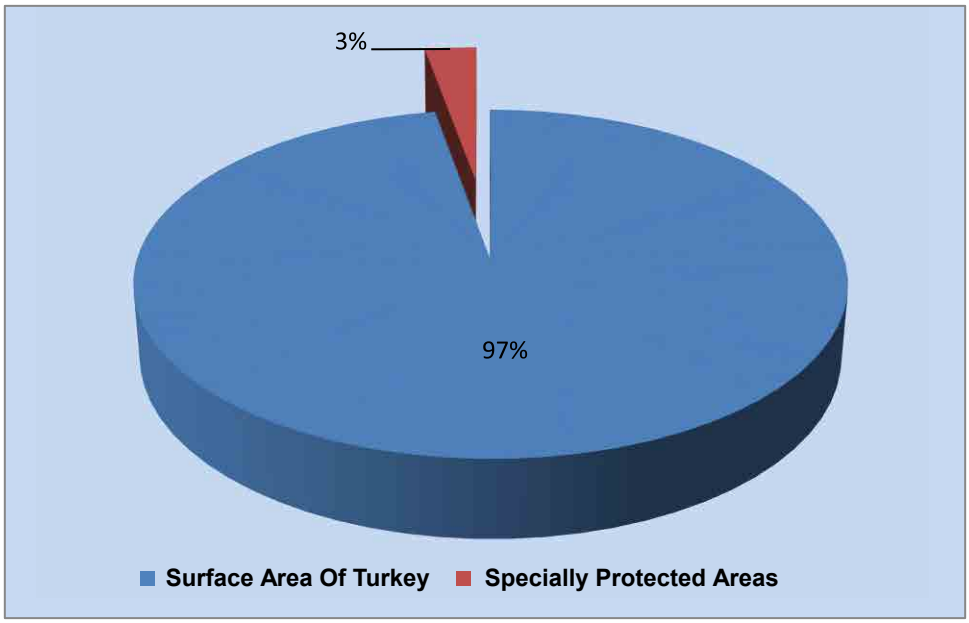
Table 84 – Surface areas of protected areas in Turkey (Ministry of Environment and Urbanisation, Ministry of Forestry and Water Affairs, 2016)

PROTECTED AREAS	SURFACE AREA (ha)
Natural Protected Areas	1.773.856
Specially Protected Areas	2.458.749
National Parks	848.614
Wild Life Improvement Areas	1.192.794
Wetlands	472.914
Nature Parks	99.394
Nature Reserve Areas	64.224
Natural Monuments	6.993
TOTAL	**6.917.538**

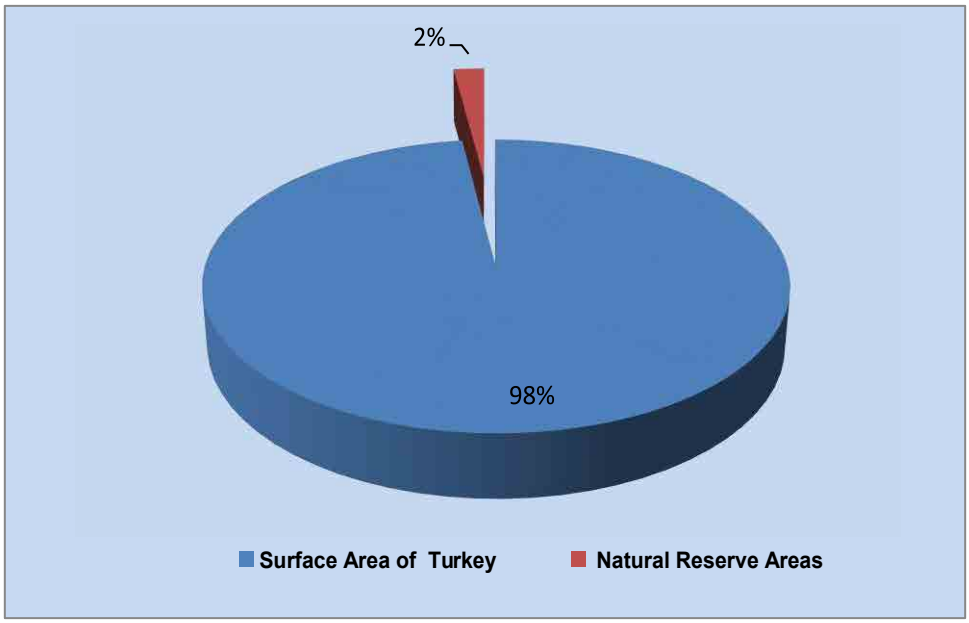


Graph 42- Surface areas of protected areas in Turkey (ha)

There are 16 Specially Protected Areas in Turkey and surface area of these areas is 2.458.749 hectares. There are 2.430 Natural Protected Areas in Turkey and surface area of these areas is 1.774.000 hectares. Total surface are of Specially Protected Areas makes up 3% of Turkey's surface area and total surface area of Natural Protected Areas makes up 2% of Turkey's surface area (Graph 43 and Graph 44).



Graph 43 –Share of Specially Protected Areas in Turkey's total surface area.



Graph 44 – Share of Natural Protected Areas in Turkey's total surface area

F.3.5. Wetlands

Turkey became a party to Ramsar Convention, which was signed in Ramsar province of Iran in 1971 with the aim of conservation and sustainable use of wetlands, in 1994. The convention entered into force upon a Decree No. 94/5434 of the Council of Ministers published in the Official Gazette No. 21937 dated 17.05.1994.

Wetlands are defined as: areas of natural or manmade, marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters and which provide numerous ecological services especially for water birds.

Thanks to the biodiversity they include, wetlands are regarded as natural heritage museum of the world and they are the most important ecosystems of the earth due to their natural functions and economical values. Wetlands,

- Provide a groundwater balance by recharging and discharging the groundwaters. Regulate the movement of water by storing floodwaters, controlling floods and preventing marine water from flowing into coastal lands.
- Positively affect the local climatic factors such as precipitation and temperature by increasing the humidity in the area.
- Clean the waters by acting as sink holes for sediments and toxic substances or by using nutrients (nitrogen, phosphorus etc.).
- Are the most biologically productive ecosystems of the earth along with tropical forests.
- Provide habitats for various plant and animal species, especially for fish and bird species, which have high ecological or commercial values.
- Possess high economic value and contribute to national economy through fishery, agriculture, livestock raising, reed production, tourism and transportation.

Turkey is regarded as one of the most important countries of Europe and Middle East in terms of wetlands. There are two major reasons for this: first, Turkey holds rich and various wetlands with different ecological characteristics; and second, two of the 4 major bird migration routes in western palearctic zone pass over Turkey. As a result of the assessments carried out by the Ministry of Forestry and Water Affairs according to criteria of Ramsar Convention, 135 wetlands with international importance has been identified in Turkey. Most of these areas are of international importance due to water bird species and fish species they accommodate.

Works on preparing National Wetland Inventory has been completed and 921 natural wetlands with a size of over 8 ha have been identified in Turkey. Within the scope of the By Law on Conservation of Wetlands published in the Official Gazette No. 28962 dated 04.04.2014, 20 wetlands have been registered as Wetland with National Importance and 5 wetlands have been registered as Wetland with Local Importance. Wetlands of Turkey which are on Ramsar list are provided on Table 79, Wetlands with National Importance are provided on Table 85 and Wetlands with Local Importance are provided on Table 86.

Table 85 – Wetlands with National Importance in Turkey (Ministry of Forestry and Water Affairs, 2016)

	Name of the Wetland	Surface Area(ha)	Province	Registration Status
1	Acıgöl	55.095	Afyonkarahisar	Wetland with National Importance
2	Ahlat Marshes	243	Bitlis	Wetland with National Importance
3	Akgöl	1.203	Van	Wetland with National Importance
4	Lake Aktaş	4.109	Ardahan	Wetland with National Importance
5	Lake Aygır	1.034	Kars	Wetland with National Importance
6	Lake Çıldır	39.151	Ardahan	Wetland with National Importance
7	Güney Keban Dam	41.424	Elazığ	Wetland with National Importance
8	Hazar	28.846	Elazığ	Wetland with National Importance
9	Lake Heybeli (Norşin)	53	Bitlis	Wetland with National Importance
10	Hürmetçi Marshes	15.713	Kayseri	Wetland with National Importance
11	İron Marshes	13.746	Bitlis; Muş	Wetland with National Importance
12	Karasu Delta	339	Van	Wetland with National Importance
13	Karkamış Flood Plain	27.396	Gaziantep; Şanlıurfa	Wetland with National Importance
14	Lake Ladik	1.836	Samsun	Wetland with National Importance
15	Lake Nazik	11.164	Bitlis	Wetland with National Importance
16	Lake Putka	4.181	Ardahan	Wetland with National Importance
17	Sarısu Plain Wetlands	10.092	Ağrı	Wetland with National Importance
18	Lake Turna (Keşiş)	3.045	Van	Wetland with National Importance
19	Lake Yeniçağa	8.224	Bolu	Wetland with National Importance
20	Yüksekova(Nehil) Marshes	21.533	Hakkâri	Wetland with National Importance
	TOTAL	**288.427**		

Table 86– Wetlands with local importance in Turkey (Ministry of Forestry and Water Affairs, 2016)

Name of the Wetland	Surface Area (ha)	Province	Registration Status
Aksaz Marshes	133	Sinop	Wetland with Local Importance
Lake Bakkal	25	Çankırı	Wetland with Local Importance
Lake Çiğ	6	Ordu	Wetland with Local Importance
Hersek Lagoon	167	Yalova	Wetland with Local Importance
Lake Samsam	931	Konya	Wetland with Local Importance
TOTAL	1.262		

F.4. Biosecurity Works

It has become possible to change genetic structures of organisms thanks to the developments in molecular biology and genetic enginnering in recent years. Genetic interventions are carried out either by making some changes on the genes of the target organism or by transplanting genes from another organism to a target organism. The organisms that are artificially given new distinct characteristics through alterations in genes by means of all these genetic technologies are called Genetically Modified Organisms (GMOs).

Thanks to the practices of genetic engineering, it is possible to develop highly productive plants and other organisms that are resistant to harsh conditions (drought, salinity, etc.) diseases, pests and various chemicals.

Especially genetically modified plants have been promoted as an important means to resolve the problem of famine in the world by considering efficiency and access to food, and these plants have been put on the world market by favoring their advantages and thus GMO based agriculture has come into prominence in some countries.

On the other hand, although long term effects of GMOs are not exactly known, it is known that they have proven adverse effects on the environment. In the light of the findings from global experiments, it is observed that environmental effects of the GMOs[11] include; foreign pollination, release of genes into the environment through gene transfer and hybridization, increase of wildness and super-wildness, decrease in plant resistance, genomic stress in organisms, gene transition into soil and water ecosystems and loss of local diversity. Furthermore, all these risks are also important for the health of humans who are an inseparable part of the environment.

Negative adverse effects of GMOs on the environment and increase and proliferation of products from GMOs caused some hesitations in using GMO including products in the world. As a result of these drawbacks, Biosecurity Protocol was accepted under the Convention on Biodiversity in 29.01.2000 and the protocol entered into force in 11.09.2003. The protocol aimed at, by also taking human health into account, transferring and managing genetically modified organisms that are obtained through modern biotechnology and they may have adverse effects on conservation and sustainable use of biodiversity and ensuring a level of security in use of genetically modified organisms. Turkey is a party to Biosecurity Protocol and the National Focal Point relating the convention is the General Directorate of Agricultural Research and Policy (TAGEM) operating under the Ministry of Food, Agriculture and Livestock.

“Law no. 5977 on Biosecurity” was approved by TBMM (Grand National Assembly of Turkey) on 18 March 2010 and published in the Official Gazette No. 27533 dated 26 March 2010, with the intend of preventing the risks resulting from genetically modified organisms and products that are obtained by use of modern biotechnology at national level, establishing a biosecurity system in order to protect human, animal, plant and environmental health, conserve biodiversity and ensure sustainability and inspect and monitor activities including GMOs.

F.5. Invasive Foreign Species in Turkey (The Most Dangerous Invasive Foreign Species in Turkey)

14 of the world’s most dangerous 100 invasive foreign species announced by the World Conservation Union (IUCN) exist in Turkey. These include: Eastern mosquitofish (Gambusia holbrooki), Warty comb jelly (Mnemiopsis leidyi), Veined rapa whelk (Rapana venosa), Prussian carp (Carassius gibelio), Zebra mussel (Dreissena polymorpha), water hyacinth (Eichornia crassipes), Killer algae (Caulerpa taxifolia), Rainbow trout (Oncorhyncihus mykiss), Crucian carp (Carassius carassius), Mozambique tilapia (Oreochromis mossambicus), Coypu (Myocastor coypus), Red-eared slider (Trachemysscripta elegans), Black rat (Rattus rattus) and African sharptooth catfish (Clarias gariepinus).

[11]Özdemir, O (2003) Effects of Genetically Modified Organisms (GMOs) on Natural Environment and Evaluation of them According to European Union, Ph.D. Thesis, Ankara University Institute of Social Sciences, ANKARA

Photo 6- Water Hyacinth (Eichornia crassipes) (Dr. İrfan UYSAL)

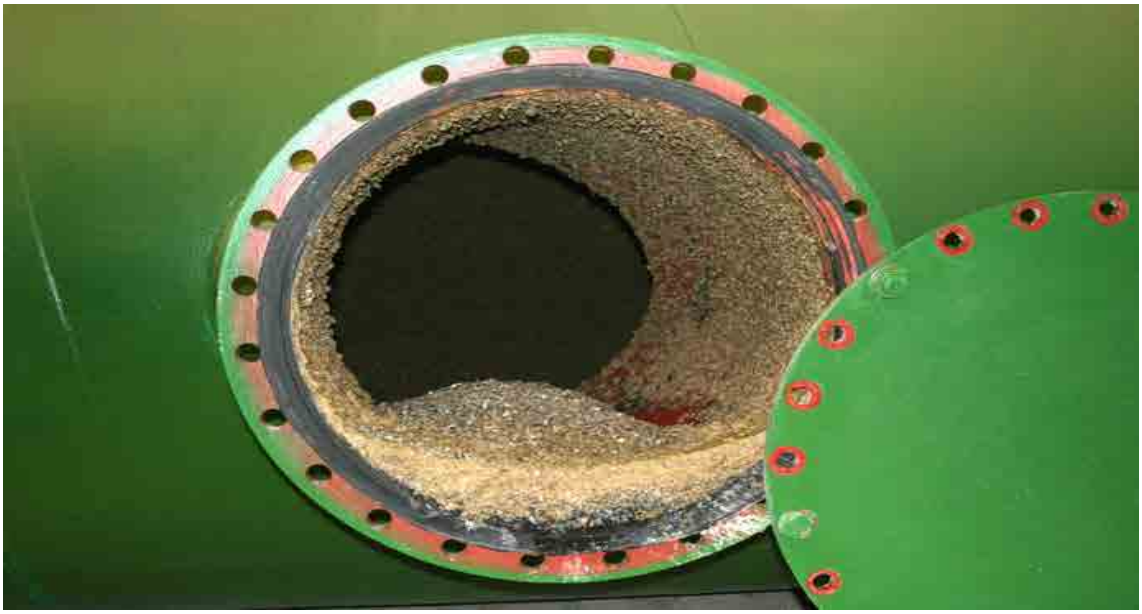


Photo 7- Zebra Mussel (Dreissena polymorpha) (Mehmet Sabih İPEK)

The species that are not included in IUCN list but dangerous for Turkey include: Kallar grass (Diplachne fusca), Persicaria perfoliat, Cutleaf groundcherry (Physalis angulata L), Physalis philadelphica Lam. var. immaculata Waterf, Red-eared slider (Trachemysscripta elegans), Bur cucumber (Sicyos angulatus), Black locust (Robinia pseudoacacia), Lamb›s Quarters, Hottentot plant (Carpobrotus acinaciformis), Tree of heaven, Ailanthus (Ailanthus altissima), Annual ragweed (Ambrosia artemisiifoli), Desert locust (Schistacerca gregaria) and Rose-ringed parakeet (Psittacula krameri).

Photo 8- Rose-ringed parakeet (Psittacula krameri)(Berrin AKYILDIRIM)

Photo 9- Coypu (Myocastor coypus)

F.5.1. Invasive Foreign Species in Turkey's Seas

Upon the opening of Suez Canal, 790 fish species entered into Mediterranean waters. While the number of invasive foreign species in Turkey's seas were 263 in 2005, this number has reached to 450 in Eastern Mediterranean Sea. There are 160 invasive foreign species in Mediterranean Sea, 330 in Eastern Mediterranean Sea, 165 in Aegean Sea, 69 in the Sea of Marmara and 21 in Black Sea. Although 66% of the invasive foreign species in Mediterranean Sea has come through Suez Canal, 80% of the invasive foreign species in Black Sea has come through ballast water from the ships.

Photo 10 – Killer Algae (Caulerpa taxifolia)

Examples of invasive foreign species identified in our seas include Mnemiopsis leidyi (Warty comb jelly), Rapana venosa (Veined Rapa Whelk), Lagocephalus sceleratus (silver-cheeked toadfish) and Caulerpa taxifolia (Killer Algae). Monitoring of these invasive foreign species is crucial in terms of conserving biodiversity and preventing possible negative social, economic and health related effects. In order to facilitate monitoring activities, an "Invasive Foreign Species Interface" has been created under the Noah's Ark Biodiversity Database.

Photo 11- Veined Rapa Whelk (Rapana venosa) (Prof. Dr. Bayram ÖZTÜRK)

F.5.2. Invasive Foreign Fish Species in Turkey's Inland Waters

While the topic of Invasive Foreign Species has gained currency for the last 10-20 years, area of distribution of these species is expanding rapidly due to climate change. Nearly 350 fish species exist in our inland waters and 25 fish species has been

introduced into our inland water. The number of endangered fish species is 49. Once these species have been introduced into our waters, it is very difficult and costly to remove and eliminate them and thus we should be careful about introducing adventive fish species to inland waters. Turkey's inland waters are under the threat from adventive fish species introduced unrestrainedly. Numerous lakes and rivers are under invasion of Eastern mosquitofish, Prussian carp, Atherina, tench, Ocean sunfish, Stone moroko and Zebra mussel. These species that invade freshwaters feed on local organisms and creatures and enter into a food competition with local species. They also spread the diseases and parasites that they bring with them into the new environment and thus lead to extinction of endemic and natural species in the area. These invasive foreign species feed on fish spawn and pose an important threat for biodiversity.

Photo 12 - Stone moroko (Pseudorasbora parva) (Baran YOĞURTÇUOĞLU)

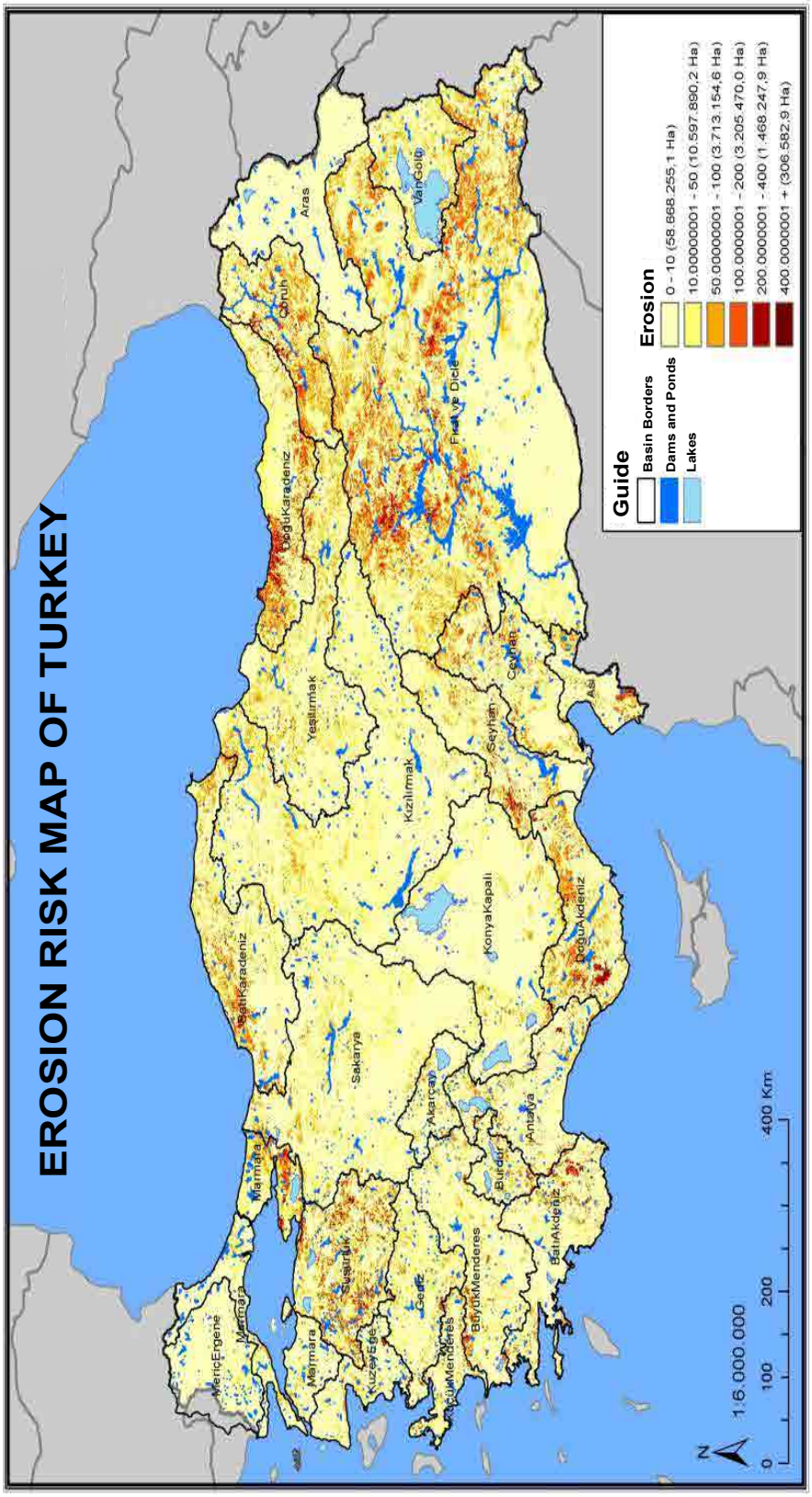
Photo 13 - Prussian carp (Carassius gibelio)

F.6. Sensitive Areas to Erosion and Desertification in Turkey

F.6.1. Combating with Erosion

Geographical location, climate, topography and soil conditions of Turkey increase the sensitivity of our country to erosion. When causes of erosion are analyzed for Turkey, it is observed that human factors come into prominence. Geographical location, topographical structure and climatic conditions of the country contribute to the increase in erosion and make it difficult to combat with erosion. While the erosion removes soil over an area, it also removes organic matter and by this way soil fertility is reduced, dam reservoirs are filled with sediments removed from soil, and the resulting floods cause loss of life and property.

The most sediment carrying rivers into seas, lakes and dam reservoirs in Turkey are Fırat, Çoruh, Yeşilırmak and Kızılırmak rivers. The least sediment carrying rivers are Dalaman Brook and İyidere creek and the reason why they carry low amount of sediment is that their basins are covered with forests and the strong natural vegetation protects soil. Degradation of soil through erosion leads to decrease in agricultural and livestock production and this causes increase in migration from rural areas to urban areas. This situation leads to crucial socio-economic problems and damages our national economy. It mandatory to combat with erosion in order for preservation of soil, sustainable management of natural resources and ensuring food security. An Expertise Commission on Combating with Erosion including academicians, research institutes, non-governmental organizations and experts from related institutions and organizations was established on the purpose of ensuring a more effective combat against erosion that is based on a scientific ground.



Map 20 – Erosion risk map of Turkey (Ministry of Forestry and Water Affairs, 2016)

Erosion control activities in Turkey has continued as afforestation, erosion control, rehabilitation of degraded forests and pasture improvement since 1946. Afforestation, erosion control, rehabilitation of degraded forests and pasture improvement, energy forests establishment, artificial regeneration and special afforestation activities had been conducted on 8.131.858 hectares of area until the end of 2015. 1.254.500 hectares of these activities was towards erosion control and other activities also contributed to erosion control indirectly.

"The Action Plan for Mobilization on Afforestation and Erosion Control" covering the years 2008-2012 was prepared in order to accelerate afforestation and erosion control activities in our country where most of the land is under the risk of desertification and erosion and within the scope of the action plant, afforestation was conducted on an area of 2.429.604 hectares and 2 billion trees were planted within the activities of combating with erosion and improving the forests. Companies, non-governmental organizations, universities, students and people from all walks of the society as well as public institutions and organizations attended the process of mobilization. After "The Action Plan for Mobilization on Afforestation and Erosion Control" was completed successfully at the end of 2012, Action Plan to Combat with Erosion, Action Plan for Green Belt Afforestation of Dam Basins and Action Plan for Upper Basin Flood Control, covering the period between 2013-2017, were prepared under the coordinatorship of the Ministry of Forestry and Water Affairs together with related institutions and organizations.

Within the scope of the Action Plan to Combat with Erosion, afforestation for erosion control, rehabilitation, erosion control and pasture improvement activities have been conducted on 1.400.000 hectares of area, and maintenance works will be carried out on 2.287.379 hectares of are where erosion control and afforestation was conducted before. Within the Action Plan for Upper Basin Flood Control, flood prevention activities will be carried out for 25 river basins and 227 prioritized flood basins covering and area of 4.155.000 hectares.

Forest stock of Turkey is continuously increasing thanks to afforestation, erosion control, rehabilitation of degraded forests and pasture improvement, energy forests establishment, artificial regeneration and special afforestation activities. While the forest area of Turkey was 20,2 million hectares in 1972, it reached to 21,7 million hectares as of 2012. Since 1972 when the first inventory records started to be kept, the forest area increased 1,5 million hectares. The rate of fertile forests increased from 49% to 53,3% in 2012 thanks to rehabilitation of degraded forests. Afforestation, erosion control, rehabilitation of degraded forests and pasture improvement, energy forests establishment, artificial regeneration activities were carried out on 8.132.000 hectares of area by the General Directorate of Forestry until the end of 2015. 1.261.823 of this were for combating with erosion.

F.6.1.1. Action Plan to Combat Erosion (2013-2017)

Action Plan to Combat Erosion covering 2013-2017 was prepared for the areas that are exposed to erosion under the coordinatorship of the Ministry of Forestry and Water Affairs together with related institutions and organizations. Within the scope of the Action Plan afforestation for erosion control, rehabilitation, erosion control and pasture improvement activities have been conducted on 1.400.000 hectares of area, and maintenance works will be carried out on 2.287.379 hectares of are where erosion control and afforestation was conducted before.

The activities prescribed in the plan are carried out by the Ministry of Forestry and Water Affairs and related units of the Ministry of Food, Agriculture and Livestock.

F.6.1.2. Action Plan for Green Belt Forestation of Basins of Dam Reservoirs (2013-2017)

A big part of the basins of dam reservoirs consist of high sloping lands which are devoid of a vegetation. In these areas, dam reservoirs are filled with sediments due to lack of vegetation. The "Action Plan for Green Belt Forestation of Basins of Dam Reservoirs" covering 2013-2017 was prepared within this purpose.

The Ministry of Forestry and Water Affairs and Directorate General for State Hydraulic Works (SHW) decided to carry out afforestation works in 400 of 1.077 dams and ponds that are operating, under construction or at project stage with the intend increasing forest cover of dam reservoir basins. It is aimed with the action plan to benefit from the forests that are under water or in dam protection area, to prevent erosion and sedimentation, improve water amount and quality, creating new tourism and recreational areas, creating new habitats for wild life, contributing to economy of the area by using commercial plants in afforestation activities.

F.6.1.3. Erosion Control Projects

Some of the important projects implemented by the General Directorate of Forestry include:

- Tokat-Behzat Creek Erosion Control Project,
- Akşehir-Teke Creek Erosion Control Project,
- Ankara-Green Belt Project,
- Çakıt Brook Project,
- Kahramanmaraş-Ahırdağı Green Belt Afforestation Project,
- Aydın-Büyük Menderes Project,
- Western Black Sea Flood and Earthquake Disasters Immediate Aid Project
- Eastern Anatolia Water Basin Rehabilitation Project,
- Senirkent and Sütçüler Erosion Control Project,
- İzmir-Karşıyaka Erosion Control Project,
- İstanbul-Çatalca Terkos Durusu Dune Project,
- Fethiye-Kumluova Project,
- Kaş-Ovagelemiş Project,
- Project for Rehabilitating Water Basins in Anatolia
- Murat River Basin Rehabilitation Project (Elazığ-Bingöl-Muş)
- Çoruh River Basin Rehabilitation Project (Artvin-Bayburt-Erzurum)

Akşehir 1962

Akşehir 2009

Photo 14 - Akşehir-Teke Creek Erosion Control Project

F.6.2. Desertification

Desertification; means land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors including climatic variation and human activity (UNCCD).

Land Degradation; means soil erosion and degradation of physical, chemical, biological and economic features of soil and loss of vegetation in in arid, semi-arid and dry sub-humid areas resulting from the effect of wind and/or water (UNCCD)

Today, desertification/ land degradation and drought are problems experienced on a global scale. These problems adversely affect human groups in the world as well as natural environment and organisms and creatures living in it. Both direct results and indirect results effect various societies and leads to global problems such as famine and immigration.

Although there are no natural deserts in Turkey, its geographical location, climate, topography and soil conditions increase the sensitivity of the country to land degradation and drought and this makes Turkey one of the countries that are mostly affected by desertification and drought.

Causes of desertification areas in Turkey include soil erosion, misuse of land in semi-arid areas, inappropriate agricultural practices, salinization as a result of wrong irrigation techniques, saline and gypsum-bearing materials and materials that show over alkaline reactions and prevent plant growth, deforestation, excessive grazing and pollution of topsoil. But the main reason for desertification is the growing demand on natural resources and increasing pressures. Generally, 65% of Turkey's surface area has a especially due to degradation of vegetation cover leads to erosion of soil and parent material. Disruption of natural balance primarily through demolition of vegetation cover in these ecologically sensitive areas causes degradation of soil and subsequently parent material.

F.6.2.1. Combating with Desertification in Turkey

Conservation of soil and water resources in Turkey started in the first years of the Republic by being aware of the sensitivity of the country to desertification and drought. And these works gained momentum after Turkey became an official party to EU Convention to Combat Desertification in 1998, and the works on preparing the "National Action Programme to Combat Desertification", which was a means for implementation of the convention and a major document related to reporting activities pursuant to the convention, accelerated. The Action Programme entered into force upon a Circular published in the Official Gazette dated 9 March 2005.

The National Action Programme to Combat Desertification was an important step towards fighting against desertification. The General Directorate of Combating Desertification and Erosion (GDoCDE) was established under the Ministry of Forestry and Water Affairs after the publication of Decree Law No. 645 dated 04.07.2011 in the Official Gazette. Upon establishment of the directorate, works and coordination for combating desertification on national and international scale started to be done more efficiently.

Also, some works on creating a national monitoring network and database in cooperation with TUBİTAK has started. Sensitive areas to desertification will be identified by assessing the data obtained through this network. The works will focus on these sensitive areas and this will pave the way for a more efficient fight against desertification.

In addition to all these works, a "Work Group to Combat Desertification" was established under the General Directorate of Combating Desertification and Erosion and this group started the activities on determination and monitoring of desertification criteria and indicators and potential desertification areas in cooperation with universities. Activities are conducted within the frame of work plans and work packages.

F.6.2.2. Desertification Sensitive Areas

Desertification, Land Degradation and Drought has been threatening 4 billion hectares of are and 1,5 billion people in 168 countries directly. 12 million hectares of farmland becomes degraded each year. Agricultural production is expected to decrease by 2% in next ten years. 5,2 million hectares of forest area disappears every year. The second cause of immigration is desertification, first being the wars. 10 million people have immigrated in the last 20 years. 25% of carbon emissions that trigger climate change results from land degradation. Thus, it is of great importance to combat desertification and land degradation and it is evident that it will gain more importance in the near future.

"The National Action Programme to Combat Desertification" which has been in effect since 2005 has been revised in concordance with the UN's 10 Year Strategy to Combat Desertification. National Action Plan was prepared with the participation of all related institutions, organizations, non-governmental organizations and universities, and it was integrated with the National Strategy to Combat Desertification that started to be prepared in 2012 and the two documents were united under one document with the title of the "National Strategy and Action Plan to Combat Desertification (2015-2023)".

This document was submitted to Higher Planning Council for a better application and approved by the Council of Ministers through the Decree No. 2015/20 dated 18.06.2015. The National Strategy to Combat Desertification (2015-2023) took effect after being published in the Official Gazette No. 29424 dated 24.07.2015. Moreover, a web based monitoring, assessment and reporting system (http://cmusep.cem.gov.tr) was developed and put into use with the intend of online registration and reporting of the activities by organizations and institutions within the scope of the action plan.

Additionally, the Ministry of Forestry and Water Affairs started the "Project for Improvement of Basin Monitoring and Assessment System" by cooperating with TUBİTAK-BİLGEM in order to monitor desertification on a national scale and determine priority and sensitive areas. Also desertification criteria and indicators were determined within the scope of the project.

At the end of the project, a risk map of Turkey was prepared by determining desertification sensitivity levels of arid (semi-arid, dry sub-humid and humid sub-humid) areas that are sensitive to desertification. Desertification criteria and indicators of Turkey (7 criteria and 48 indicators) have been determined as can be seen on the Table 87.

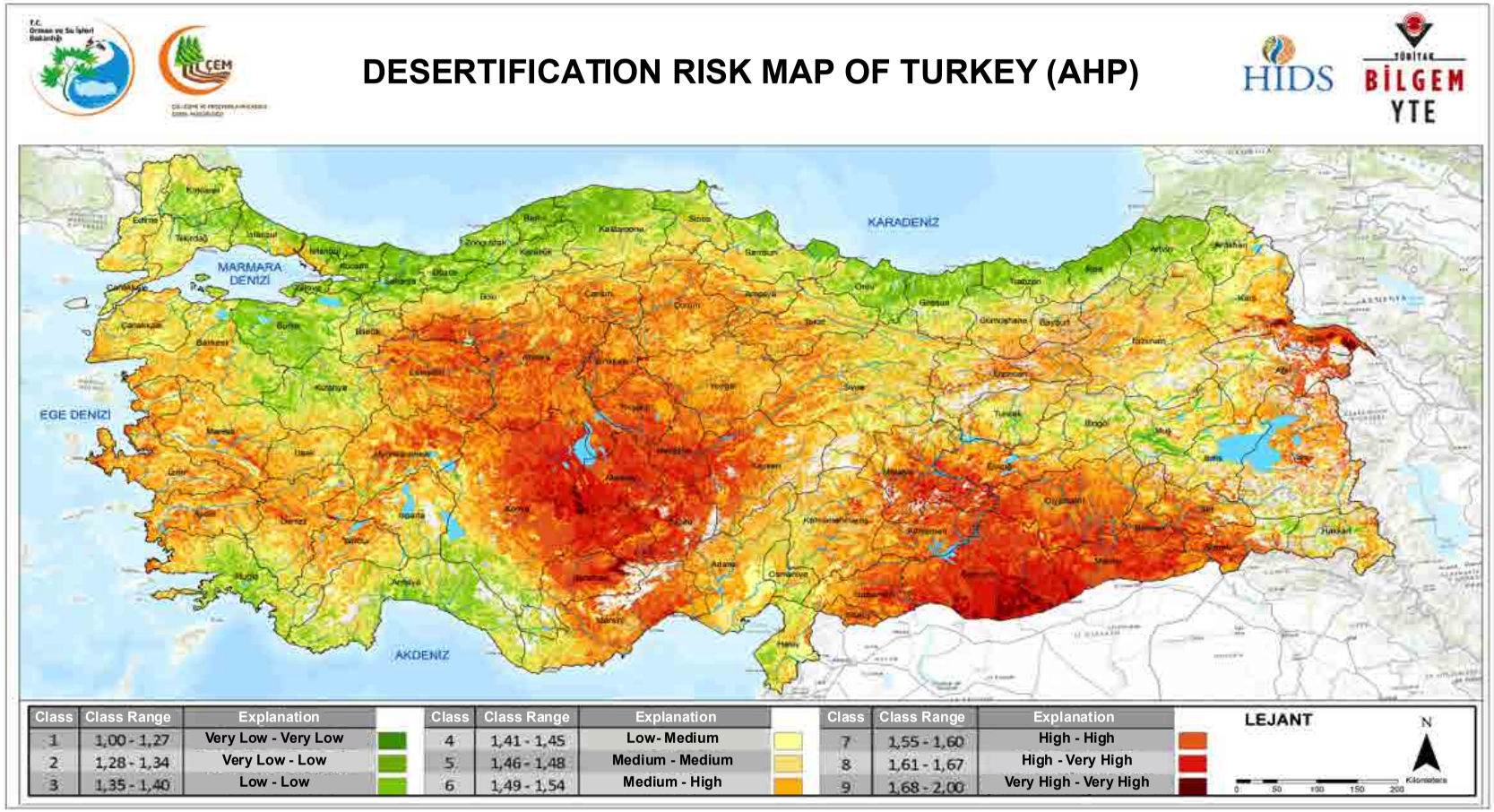
Table 87 - Desertification Criteria and Indicators of Turkey (Ministry of Forestry and Water Affairs, 2016)

	CRITERIA	INDICATORS
1	Climate	10
2	Water	3
3	Soil	10
4	Vegetation and Land Use	2
5	Topography and Geomorphology	6
6	Socio-Economy	7
7	Management	10
	TOTAL	**48**

Within the scope of the works, a GIS based desertification model was prepared and "Desertification Risk Map of Turkey" was prepared by determining the areas sensitive to desertification. The map is provided below as Map 21.

According to Desertification Risk Map of Turkey, nearly 49% of our lands has a desertification risk above medium level.

Calibration and verification works of the Desertification Model and Risk Map of Turkey was carried out in Gediz basin (pilot area) and these works will continue in a way to cover the whole area of Turkey and model and risk map will be updated and improved. It is also aimed to turn Desertification model into a regional project to cover Central Asian, African and Mediterranean countries.



Class	Class Range	Explanation
1	1,00 - 1,27	Very Low - Very Low
2	1,28 - 1,34	Very Low - Low
3	1,35 - 1,40	Low - Low
4	1,41 - 1,45	Low- Medium
5	1,46 - 1,48	Medium - Medium
6	1,49 - 1,54	Medium - High
7	1,55 - 1,60	High - High
8	1,61 - 1,67	High - Very High
9	1,68 - 2,00	Very High - Very High

Map 21 - Desertification Risk Map of Turkey (Ministry of Forestry and Water Affairs, 2016)

F.6.2.3. Document on National Strategy to Combat Desertification

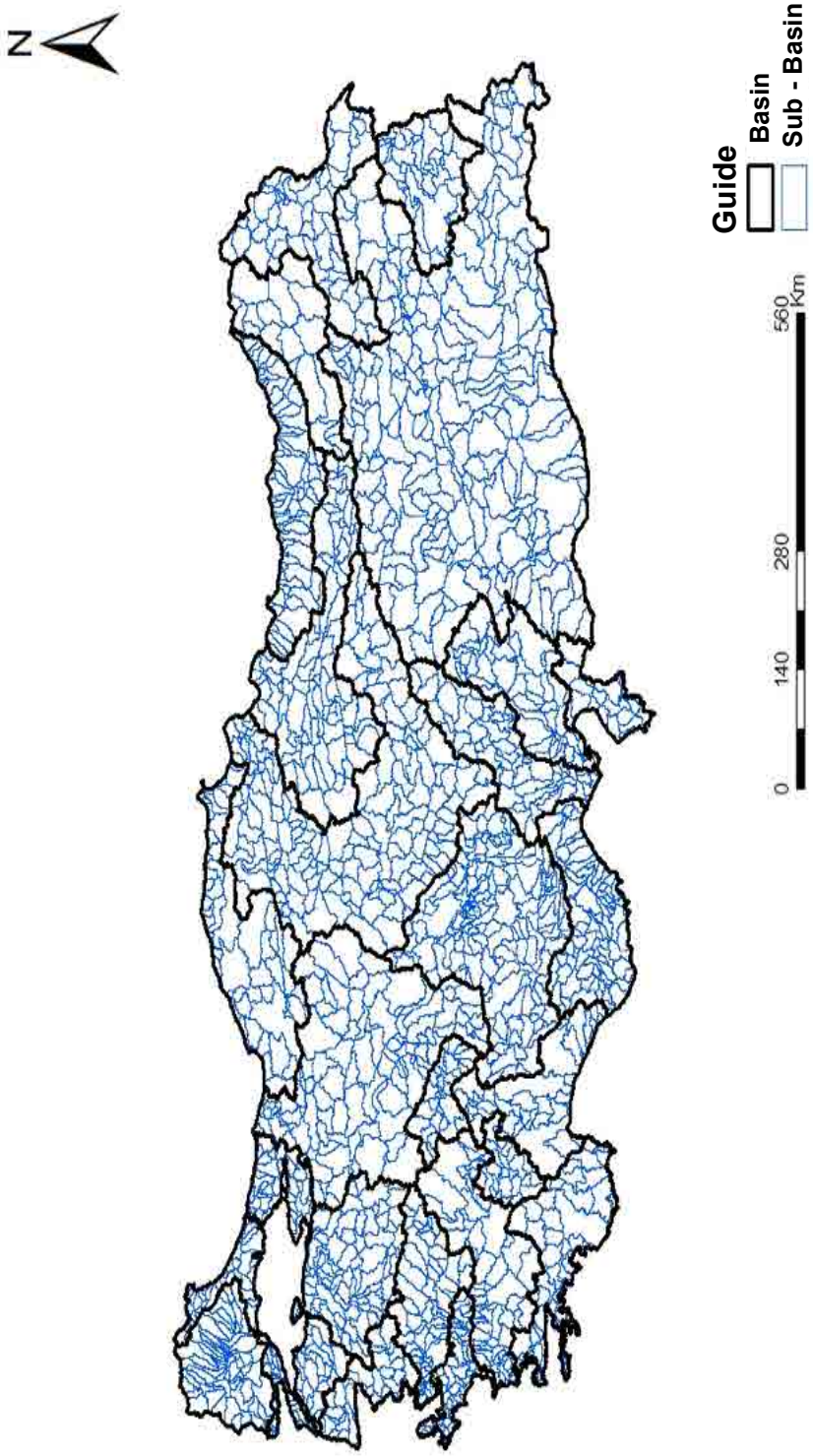
During the 8th parties meeting of the UN Convention to Combat Desertification in 2007, “10 Year Strategy Document” was approved and it was decided that 195 parties of the convention prepare national strategy documents by grounding on this document. Turkey and Spain was asked to be the leader of the other countries within this scope. Turkey prepared its Document on National Strategy to Combat Desertification and vision was determined during the preparation of the document through a participatory process. 4 strategic targets, 9 expected impacts and 12 indicators were stated under the vision. Mission was determined after this process and 7 targeted applications, 23 outputs, 74 actions and 165 indicators were identified.

F.6.3. General Evaluation of Basin Rehabilitation

Basin Rehabilitation consist of activities towards providing a natural balance between land, water and vegetation with a view to improve social, cultural and economic welfare of the people in basins by taking necessary technical, cultural and administrative measures. It is crucial to restore the disturbed balance between land-water-vegetation with the intent of reducing negative effects of climate change and rehabilitate and provide a sustainable management of natural resources. Many state organizations and institutions are liable to carry out activities concerning water basins in Turkey. It is also important to ensure participation of local people and non-governmental organizations and other interest groups to basin rehabilitation activities for a sustainable management of natural resources. Within this purpose, Integrated Basin Rehabilitation Projects that handle ecological, social, cultural and economic dimensions of the matter have been carried out in basins since 1990s with participation of all sectors and all interest groups in the area.

The most important ones of these projects are;

- Eastern Anatolia Water Basins Rehabilitation Project 1993-2001)
- Anatolian Water Basins Rehabilitation Project (2005-2011)
- Çoruh River Basin Rehabilitation Project (2012-2019)
- Murat River Basin Rehabilitation Project (2012-2018)
- Closed Basin of Konya, Başlamışlı Kocadere Integrated Rehabilitation Project (2015-2019)
- Upper Göksu Basin Sazak Afşar Integrated Rehabilitation Project (2015-2019)
- Upper Göksu Basin Gökdere Integrated Rehabilitation Project (2014-2018)
- Upper Göksu Basin Bağbaşı Integrated Rehabilitation Project (2016-2020)
- Akarçay Basin Hüseyinli Belenyurdu Integrated Rehabilitation Project (2015-2019)
- Akarçay Basin Şuhut Integrated Rehabilitation Project (2016-2020)



Map 22 - Basins and sub-basins in Turkey (Ministry of Forestry and Water Affairs, 2016)

F.6.3.1. National Basin Management Strategy (2014-2023)

National Basin Management Strategy was put into force with a decree of Higher Planning Council dated 13.06.2014 with a view to provide a guide for works on providing sustainability and sufficiency of ecological, economic and social benefits and services of water basins.

F.6.3.2. Basin Monitoring and Assessment System

By ensuring an effective use of natural resources and sustainable basin management and establishing a monitoring system through which obtained data can be monitored in coordination with the organizations operating in the basins, it is expected to reduce monitoring costs, take necessary measures thanks to rapid and updated monitoring, ensure successful investments thanks to the effective monitoring of the projects carried out in the basins, provide a balanced use and protection of natural resources. Feasibility reports regarding improvement of Basin Monitoring and Assessment System has been prepared, necessary criteria and indicators for monitoring have been determined, and modelling works for components of “soil erosion and mass movements”, “floods”, “desertification”, “sustainable forest management” and “land use” are still under progress.

F.7. Legislative Regulations

F.7.1. Legislative Regulations on Conservation of Natural Properties

Laws

a. Decree Law No. 644 on the Organization and Functions of the Ministry of Environment and Urbanisation
b. Decree Law No. 383 on the Establishment of an Environmental Protection Institution
c. Law No. 3194 on Land Development Planning and Control
d. Law No. 2863 on the Conservation of Cultural and Natural Property
e. Environmental Law No. 2872
f. Coastal Law No. 3621

International Conventions

1. Convention for the Protection of the Mediterranean Sea against Pollution
2. Protocol on Specially Protected Area in Mediterranean Sea and Biodiversity

By Laws

1. By Law on Establishment and Working Principles of Commissions for Protecting Natural Assets (Official Gazette No. 28088 dated 18.10.2011)
2. By Law on Plans to be implemented in Protected Areas (Official Gazette No. 28242 dated 23.03.2012)
3. By Law on Procedures and Principles Relative to Determination, Registration and Confirmation of Protected Areas (Official Gazette No. 28358 dated 19.07.2012)
4. By Law on Management of Natural Properties, Natural Protected Area and Specially Protected Areas that are Fully Owned by the State (Official Gazette No. 28635 dated 02.05.2013)
5. By Law on Exchanging Immovable Properties in Areas of Natural Heritage, Natural Protected Areas and Specially Protected Areas with Immovable Properties Owned by the Ministry of Treasury (Official Gazette No. 28727 dated 03.08.2013).

Circulars

1. Circular regarding Activities of Regional Commission for Conserving Natural Heritage (2011/17).
2. Circular regarding Analyzing and Completing Plans for Protected Areas (2014/23).
3. Circular on Implementation of Adequate Pay Procedures (2014/21)

Resolutions

1. Resolution regarding Structures to be built in residential Hamlets, Villages and Neighborhoods of Natural Protected Areas (Official Gazette No. 28329 dated 20.06.2012).
2. Resolution on Conservation and Utilization Procedures regarding Caves (Official Gazette No. 28596 dated 23.03.2013)

3. Resolution regarding Structures that are Imperative for Security and Safety of the State (Official Gazette No. 28721 dated 28.07.2013)
4. Preparation of Pre-Assessment Reports and Ecology-Based Scientific Research Reports in concordance with Technical Procedures regarding Assessment of Natural Protected Areas (No. 28899 dated 31.01.2014)
5. Resolution regarding Implementation of Planned Hydroelectric Power Plant Projects in Natural Protected Areas (No. 29086 dated 12.08.2014)

Protocols;
1. Protocol with the Ministry of Culture and Tourism regarding the principles to be applied in areas where Natural Protected Areas and areas of Cultural Heritage overlap with interaction-transitional areas (01.10.2012).

2. Protocol, with the General Directorate of Mineral Research and Exploration, regarding exploration, determination, registration and management of natural caves defined as natural property and geological areas regarded as natural protected areas. (14.02.2014)

Ministerial Consent;
Technical Principles regarding Assessment of Natural Protected Areas (2013)

F.7.2. Legislative Regulations Regarding Nature Protection

F.7.2.1. International Conventions

Conventions acceded by Turkey have the force of law and are a part of national legislation. International conventions regarding conservation of the environment and biodiversity acceded by Turkey are as follows:

- UN Convention on Biological Diversity (CBD) (1997) and the Cartagena Protocol on Biosafety (2004)
- UN Convention to Combat Desertification (CCD) (1998)
- Convention on Wetlands of International Importance especially as Waterfowl Habitat (RAMSAR) (1994)
- Convention on International Trade in Endangered Species (CITES) (1996)
- Convention Concerning the Protection of the World Cultural and Natural Heritage (1983)
- International Convention for the Prevention of Pollution from Ships (1990) (MARPOL)
- International Treaty on Plant Genetic Resources for Food and Agriculture (2006)
- Berne Convention on the Conservation of European Wildlife and Natural Habitats (BERNE) (1984)
- European Landscape Convention (2001)
- Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention) (1981) and Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (1988) including annexed protocols.
- Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention) (1994)
- The Black Sea Biodiversity and Landscape Conservation Protocol (2004) including annexed protocols.

F.7.2.2. National strategies, plans and programmes concerning the environment

- National Environmental Action Plan (1998),
- National Plan for In-situ Conservation of Plant Genetic Diversity (1998),
- National Biodiversity Strategy and Action Plan (2001),
- National Agenda 21 Program (2001),
- National Strategy for Wetlands(2003),
- Turkish National Forestry Program (2004),
- National Science and Technology Policies 2003-2023 Strategy Document (2004),
- Turkish National Program to Combat Desertification (2005),
- National Environmental Strategy (2006),
- National Rural Development Strategy (2006).

F.7.2.3. Laws and By Laws regarding Nature Conservation and Biodiversity

Fundamental principles regarding protection and improvement of the environment and preventing the environmental pollution are designated and ruled by the Environmental Law No. 2872 dated 09.08.1883 which aims at protection of the environment, the common property of al living creatures, in accordance with the principles of sustainable environment and sustainable development. Within the scope of the Law No. 5491 dated 26.04.2006 on amending the Environmental Law No. 2872, importance of conserving biodiversity is stated in Article 6 and the article designates the penal sanctions for the acts of doing harm to the environment and biodiversity if determined through inspections and controls. Rules on prevention of environmental pollution and environmental impact assessment are defined by By Laws issued under the Environmental Law.

Laws and By Laws regarding conservation of species and areas in Turkey are as follows:

1. Law on National Parks (2873 – 09 August 1983):
2. Law on the Conservation of Cultural and Natural Property (2863 – 23 July 1983)
3. Decree Law regarding Establishment of the Environmental Protection Agency for Special Areas (383 – 19 October 1989)
4. Law on Land Hunting (4915- 01 July 2003)
5. Fishery Law (1380-04 April 1971)
6. Forestry Law (6831-31 August 1956)
7. Law on Animal Protection (5199- 24 June 2004)
8. By Law on Implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
9. By Law on Conservation of Wetlands
10. By Law on Extracting, Producing and Exporting Natural Flower Bulbs
11. By Law on Beekeeping
12. By Law on National Parks

Although By Laws on conservation of species and areas also apply for conservation of genetic resources, there are also special By Laws regarding conservation of genetic resources by the Ministry of Food, Agriculture and Livestock. These include:

1. By Law regarding Collection, Conservation and Utilization of Plant Genetic Resources
2. By Law on Conservation of Animal Gene Resources
3. Law on Animal Improvement (4631-28 February 2001)
4. Law on the Protection of Breeder's Rights for New Plant Varieties (5042-08 January 2004)
5. Law on Seed Growing (5553-31 October 2006)

Application and permit procedures of foreign researchers who wish to carry out researches in Turkey are determined by the "Principles Pertaining to Foreigners, or those Applying on their Behalf, Wishing to Do Scientific Research, Study, or Film Making in Turkey, As Well As to Members of the Foreign Press" that entered in force with Decree No. 88/12839 dated 4 April 1988 of the Council of Ministers.

The laws and By Laws that aim to contribute to sustainable use of biodiversity and designate principles for management of the resources in use are as follows:

1. Forest Law (6831-31 June 1956)
2. Pastures Law (4342-25 February 1998) and By Law on Pastures
3. Coastal Law (3621/3830-04 April 1990)
4. Agriculture Law (5488-18 April 2006)
5. Law on Soil Conservation and Land Use (5403-03 July 2005)
6. Law on National Afforestation and Erosion Control Mobilization (4122-23 July 1995) and By Law on Afforestation
7. Law on Organic Agricultural (5262-01.12.2004) and By Law
8. By Law regarding Good Agricultural Practices
9. By Law on Conservation and Utilization of Farmlands

Some of the major laws that regulate border control, for both health and conservation purposes, of species to be exported from Turkey or imported to Turkey include: the Law No. 6968 on Agricultural Pest Control and Agricultural Quarantine dated 15 May 1857 and the Law No. 3285 on Livestock Health dated 08 May 1986. Besides them, the Anti-Smuggling Law No. 5607 dated 19 July 2003 in force since 1932 and revised in 2003, and the Customs Law No. 4458 dated 27 October 1999 also regulate border controls.

The Draft of the Law on Conserving Nature and Biodiversity has been prepared and waiting for enactment.

F.8. Forest and Nature Conservation Policies and Developments

F.8.1. Forest Conservation

Forest improvement, forest enhancement and forest establishment works (forestation, combating erosion, improving degraded forest areas, special forestation and artificial regeneration etc.) were carried out in 8.131.988 ha of area by the Ministry of Forestry and Water Affairs from beginning to the end of 2015 and 4.445.923 ha of this was carried out in the last 13 years from 2003 to 2015.

Table 88 – Forest Conservation Activities in Turkey (General Directorate of Forestry, 2016)

ACTIVITIES	YEARS	AREA OF ACTIVITY (hectares)
Forestation	1946-2015	2.289.843
Erosion Control (Including avalanche)	1962-2015	1.261.523
Rehabilitation	1998-2015	2.793.708
Pastures Improvement	1962-2015	201.980
Special Forestation	1986-2015	130.553
Artificial Regeneration	1973-2015	831.503
Energy Forest Creation	1978-2005	622.878
TOTAL		**8.131.988**

Aims of the General Directorate of Forestry for 2023 include:

- Increasing the area of forests from 28,6% to 30%,
- Increasing rate of special forest areas from 1% of the total forest area of Turkey to 5% through special afforestation,
- Maintaining the world ranking of Turkey (3rd) concerning afforestation and erosion control,
- Reducing the amount of sediment removed by erosion to 150 million tons/year,
- Entering in the list of top 7 countries in the world in forest seedling and ornamental plant sectors,
- Increasing the amount of carbon absorbed by forest areas from 15 million tons/year to 20 million tons/year by means of afforestation and erosion control activities within the process of combating with climate change,
- Creating green belt forests around 81 provinces and 750 districts with a population over 5.000.

F.8.2. Nature Conservation Policies

Nature conservation were given importance after the first years of the Republic in Turkey. Declaration of the first National Park in 1958 when environmental problems were not experienced intensely yet, reflects a radical nature conservation approach. After 1970s when human pressure on the environment started to increase in Turkey and the world, nature conservation policies started to be institutionalized in Turkey.

Turkey's attempts to become a party to international conventions on conserving biodiversity reflects its nature protection policy.

Activities towards conservation, improvement and increasing the economic value of biodiversity of Turkey were given priority in the 9th Development Plan for 2007-2013.

F.8.3. Works on Conservation of Natural Heritage

Investments and projects are carried out in Natural Heritage Areas, Natural Protected Areas and Specially Protected Areas with a view to solve environmental problems and pass down the environmental values to next generations.

"Ecologically Based Scientific Research Projects" for four seasons have been implemented in our country with the purpose of preserving natural protected areas, maintaining them for future generations, determining bio-ecological (flora, fauna, habitat), geological, hydrogeological and geomorphological features of the areas under the light of scientific criteria and revealing the recommendations.

Biodiversity Research Projects have been carried out by the General Directorate for Protection of Natural Assets in Specially Protected Areas and marine and terrestrial areas.

Conservation and monitoring activities have been carried out for populations of sea turtles and fished in Göksu Delta, Köyceğiz-Dalyan, Fethiye-Göcek, Patara, Belek and Kaş-Kekova Specially Protected Areas within the scope of the Project for Conservation of Endangered Species and Habitats.

Management plans have been prepared for specially protected areas and permit and operation procedures have been implemented for state-owned areas.

Natural Protected Areas Management System was established in order to present current conditions of natural protected areas, registering numeric data of the areas into digital media and identify their borders. Within the scope of this project, inventory of SPAs, natural protected areas and natural heritage was transferred into digital media. The main aim of the project is to provide a service for public so that people can learn online whether their immovable properties overlap with natural protected areas, without applying to public institutions.

Municipalities of the protected areas are supported through the budged allocated for investments and investment areas include:

- Sewerage,
- Domestic Water,
- Wastewater Treatment Plant,
- Organized Solid Waste Storage Facility,
- Geological and Geotechnical investigation reports,
- Preparing Territorial Plans and Land Development Plans,
- Preparing Maps and Subdivision Plan

F.8.4. Membership to International and Regional Organizations

Turkey, as a member of UN, is a member of many organizations under UN such as UNEP and FAO and organizations under them such as International Commission for Plant Genetic Resources. Other than these, Turkey is the member of international organizations including International Plant Genetic Resources Institute (IPGRI, Italy), International Center for Agricultural Research in the Dry Areas (ICARDA), The International Union of Forest Research Organizations (IUFRO), and regional formations including European Forest Genetic Resources Programme (EUFORGEN) and The European Cooperative Programme for Plant Genetic Resources (ECPGR).

National Programme of Turkey for the Adoption of the EU Acquis was prepared on 19 March 2001 following the official approval of Accession Partnership Document by EU Council on 8 March 2001. National Environmental Strategy (NES) was completed in 2006 on the purpose of aligning with EU Environmental Acquis and ensuring an effective implementation of the legislation. It is aimed with NES to strengthen nature conservation system in order to ensure conservation of biodiversity by nature conservation sector, sustainable use of biodiversity, and preventing loss of biodiversity.

F.9. Conclusion and Evaluation

Turkey has been one of the few countries that increase its forest area while forests are continuously disappearing in the world. While its forest area was 20.8 million hectares in 2002, this number reached to 22.3 million hectares at the end of 2015. In the last 13 years, 1.500.000 hectares of new forest area has been created. Although 28,6% of Turkey's surface area is covered with forests, 43% of this forests needs improvement. Our main aim is to increase the rate of forest areas from 28,6% to 30% (23 million hectares) until 2023 which is the 100th anniversary of the foundation of the Republic.

SOURCES

- Ministry of Environment and Urbanisation - General Directorate for Protection of Natural Assets
- Ministry of Food, Agriculture and Livestock
- Ministry of Forestry and Water Affairs - Directorate of Nature Conservation and National Parks
- Ministry of Forestry and Water Affairs - General Directorate of Combating Desertification and Erosion
- General Directorate of Forestry
- National Biodiversity Strategy and Action Plan, Directorate of Nature Conservation and National Parks, 2007
- UYSAL. İ. and BOZ. B., 2015, the most Dangerous Invasive Foreign Species in Turkey, Publication of the Ministry of Forestry and Water Affairs, ANKARA
- Wetlands, 2013, Ministry of Forestry and Water Affairs, Directorate of Nature Conservation and National Parks
- Important Wetlands in Turkey - Ramsar Areas, 2013, Ministry of Forestry and Water Affairs, Directorate of Nature Conservation and National Parks
- List of Plants in Turkey 2012
- Biodiversity Monitoring and Assessment Report 2012

G. LAND USE

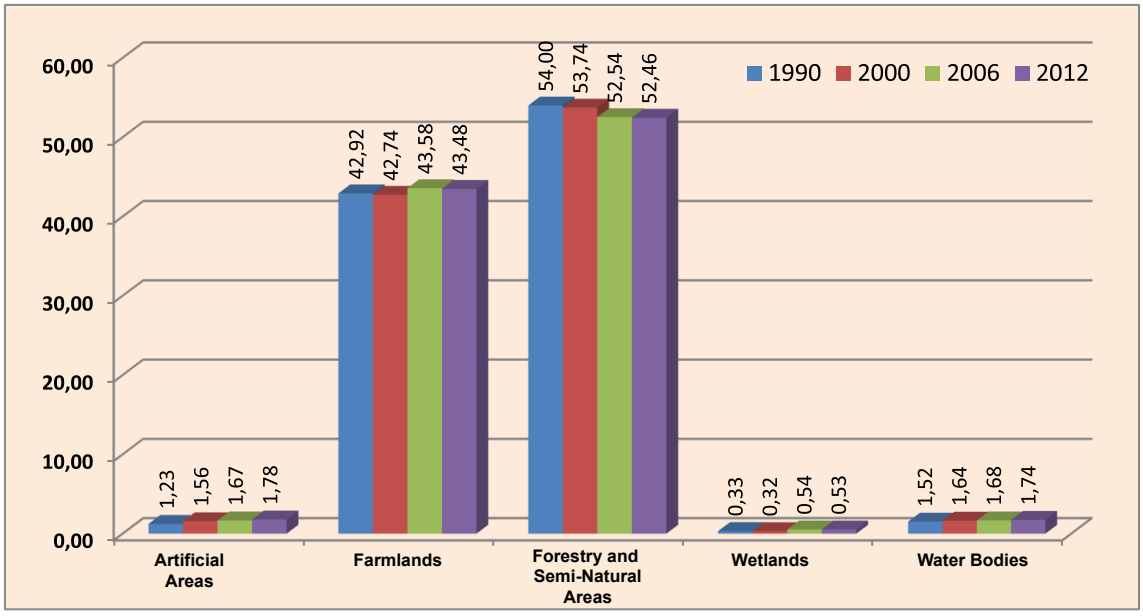
G. LAND USE

Land cover concept is often used in the definition of land use. But these two concepts are synonymous. Land cover means vegetation cover and manmade structures on the earth. However, land use defines human activities concerning the land. The concept of land use is used in two connected meanings. Instead of appropriateness and potential use of the land, these meanings are related to types of land cover and real use of the land.

Land cover term is related with the characteristics over the worlds. Farmlands, lakes, forests and highways are all examples of land cover. However, land use term is retiled to human activity on a specific land area and its economic function.

G.1. Data on Land Use

According to CORINE data of 2012, 43,48% of the surface area of Turkey consists of farmlands, 52,46% consists of forests and semi-natural areas and it can be stated that nearly 96% of the country is natural environment.



Graph 45 – Land use status in Turkey (%), (Ministry of Forestry and Water Affairs, 2016)

Table 89 – Distribution of Land Use in Turkey (Ministry of Forestry and Water Affairs, 2016)

	Corine 1990		Corine 2000		Corine 2006		Corine 2012	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Artificial Areas	961.724,59	1,23	1.217.493,26	1,56	1.300.588,84	1,67	1.387.481,66	1,78
Farmlands	33.478.544,99	42,92	33.341.808,77	42,74	33.994.416,04	43,58	33.904.488,06	43,48
Forests and Semi-Natural Areas	42.124.433,32	54,00	41.919.963,87	53,74	40.983.777,20	52,54	40.907.562,23	52,46
Wetlands	255.345,31	0,33	246.681,64	0,32	417.436,77	0,54	415.839,22	0,53
Bodies of Water	1.183.949,27	1,52	1.280.398,32	1,64	1.309.079,21	1,68	1.357.310,03	1,74
TOTAL	**78.003.997,48**	**100,00**	**78.006.345,85**	**100,00**	**78.005.298,06**	**100,00**	**77.972.681,19**	**100,00**

G.2. Spatial Planning

Spatial Planning is the planning of land use by various sectors (housing, industry, agriculture, tourism, transportation etc.) on specific scales by deciding where and how the land will be used and by considering the infrastructure needs concerning land use.

In Turkey, Territorial Plan, which is an important component of spatial planning and designate the sub-scale plans, are prepared and implemented by the Ministry of Environment and Urbanisation pursuant to its liabilities stated in the Decree Law No. 644 on the establishment and functions of the Ministry of Environment and Urbanisation.

NATIONAL SPATIAL STRATEGY PLANS
(Ministry of Environment and Urbanization)

TERRITORIAL PLAN
(Ministry of Environment and Urbanization, Metropolitan Municipalities)

MASTER DEVELOPMENT PLAN
(Provincial Special Administrations, Municipalities)

IMPLEMENTARY DEVELOPMENT PLANS
(Provincial Special Administrations, Municipalities)

Figure 5 –Levels of spatial planning under the legislation in Turkey

Additionally, borders of the metropolitan municipalities have been defined as borders of the provinces and the authority to prepare Territorial Plan in metropolitan municipalities has been delegated to Metropolitan Municipalities pursuant to the "Law No. 6360 regarding the Establishment of Fourteen Metropolitan Municipalities and Twenty-Seven Districts and Amendments at Certain Law and Decree Laws"

G.2.1. Territorial Plan

Territorial Plans are approved in accordance with the procedures and principles stated in the By Law on Spatial Planning published in the Official Gazette No. 29030 dated 14/06/2014.

Territorial Plan is an upper scale plan that designates different/all kinds of land use purposes such as residential areas, housing, industry, agriculture, tourism, transportation etc. in accordance with national and regional plans.

Environmental Plans are crucial in terms of filling the deficiency of upper scale plans from past to present, eliminating the problems resulting from rapid and uncontrolled Urbanisation and from divisional and sectoral planning, ensuring a controlled development and sustainability of Urbanisation and industry, preventing any intervention that may disturb natural balance and threaten natural resources, protecting the environment and preventing environmental pollution before it happens.

It is aimed with Territorial Plans to;

- Determine policies and strategies regarding conservation and development,
- Prevent unorganized Urbanisation and industrialization and manage urban and rural developments (social, economic and spatial) in a healthy way,
- Conservation of sensitive areas and environmental values (coastal areas, forests, domestic water basins, natural, cultural and historical heritage),

- Prevent misuse of farmlands
- Develop policies, strategies and land use decisions for sub-scale plans.

Territorial Plans are prepared by the Ministry of Environment and Urbanisation by adopting the approaches of;

- Sustainable Environment and Sustainable Development
- Conservation of natural, historical and cultural environmental values,
- Prevention of environmental pollution
- Development as a whole (technical infrastructure solutions),
- Participation and transparency,
- Benefiting from technology,

and produces updatable and applicable plans that are inquirable through database in a disciplined way by using environmental inventory, satellite images and geographical information systems (GIS) technology.

In the process of preparing Territorial Plans;

1- All social, economic and natural data that will form the basis for planning is obtained; potentials, problems and resources of planning areas are determined; sectoral and demographical analysis are carried out, ecologically sensitive areas are determined through risk analysis and synthesis map sheets are prepared (Analysis and Synthesis)

- Comparable,
- Assessable,
- Inquirable,
- Improvable,
- Updatable,
- Standard

database is created by using geographical information system and present data and data from land elevation models, satellite images and field survey.

Figure 6 – Staellite Image

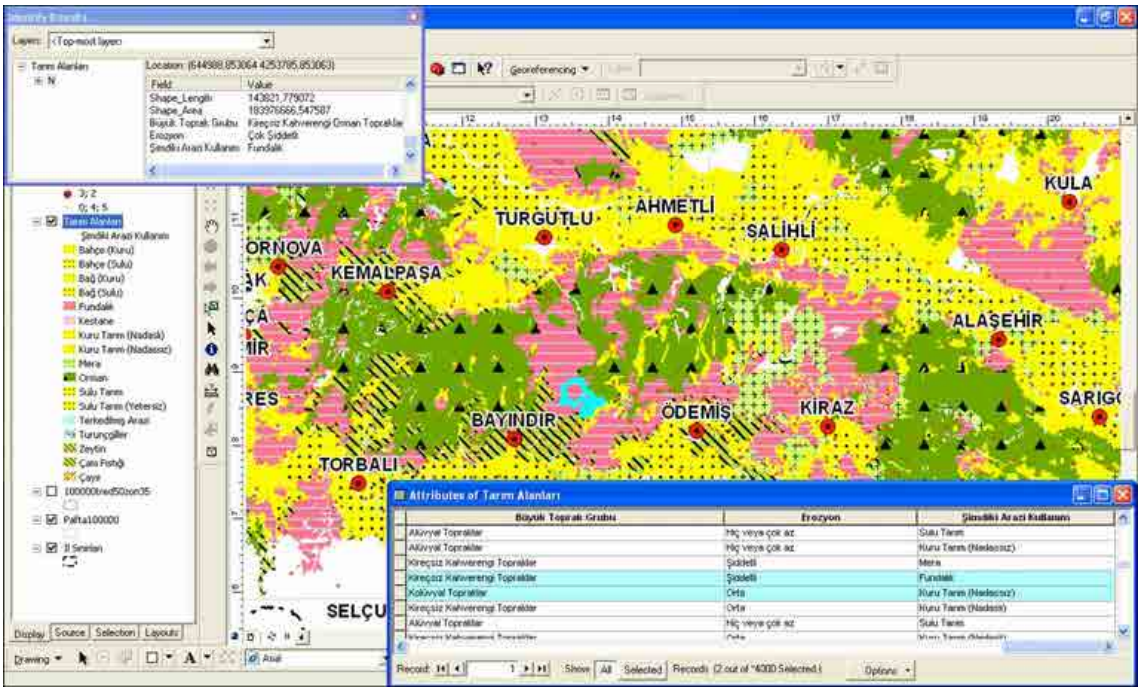


Figure 7 - GIS / Geographical database model

2- Development scenarios and general land use decisions in this direction are made by preparing plan alternatives.

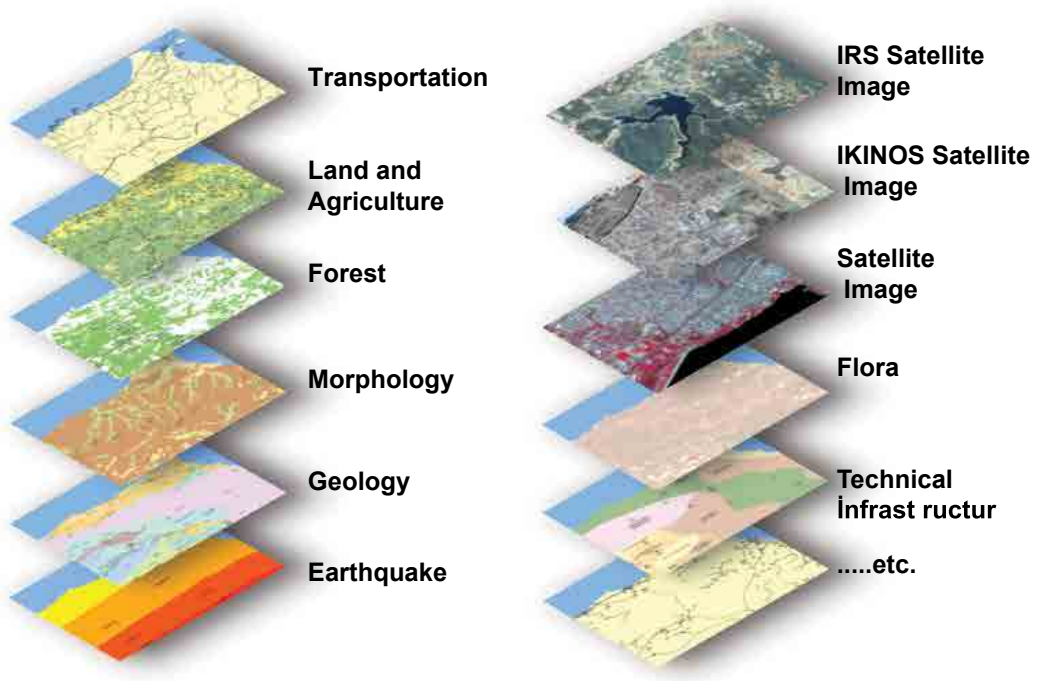


Figure 8 – Geographical information layers.

3-The final version of the Territorial Plan prepared at the end of all these stages include:

- Accepted population and sectoral projections (Target year: 20 years);

and,

- Land use for urban purposes, (Urbanisation areas, urban development areas, industry, storage areas, non-domestic urban activity areas)

- Rural residential areas and utilization decisions,
- Tourism areas and utilization decisions in line with area potentials

that will be needed according to existing population and accepted population;
and

- Transportation (land transport, railway transport, maritime transport elements)
- Education
- Energy
- Land use decisions and strategies regarding waste treatment and waters

that have been determined within the frame of investments by related institutions and will be needed during implementation of the plan;
and,

- Farmlands,
- Forest Areas,
- Military Zones,
- Natural Protected Areas,
- Areas of Domestic Water Conservation Belts and utilization decisions pursuant to related laws

that are determined in the light of the data from related institutions;
and areas that are determined under special laws:

- National Parks,
- Nature Conservation Areas,
- Wildlife improvement areas,
- Tourism protection and improvement areas and directions to related laws and plans/projects.

4- Territorial Plan is an upper scale physical plan on which glimpsers can see areas that haven't gained a natural/ecological conservation status but expected to gain these status and the decisions on these areas.

5- The Map sheets that show the decisions on reflection of determined policies, strategies and scenarios on space, Plan Explanation Reports in which plan scenario, land use and land distribution are explained by justifications within the frame of strategies and policies, and Plan Provisions that define implementation of the plan and state land use decisions and structuring conditions make up of the Territorial Plan as a whole.

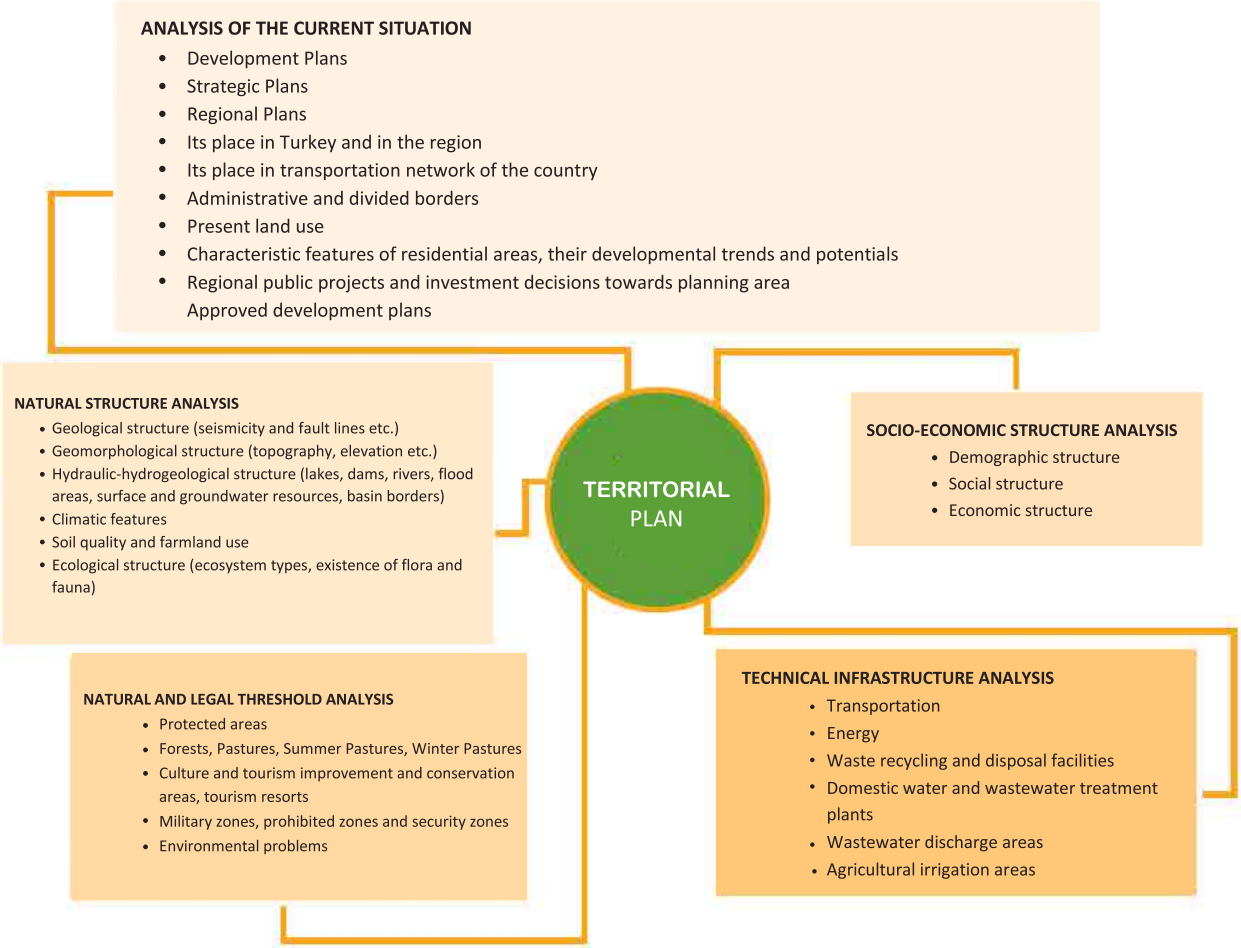


Figure 9 – Analysis and Synthesis Process

G.2.1.1. Countrywide Environment Plans

1/100.000 Scale Territorial Plans were approved for 19 planning areas (61 provinces) and Amasya province by the Ministry of Environment and Urbanisation between 2005 and 2015. These provinces are provided below.

- Adıyaman-Şanlıurfa-Diyarbakır Planning Area 1/100.000 Scale Territorial Plan
- Antalya-Burdur-Isparta Planning Area 1/100.000 Scale Territorial Plan
- Ardahan-Kars-Iğdır-Ağrı 1/100.000 Scale Territorial Plan
- Aydın-Muğla-Denizli Planning Area 1/100.000 Scale Territorial Plan
- Antalya-Burdur-Isparta Planning Area 1/100.000 Scale Territorial Plan
- Aydın-Muğla-Denizli Planning Area 1/100.000 Scale Territorial Plan
- Balıkesir-Çanakkale Planning Area /100.000 Scale Territorial Plan
- Erzurum-Erzincan-Bayburt Planning Area 1/100.000 Scale Territorial Plan
- İzmir-Manisa Planning Area 1/100.000 Scale Territorial Plan
- Kırşehir-Nevşehir-Niğde-Aksaray Planning Area 1/100.000 Scale Territorial Plan
- Konya-Karaman Planning Area 1/100.000 Scale Territorial Plan

Map 23 - Territorial Plans over the country (Ministry of Environment and Urbanisation, 2016)

- Malatya-Elazığ-Bingöl-Tunceli Planning Area 1/100.000 Scale Territorial Plan
- Mardin-Batman-Siirt-Şırnak-Hakkâri Planning Area 1/100.000 Scale Territorial Plan
- Mersin-Adana Planning Area 1/100.000 Scale Territorial Plan
- Muş-Bitlis-Van Planning Area 1/100.000 Scale Territorial Plan
- Ordu-Trabzon-Rize-Giresun-Gümüşhane-Artvin Planning Area 1/100.000 Scale Territorial Plan
- Tekirdağ-Kırklareli-Edirne (Lower Part of Trakya Ergene Basin) Planning Area 1/100.000 Scale Territorial Plan
- Yozgat-Sivas-Kayseri Planning Area 1/100.000 Scale Territorial Plan
- Zonguldak-Bartın-Karabük Planning Area 1/100.000 Scale Territorial Plan

Also it is expected to complete 1/100.000 Scale Territorial Plan (started in July 2014) for Afyon-Uşak-Kütahya Planning Area in the first half of 2016.

1/100.000 Scale Territorial Plans prepared by the Ministry of Environment and Urbanisation are published on the website of the General Directorate for Spatial Planning at http://www.csb.gov.tr.

Today, 97% of Territorial Plans that form the basis for development, land use and sub-scale activities have been completed countrywide. All of the Territorial Plans (100%) will have been prepared countrywide after revision works of a region including 3 provinces provincial, Territorial Plan for Kilis and Territorial Plan for Ankara by the Metropolitan Municipality are completed in line with 2023 vision of the Ministry of Environment and Urbanisation.

G.3. Legislative Regulations and Developments about Land Use

The Law No. 3194 on Land Development Planning and Control entered into force in 1985 and it is a general and fundamental law that includes provisions on land use. The Law designates procedures and principles on land development activities of mapping, planning, development activities, license, occupancy permit, inspection, penalty etc.

The Coastal Law no 3621 was enacted with the aim of protecting seas, natural and artificial lakes and rivers and their coastal areas which are parts of these areas by considering their natural and cultural features, and with the aim of using them for the benefit of society and defining the principles of this process.

The By Law on Spatial Planning entered into force in July 2014 and the aim of the By Law is to protect and improve physical, natural, historical and cultural values, provide a balance between conservation and utilization and support sustainable development on national, regional and provincial scale, and it also designates procedures and principles regarding preparation of spatial plans that are prepared with the intend of providing healthy and safe environments and bringing decisions on structuring.

The By Law on implementation of Coastal Law No. 3621 includes provisions on coasts of seas, natural and artificial lakes and river banks and coastal lines, means and conditions for benefiting from these areas for the benefit of society, principles of planning and structuring on the coastal areas and coastal lines, principles on land recovery and utilization through land filling and draining swamps, organization, functions and authority of the commission for determination of coastal border lines ,and principles on implementation of the Coastal Law.

SOURCES

- Ministry of Environment and Urbanisation – General Directorate for Spatial Planning
- Ministry of Forestry and Water Affairs - Information Processing Department
- General Directorate of Forestry

H. ORGANIZATIONAL STRUCTURE AND ACTIVITIES OF THE MINISTRY OF ENVIRONMENT AND URBANISATION

H. ORGANIZATIONAL STRUCTURE AND ACTIVITIES OF THE MINISTRY OF ENVIRONMENT AND URBANISATION

H.1. Organizational Structure

The concepts of environmental protection and environmentalism has gained more importance as environmental pollution has exceeded the national border, it has reached to a level that threatens future and people have become aware that natural resources are limited.

The topic of protecting the environment and natural balance has remained on the agenda of Turkey since 1970s.

The increase in environmental problems over the world forced the nations to take action and the first Conference on the Human Environment took place in 1972 in Stockholm with participation of 113 countries. The most important feature of the conference was that it was the first environmental conference attended by various countries that were different from one another in terms of economic development, social, cultural and political structures.

Turkey started to build up ınstitutional and legal structures in response to the developments after the Stockholm Conference. Within this scope, a department for environmental problems was established under the Ministry of Development and Housing.

"Environmental Problems Coordination Committee" including 8 Ministers was established in 1974. "Environmental Research Coordination Department" was established under TÜBİTAK in 1976.

"Environmental Organization of the Prime Ministry" was established under the Ministry of State in 1978. This organization was made up of the "Undersecretariat of Environment" and the "Higher Board of Environment".

Activities on prevention of environmental pollution was included in the 4th 5-year Development plan prepared in 1979 and the Undersecretariat of Environment was established under the Ministry. The undersecretariat was responsible for developing environmental policies, conducting inspections and providing coordination between national and international institutions.

As is known, Article 56 of the Constitution of The Republic of Turkey states that "Everyone has the right to live in a healthy and balanced environment. It is the duty of the State and citizens to improve the natural environment, to protect the environmental health and to prevent environmental pollution". "The Right to a Healthy Environment" was first guaranteed by constitution through this article. The Environmental Law No. 2872 dated 09.08.1983 that took effect in 1983 also imposed duties of taking part in environmental protection and improvement on both state and the citizens.

With an administrative By Law in 1983, the institution that had been established in 1978 was abrogated and General Directorate of Environment was established instead (Decree Law No. 222 in the Official Gazette dated 08.06.1983)

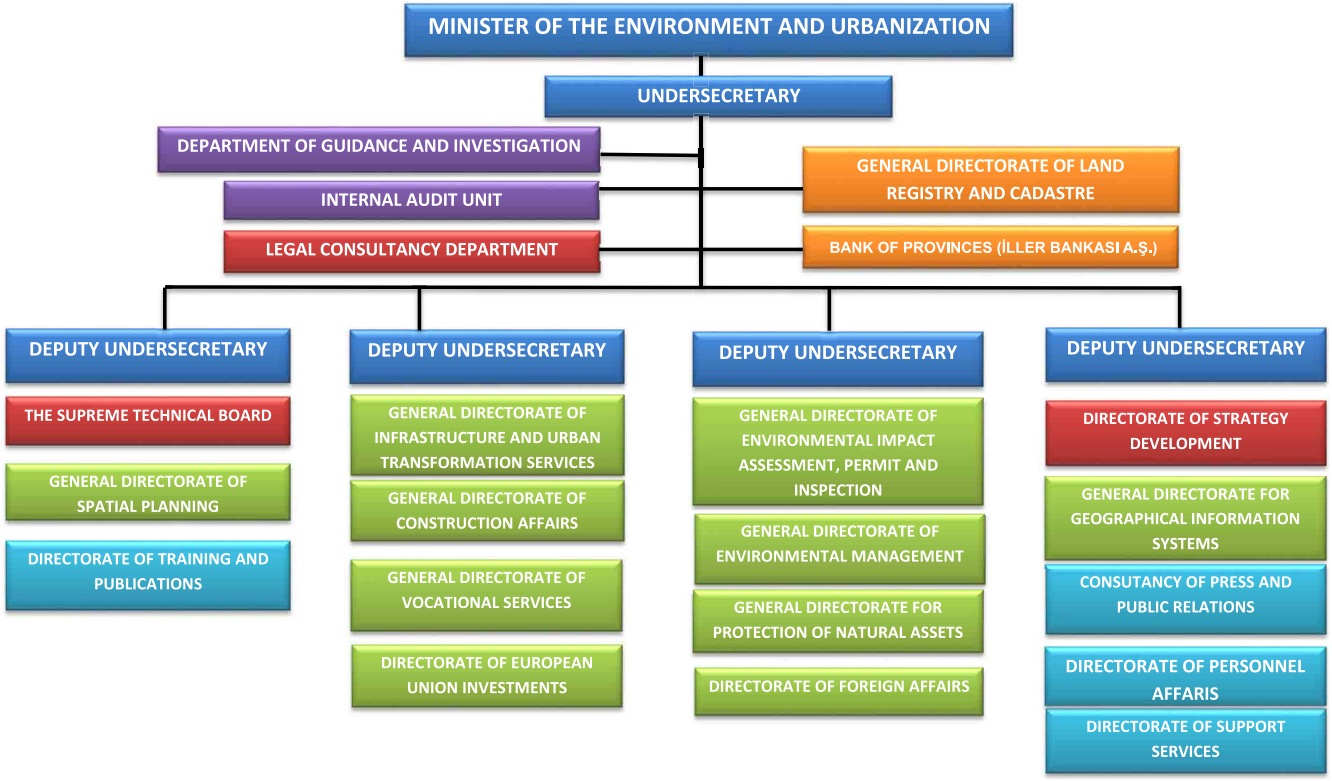


Figure 10 – Organization Table of the Ministry of Environment and Urbanisation (June of 2016)

Since the directorate couldn't satisfy the needs in time, this directorate was turned into "Under secretariat of Environment" in 1989 (Decree Law No. 389 in the OG dated 29.09.1989). Later, the necessity to manage environmental problems through preventive measures instead of remedial measures by adopting modern approaches on the right to a healthy environment in many developed countries arose, and the Ministry of Environment was established in 1991 (Decree Law No. 443 in the OG dated 09.08.1991)

In the following years, the Ministry of Environment was changed in accordance with changing and developing environmental conditions.

It was changed as the Ministry of Environment and Forestry with the Decree Law No. 4856 dated 08.05.2003 and then it was changed as the Ministry of Environment and Urbanisation pursuant to the Decree Law No. 644 published in the Official Gazette dated 04.07.2011.

H.2. Environmental Legislations

H.2.1. Laws

- Environmental Law No. 2872
- Law no 2863 on Protection of Cultural and Natural Heritage
- Coastal Law No. 3621
- No. 3194 on Land Development Planning and Control
- Law No. 5312 Pertaining to Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Harmful Substances
- Decree Law No. 644 on the establishment and functions of the Ministry of Environment and Urbanisation
- Decree Law No. 648 on amendments to Decree Law No. 644 on the establishment and functions of the Ministry of Environment and Urbanisation and to some decree laws
- Decree-Law No. 383 on the Establishment of an Environmental Protection Institution

H.2.2. By Laws

ENVIRONMENTAL COMPLIANCE CHAIN

- By Law on Environmental Impact Assessment
- By Law on Environmental Permit and License
- By Law on Control of Major Industrial Accidents
- By Law on Environmental Inspection

ENVIRONMENTAL QUALIFICATION

- By Law on Qualification of Environmental Representatives, Environmental Consulting Firms and Environmental Management Units
- By Law on Qualification of Environmental Measurement and Analysis Laboratories

WASTE MANAGEMENT

- By Law on Control of Packaging Wastes
- By Law on Control of Waste Electrical and Electronic Equipment
- By Law on Control of Waste Batteries and Accumulators
- By Law on Control of Waste Oils
- By Law on Organized Storage of Wastes
- By Law on Incıneration of Wastes
- By Law on Control of Vegetable Waste Oils
- By Law on the Control of Excavation Soil and Construction and Demolition Waste By Law on Rehabilitation of Degraded Land due to Mining Activities
- By Law on Waste Management
- By Law on Control of End-of-life Vehicles

- By Law on Control of End-of-life Tires
- By Law on Control of Polychlorinated Biphenyls and Polychlorinated Terphenyls
- By Law on Control of Hazardous Waste
- By Law on Control of Medical Waste
- By Law on Mining Wastes

MARINE AND COASTAL MANAGEMENT

- By Law on Implementation of the Law Pertaining to Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Harmful Substances
- By Law on Purchasing Goods And Services Pursuant to the Law Pertaining to Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Harmful Substances
- By Law on Reception of Wastes from Ships and Waste Control By Law
- By Law on Bathing Water Quality

AIR MANAGEMENT

- By Law on Reduction of Sulphur Rate in Some Types of Fuel Oils
- By Law on Combustion Plants
- By Law on Control and Assessment of Environmental Noise
- By Law on Exhaust Gas Emission Control and Gasoline and Diesel Oil Quality
- By Law on Air Quality Assessment and Management
- By Law on Control of Air Pollution from Heating
- By Law on Measures to Be Taken for Protecting Environmental and Public Health from Adverse Effects of Non-ionizing Radiation
- By Law on Control of Odorous Emissions
- By Law on Control of Air Pollution Resulting From Industrial Activities

MANAGEMENT OF CHEMICALS

- By Law on Limitations Relating to Production, Placing on the Market and Usage of Certain Hazardous Substances, Preparations and Articles
- By Law on Inventory and Control of Chemicals
- By Law on Testing Methods to Be Used to Determine Physicochemical, Toxicological and Ecotoxicological Features of Substances and Mixtures
- By Law on Classification, Labelling and Packaging of Hazardous Substances and Mixtures
- By Law on Preparation and Delivery of Security Information Forms of Hazardous Substances and Mixtures
- By Law on Security Information Forms of Hazardous Substances and Mixtures
- By Law on Restrictions and Prohibition to Hazardous Substances and Mixtures

WATER AND SOIL MANAGEMENT

- By Law on Procedures and Principles to Be Abided in Determining Tariffs for Wastewater Infrastructure and Domestic Solid Waste Disposal Facilities
- By Law on Procedures and Principles to be applied for Incentive Measures for Wastewater Treatment Plants pursuant to Article 29 of the Environmental Law
- By Law on Utilization of Domestic and Urban Treatment Sludge in Soil
- By Law on Urban Wastewater Treatment
- By Law on Control and Utilization of Sand, Gravel and Similar Substances
- By Law on Control of Water Pollution
- By Law on Control of Pollution by Dangerous Substances in Water and its Environment
- By Law on Control of Soil Pollution and Areas of Point Source Pollution
- By Law on Protection of Groundwaters against Pollution and Deterioration
- By Law on amendments to the Surface Water Quality Management By Law
- By Law on the Control of Water Leakages on Domestic Water Supply and Distribution System
- By Law on Monitoring Surface Waters and Groundwaters

- The By Law on Protecting and Improving the Waters in which Trout and Carp Fishes Live
- By Law on Quality of Surface Waters that are Used or Planned to Be Used for Domestic Purposes
- By Law on Conservation of Water Basins and Preparing Management Plans
- By Law on Protection of Groundwaters against Pollution and Degradations
- By Law on Surface Water Quality

CLIMATE CHANGE

- By Law on Reducing Ozone Depleting Substances.
- By Law on Monitoring of Greenhouse Gas Emissions

CONSERVATION OF NATURAL HERITAGE

- By Law on Cargo Vehicles that Operate in Lake Köyceğiz and Dalyan Canals
- By Law on Procedures and Principles Regarding Organization and Functions of the Commission for Protection of Cultural and Natural Properties
- By Law on Preparing Plans for Protected Areas
- By Law on Procedures and Principles Relative to Determination, Registration and Confirmation of Protected Areas
- By Law on Management of the State-owned Areas in Natural Heritage Areas, Natural Protection Areas and Special Protected Areas
- Planned Areas Standardized Building and Zoning By Law
- By Law on Exchanging Immovable Properties in Areas of Natural Heritage, Natural Protected Areas and Specially Protected Areas with Immovable Properties Owned by the Ministry of Treasury

OTHER

- By Law on Tracking and Collecting Environmental Incomes and Use of Allowances Provided in Return for Collection
- By Law on Determining Offenses, Imposing and Collecting Fines concerning Administrative Fines to be Imposed Pursuant to the Environmental Law.
- By Law on Procedures and Principles Regarding Operation of Higher Environmental Boards and Local Environmental Boards
- By Law on Circulation of Capital Enterprise for the Ministry of Environment and Urbanisation

H.2.3. Communiques

WASTE MANAGEMENT

- Communique on Interim Waste Storage Facilities
- Communique on Waste Collection Centers
- Communique on Transportation of Wastes by Road Transport
- Communique on Recycling Some Non-Hazardous Wastes
- Communique on Technical Procedures regarding Storage, Treatment, Dismantling, and Processing End-of-life Vehicles
- Communique on Tank Cleaning Facilities
- Communique on Refuse-derived Fuel, Additional Fuel and Alternative Raw Material
- Compost Communique

MARINE AND COASTAL MANAGEMENT

- Communique on Administrative and Technical By Law to be implemented for Waste Collection Ships
- Communique on Determination of Closed Coves and Bays that are Sensitive Fish Farms in the Sea
- Communique on Monitoring Fish Agricultural Facilities in Seas
- Communique on Principles and Fees to be applied pursuant to the By Law on Waste Collection from Ships and Waste Management (2009/3)
- Communique on Quality Standards of Waters Accommodating Shellfish
- Communique on Directive and Tariffs of Financial Liability Insurance for Marine Pollution to Be Taken by Coastal Facilities
- Communique on Authorization of Institutions and Organizations that will prepare Risk Assessment Concerning Pollution of Marine Environment by Petroleum and other Hazardous Substances and Emergency Response Plans

CLIMATE CHANGE

- Communique on Voluntary Carbon Market Project Registry

WATER AND LAND

- Communique on Technical Procedures regarding Wastewater Treatment Plants
- Communique on the By Law on Urban Wastewater Treatment, Sensitive and Less Sensitive Water Areas
- Communique on Administrative Procedures regarding the By Law on Water Pollution Control
- Communique on the By Law on Water Pollution Control, Methods of Sampling and Analyzing
- Communique on abrogation of the Communique on Hazardous and Dangerous Substances in Water under the By Law on Water Pollution Control
- Communique on Integrated Pollution Prevention and Control in Textile Sector
- Communique on Protection of Stagnant Inland Waters against Eutrophication
- Communique on Technical Procedures regarding the By Law on the Control of Water Leakages on Drink Water Supply and Distribution System
- Communique on Protection of Stagnant Inland Surface Waters against Eutrophication
- Communique on Establishment, Duties and Working procedures and Principles of Basin Management Commissions

MEASUREMENT AND MONITORING

- Communique on Continuous Wastewater Monitoring Systems
- Communique on Continuous Emission Measurement Systems

ENVIRONMENTAL COMPLIANCE CHAIN

- Communique on Preparing Security Reports on Major Industrial Accidents

DEPARTMENT OF ADMINISTRATIVE SERVICES

- Communique on Administrative Fines to be Imposed under the Environmental Law No. 2872 (No: 2015/1) (O.G. 28.12.2014/29219)

ENVIRONMENTAL QUALIFICATION

- Communique on Minimum Qualifications of Institutions and Organizations that Prepare Risk Assessment and Emergency Action Plan regarding Pollution of Marine Environment by Oil and other Hazardous Substances
- Communique on Confirmation of Greenhouse Gas Emission Reports and Authorization of Confirmative Institutions
- Communique on Qualification Document regarding Soil Pollution Control and Cleaning Point-source Polluted Areas
- Communique on Qualification Document

H.2.4. Circulars

WASTE MANAGEMENT

- Circular on the By Law Regarding Waste Landfill (2010/16)
- Circular on Preparation of Implementation Projects for Organized Storage Facilities (2014/13)
- Instruction on Inspection of Organized Storage Facilities (2011/13)
- Circular on Integrated Waste Management Plan (2010/09)
- Circular on Prevention of Wasting Stationery Equipment (2012/13)
- Delegation of Authority regarding Excavation Soil and Construction and Demolition Waste (2008/6)
- Control of Excavation Soil and Construction and Demolition Waste (2004/5)
- Circular on Utilization of Inert Mining Waste for Rehabilitation, Restoration and Filling Purposes (2010/13)
- Circular on Business Deadline Plans for Solid Waste Disposal Facilities (2006/14)
- Circular on Approval of the Projects for Solid Waste Disposal and Prior Processing Facilities (2011/12)
- Circular on Solid Wastes (2004/7)
- Circular on Solid Wastes (2003/8)
- Solid Waste Characterization and Solid Waste Disposal Facility Information Update (2007/10)
- Circular on Organized Storage of Mining Wastes and Technical Designing of Other Organized Storage Facilities (2011/12)

- Circular on Permits the will be Granted to Solid Waste Disposal and Organized Storage Facilities in Forest Areas (2011/10)
- Circular on Disposal of Drilling Mud and Wastes from Physical Procession of Chrome Mineral (2012/15)
- Circular on Year-end Reports for Medical Wastes (2006/25)
- Circular on Disposal of Medical Wastes (2010/17)
- Safe Disposal of Medical Wastes (2008/9)
- Circular on Sterilization of Medical Wastes (2006/7)
- Procedures and Principles regarding Packaging Wastes (Consent No. B.09.0.EMC.0.10.04-145.07-12444 dated 22.10.2012)

MARINE AND COASTAL MANAGEMENT

- Circular on Approval of Wastewater Treatment/Deep Sea Discharge Facility Projects (2014/7)
- Circular on Monitoring Deep Sea Discharge (2009/16)
- Circular on Implementation of Tracking Wastes from Ships (2013/12)
- Circular on Marine Pollution Inspectors that will be Charged for Control of Marine Pollution from Ships and the Training that Will Be Provided to them (2010/8)
- Circular on Procedures regarding Approval of Risk Assessment and Emergency Response Plans of Coastal Facilities (2009/6)
- Circular on Delegation of Authority (Fish Farms) (2010/11)
- Circular on Delegation of Authority (Illegal Dumping) (2011/9)

AIR MANAGEMENT

- Circular on Exhaust Gas Emission Measurements of 2014 (2014/09)
- Circular on Control of Environmental Noise from Places of Amusement (2011/11)
- Circular on Assessment and Management of Air Quality (2013/37)
- Circular on Air Pollution Control and Prevention (2010/14)
- Circular on Imported Solid Fuels (2011/4)
- Circular on Imported Solid Fuels (2015/02)

WATER AND LAND MANAGEMENT

- Circular on Abrogation of the Circular No. 2004/12 on Solid Waste and Wastewater Management (2013/11)
- Circular on Approval of Projects for Wastewater Treatment and Deep Sea Discharge Facilities (2014/7)
- Circular on Business Deadline Plan for Wastewater Treatment Plants (2006/15)
- Circular on Restrictions to Discharge Standards into Ergene River (2014/11)
- Circular on Identification Document for Wastewater Treatment Plants (2015/6)
- Circular on Technical Procedures to be applied in Management of Wastewaters in Olive Oil Production Facilities (2015/10)

CLIMATE CHANGE

- Circular on Climate Change and Air Management Coordination Board (2013/11)
- Circular on Import and Use of Ozone Depleting Substances (2015/1)
- Circular on Halon

ENVIRONMENTAL QUALIFICATION

- Procedures and Principles regarding Determination of the Qualifications of Vehicle Tracking Service Providers

CONSERVATION OF NATURAL HERITAGE

- Circular on Activities of CNT Commission (2011/17)
- Circular on Application of Equal Pay Processes (2011/21)
- Circular on Procedures and Principles regarding Development Plan Proposals for Protected Areas (2014/23)

H.3. Acceded international environmental conventions, agreements and protocols

International environmental conventions, agreements and protocols acceded by the Republic of Turkey are provided below.

- Antarctic Convention
- European Landscape Convention (Florence Convention)
- Convention on the Conservation of European Wildlife and Natural Habitats (Berne Convention)
- Convention on the Protection of the Mediterranean Sea against Pollution (Barcelona Convention)
- International Convention for the By Law of Whaling (Whaling Convention)
- United Nations Convention on Biological Diversity
- United Nations Framework Convention on Climate Change (UNFCCC)
- Kyoto Protocol
- Intergovernmental Panel on Climate Change (IPCC)
- Convention for the Prevention of Marine Pollution from Land-Based Sources (Paris Convention)
- Convention for the Prevention of Pollution from Ships (Marpol 73/78)
- The Convention concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention)
- Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention)
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES Convention)
- Vienna Convention for the Protection of the Ozone Layer
- The United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD)
- Convention on Wetlands of International Importance especially as Waterfowl Habitat (RAMSAR)
- International Convention on Civil Liability for Oil Pollution Damage (Civil Liability Convention-CLC 92)
- International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND 1992)
- Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention)
- Convention on Long-Range Transboundary Air Pollution
- Co-operative Programme for Monitoring and Evaluation of the Long Range Transmission of Air Pollutants in Europe (EMEP)
- Convention on Long-Range Transboundary Air Pollution (CLRTAP)
- Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention)
- Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal (İzmir)
- Montreal Protocol on Substances that Deplete the Ozone Layer
- Protocol concerning Cooperation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency
- Protocol for the Prevention of Pollution in the Mediterranean Sea by Dumping from Ships and Aircraft
- Protocol on the Protection of the Black Sea Marine Environment Against Pollution from Land Based Sources (LBS)
- Protocol on Black Sea Biodiversity and Landscape Conservation
- Protocol on The Protection of the Black Sea Marine Environment Against Pollution by Dumping
- Protocol on Cooperation in combating pollution of the Black Sea Marine Environment by Oil and Other Harmful Substances in Emergency Situations
- Protocol on the Protection of the Mediterranean Marine Environment Against Pollution from Land Based Sources
- Convention of United Nations Economic Commission for Europe on the Transboundary Effects of Industrial Accidents
- Agreement between the European Community and the Republic of Turkey concerning the Republic of Turkey's participation in the European Environment Agency and the European Environment Information and Observation Network.
- Mediterranean Action Plan

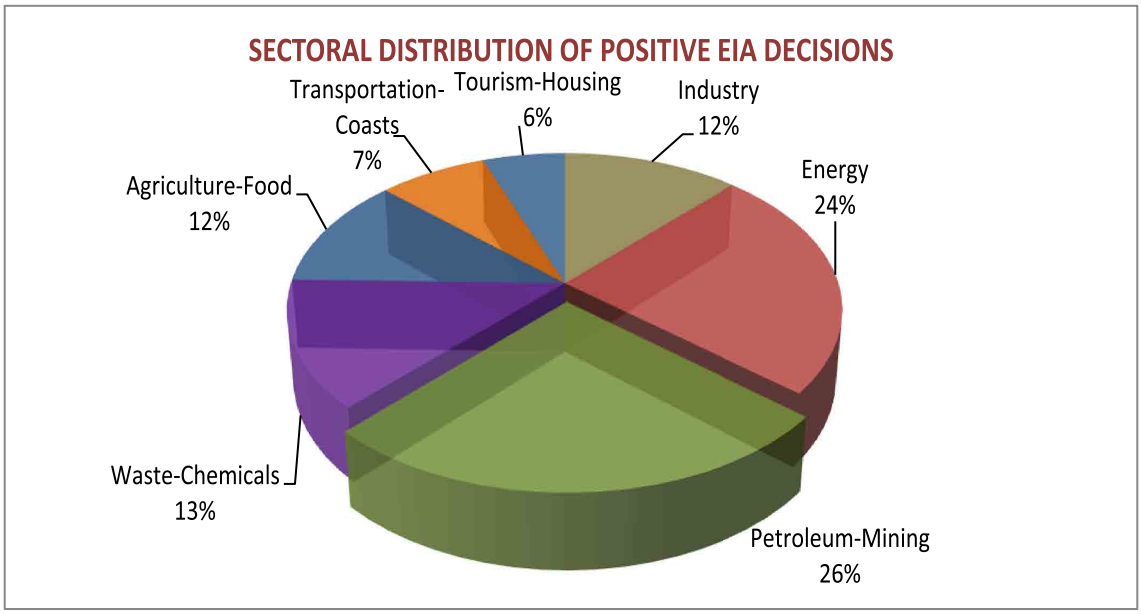
H.4. EIA Activities

The Concept of Environmental Impact Assessment came into use in Turkey with the Article 10 of the Environmental Law that was enacted in 1983. Environmental Impact Assessment is regarded as one of the most important means of sustainable development and the first stage of the environmental compliance chain and it has been applied in our country since publication of the "By Law on Environmental Impact Assessment", in the Official Gazette No.21489 dated 7 February 1993. The By Law has been updated in different times both during the EU harmonization process and due to the problems confronted in application of the By Law. The last By Law on Environmental Impact Assessment that is currently in force was published in the Official Gazette No. 29186 dated 25.11.2014.

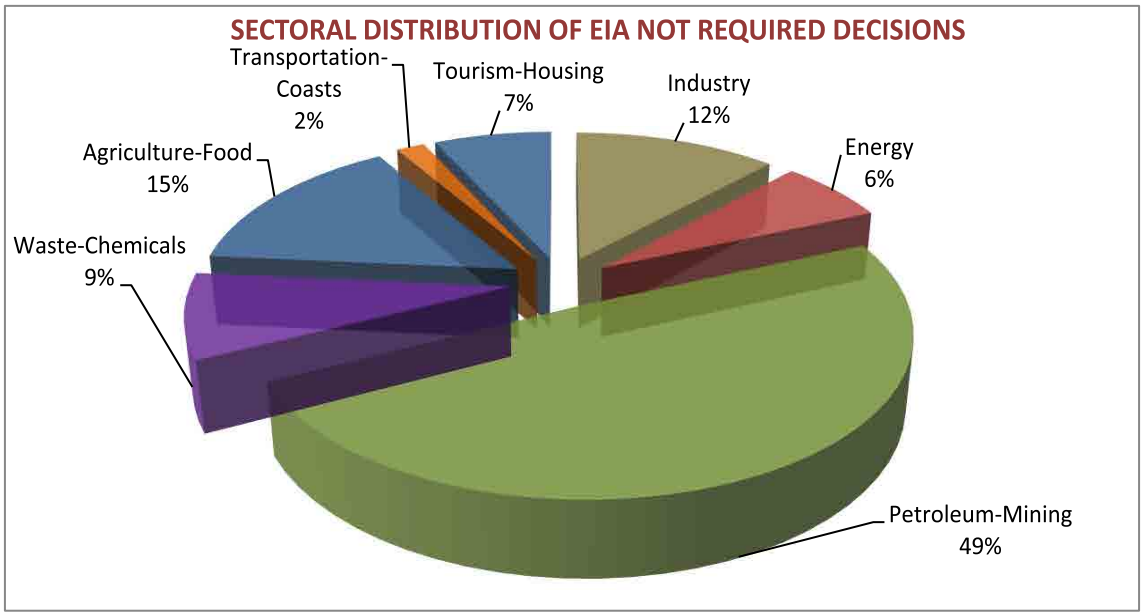
Decisions of "EIA Positive" or "EIA Negative" about the projects within the scope of Annex List-1 of By Law on Environmental Impact Assessment are taken by the Ministry, and decisions of "EIA required" or "EIA Not Required" about the projects within the scope of Annex List-2 are taken by Provincial Directorates of Environment and Urbanisation.

Table 90 –EIA Decisions by the Ministry of Environment and Urbanisation during 2011-2015 Period (Ministry of Environment and Urbanisation, 2016)

YEAR	EIA POSITIVE	EIA NOT REQUIRED	EIA REQUIRED
2011	308	4.592	41
2012	426	3.759	37
2013	477	3.613	34
2014	471	4.058	118
2015	315	3.886	87



Graph 46 – Sectoral distribution of positive EIA decisions (1993-2015), (Ministry of Environment and Urbanisation, 2016)



Grafik 47 – Sectoral distribution of EIA decisions is not required (1993-2015), (Ministry of Environment and Urbanisation, 2016)

H.5. Environmental Permit and License Activities

According to the Environmental Law N.2872, those facilities which have adverse environmental effects are required to get permits to operate, and those institutions which do business with other facilities in waste recovery, recycling and disposal are required to get licenses.

Activities and facilities with pollution impact on environment used to be supposed to apply for discharge, emission, noise, deep-sea discharge, and hazardous substance discharge permits and waste management permits in relation to related legislations. However, since 01 April 2010, based on the integrated approach strategy, just one environmental permission application has been adopted.

Accordingly, the By Law on Permits and Licenses to Be Obtained Pursuant to Environmental Law, which was published in the Official Gazette N.27214 dated 29 April 2009 and entered in force on 01 April 2010, was repealed, and the By Law on Environmental Permit and License, which was published in the Official Gazette N. 29115 dated 10.09.2014, entered in force on 01 November 2014. The facilities that are included in Annex List 1 and Annex List 2 of the By Law are obliged to obtain environmental permit or environmental permit and license to be able to operate.

Granting Environmental Permit/License Certificate is a two stage process. In the first stage, institutions in Annex 3A and Annex B submit their documents and if the application is approved, a one-year Provisional Activity Certificate (PAC), a kind of prior authorization, is prepared. In the second stage, the environmental permit/license process is completed and changed into a 5 year permit. Within the scope of the By Law, there are 21 license areas under the topics of Recovery, Disposal, Interim Storage, Treatment and Purification.

Table 91 –Number of documents granted under the By Law on Environmental Permit and License, by years (Ministry of Environment and Urbanisation, 2016)

	PROVISIONAL ACTIVITY CERTIFICATE			PERMIT/LICENCE DOCUMENT		
	ANNEX-1	ANNEX -2	TOTAL	ANNEX-1	ANNEX -2	TOTAL
2010*	68	250	318	1	14	15
2011	441	1.837	2.278	115	698	813
2012	602	3.153	3.755	393	2.006	2.399
2013	737	3.293	4.030	549	2.793	3.342
2014	497	3.502	3.999	466	3.285	3.751
2015	396	3.219	3.615	499	3.280	3.779
TOTAL	**2.741**	**15.254**	**17.995**	**2.023**	**12.076**	**14.099**

* Data for the period between 01/04/2010-31/12/2010.

The Central Organization of the Ministry and Provincial Directorates of Environment and Urbanisation have given PAC to 17,995 activities or facilities in total, and given Environmental Permit or Environmental Permit and License Certificates to 14,099 activities or facilities since 2010 when By Law on Permits and Licenses to Be Obtained Pursuant to Environmental Law and later Environmental Permit and License started to be implemented. Data on PAC and Environmental Permit/Environmental Permit and License is presented in Table 91

H.5.1. Import and Export Permits

H.5.1.1. Import of batteries and accumulators

The Communique on Import Inspection of Batteries and Accumulators was prepared and enacted in 2006 with the purpose of establishing effective collection systems for waste batteries and accumulators that are under the By Law on Control of Waste Batteries and Accumulators, launching batteries and accumulators into the market that are in accordance with the By Law and executing import inspections accordingly. Import and export of batteries and accumulators are carried out in concordance with the By Law by updating the communique in January every year.

Import processes are carried out in two stages. In the first stage, the firms wishing to import batteries and accumulators apply to the Ministry for an environmental compliance certificate (Advance Fixing Certificate) by submitting an import document including information on imports of the previous year and their waste management plans which shows how to collect waste batteries and accumulators. Firms apply online through Risk Based Control System in Foreign Trade (TAREKS) and applications of the firms, whose applications have been approved, are approved after the assessment period and the first stage is completed.

Table 92 - 2013-2015 battery and accumulator import data (Ministry of Customs and Trade, 2016)

TYPE OF BATTERY&ACCUMULATOR	2013-kg	2014-kg	2015-kg
MANGANESE DIOXIDE BATTERIES	6.641.363	6.549.403	6.269.669
MERCURIC OXIDE BATTERIES			11
SILVER OXIDE BATTERIES	10.841	9.832	15.171
LITHIUM BATTERIES-PRIMER	160.383	200.615	235.901
ZINC–AIR BATTERIES	38.109	51.360	37.307
ZINC CARBON BATTERIES	1.732.283	1.863.252	1.741.803
NI-CD	1.140.677	509.585	304.830
NI-Iron	8.764	4.798	1.309
NI-HYDRIDE BATTERIES	117.763	116.145	99.183
LI-ION ACCUMULATORS	936.314	1.291.805	1.897.844
OTHER ACCUMULATOR	458.232	279.293	314.636
LEAD ACCUMULATORS	46.198.938	48.915.016	53.136.981
TOTAL	**57.443.666**	**59.791.104**	**64.054.645**

The firm that has obtained advance fixing approval makes import application through the same system and waits for the approval of Regional Directorates of the Ministry of Economy. Regional Directorates of the Ministry of Economy carry outs inspections in order to see labelling of the products and to see whether the batteries and accumulators wished to import are in compliance with the restrictions and prohibitions of the By Law on Control of Waste Batteries and Accumulators.

H.5.1.2. Scrap metal ımport

Metal Scrap Importer Documents are granted by the Ministry of Environment and Urbanisation for scrap metals that are in Annex-1 of the Communiqué on Import Inspection of Wastes that are under control relating to protection of environment (Product Safety and Inspection: 2016/3) that is prepared every year and published on 1 January by the Ministry of Economy by considering the recommendations of related institutions and organizations.

Metal Scrap Importer Documents are granted to the facilities that process scrap metal by melting or that apply prior processing to increase the quality and intensity of scrap metal through crushing and reducing its size and that has obtained Provisional Activity Certificate or Environmental Permit and License Document from the Ministry of Environment and Urbanisation for these purposes.

Additionally, these facilities have to document that they own Certificate of Conformity to Radiation Measurement System (conformity to stationary and mobile devices and other related equipment that are suitable and calibrated for radiation control), given at the end of evaluation by Turkish Atomic Energy Authority, and personnel trained on radiation protection.

Scrap metal imports are carried out at 23 specialized customs having radiation panels (Customs General Communiqué, Customs Transaction Serial No: 104).

Table 93 - Amounts of scrap metal import (Ministry of Customs and Trade, 2016)

GTIP	MATERIAL NAME	2013 (KG)	2014 (KG)	2015 (KG)
7204.10.00.00.11	Classified or graded cast iron waste and scrap	41.515,00	1.696.985,00	3.493.828
7204.10.00.00.19	Other cast iron waste and scrap	51.620.154,58	22.653.757,00	28.230.646
7204.21.10.00.11	Classified or graded stainless steel waste and scrap including 8% or more nickel by weight	0,00	53.047,00	0
7204.21.10.00.19	Other stainless steel waste and scrap including 8% or more nickel by weight	1.892.255,04	120.269,00	285.017
7204.21.90.00.11	Other classified or graded stainless steel waste and scrap	97.022,00	0,00	0
7204.21.90.00.19	Other stainless steel waste and scrap	4.466.549,49	5.250.538,00	4.600.357
7204.29.00.00.11	Other classified or graded alloy steel waste and scrap	139.211.704,00	668.588.580,00	100.056.280
7204.29.00.00.19	Other alloy steel waste and scrap	8.581.861,72	13.765.505,00	30.087.948
7204.30.00.00.00	Waste and scrap of tinned iron or steel	8.323.321,00	8.071.269,00	6.189.737
7204.41.10.00.00	Turnings, shavings, chips, milling waste, sawdust, filings, trimmings and stampings, (only turning and milling waste)	25.662.206,45	23.698.450,00	21.130.064
7204.41.91.00.00	Trimmings and stampings in bundles	0,00	0,00	0
7204.41.99.00.00	Other trimmings and stampings in bundles	2.481.956,36	2.198.613,00	2.886.105
7204.49.10.00.00	Other Fragmentized (shredded) wastes and scraps	3.114.772.829,00	2.483.862.654,00	2.356.934.183
7204.49.30.00.00	Other wastes and scrap in bundles	22.574.771,46	7.346.500,00	29.946.028
7204.49.90.00.11	Other unclassified and non-graded wastes and scraps	5.152.553.367,00	4.572.469.667,00	3.966.289.111
7204.49.90.00.19	Other waste and scrap	11.405.501.676,00	11.495.602.612,00	9.833.414.762
7404.00.10.00.00	Waste and scrap of refined copper	3.437.887,63	3.024.355,00	3.837.292
7404.00.91.00.00	Waste and scrap of copper-zinc alloys (brass)	974.112,19	4.539.835,00	4.005.261
7404.00.99.00.00	Waste and scrap of other copper alloys	1.273.392,19	4.510.012,00	3.999.612
7503.00.10.00.00	Waste and scrap of unalloyed nickel	0,00	0,00	
7503.00.90.00.00	Waste and scrap of nickel alloys	2.115,44	821,00	37.081
7602.00.19.00.00	Other aluminum waste (including factory rejects)	6.569.855,66	9.601.549,00	12.160.879
7602.00.90.00.00	Aluminum waste	23.188.104,34	34.048.875,00	38.303.621
7902.00.00.00.00	Waste and scrap of zinc	281.403,08	444.235,00	762.098
8002.00.00.00.00	Tin waste and scrap	1.450,00	0,00	0
	GRAND TOTAL	**19.973.509.510**	**19.361.548.128**	**16.446.649.910**

H.5.1.3. Waste import

Waste import is carried out within the frame of the letter of conformity prepared by Provincial Directorates of Environment and Urbanisation under the Communiqué on Import Inspection of Wastes That are Under Control Relating to Protection of Environment (Product Safety and Inspection: 2016/3) that is prepared by the Ministry of Economy every year and put into use on 1 January by receiving opinions of the Ministry of Environment and Urbanisation and related institutions and organizations.

- Industrialist having recycling facilities and license or provisional activity document from the Ministry can import wastes listed in Annex-1 of the communique.

- Some wastes can be imported only if they apply export registered import in line with inward processing decree.

Waste imports are also carried out at 23 specialized customs having radiation panels (Customs General Communique, Customs Transaction Serial No: 104).

Table 94 – Amount of waste import (Ministry of Environment and Urbanisation, 2016)

GTIP (Annex-1)	NUMBER OF APPLICATION	NUMBER OF CONFORMITY	NUMBER OF NONCONFORMITY	OUT OF SCOPE	RETURN	AMOUNT (Kg)
2620.11.00.00.00	62	62				1.384.732
2620.19.00.00.00	175	174		1		10.071.166,75
2620.30.00.00.00	14	14				235.686
2620.40.00.00.00	2	1	1			20.809
39.01 – 39.14	365	96		269		15.219.501,365
3915.10.00.00.00	288	287	1			15.825.225,35
3915.20.00.00.00	43	26		17		652.584,96
3915.30.00.00.00	6	6				459.386
3915.90.11.10.00	29	29				1.000.450
3915.90.11.90.00	64	64				2.389.258
3915.90.80.00.11	324	323	1			24.156.099,99
3915.90.80.00.19	135	133	2			4.904.137,29
4004.00.00.00.11	73	73				28.518.281
4004.00.00.00.12	15	15				402.572
4004.00.00.00.13	7	7				268.860
4012.20.00.90.00	15	15				126.497
4707.10.00.00.00	609	609				89.315.796
7001.00.10.00.00	1	1				26.150
8548.10.21.00.00						
8548.10.91.00.00						
TOTAL						**194.977.193**

H.5.1.4. Solid fuel import

Activities regarding import of fuels that are under control relating to protection of environment are carried out under the Communiqué on Import Inspection of Solid Fules That are Under Control Relating to Protection of Environment (Product Safety and Inspection: 2016/3) that is prepared by the Ministry of Economy every year and put into use on 1 January by receiving opinions of the Ministry of Environment and Urbanisation and related institutions and organizations.

Table 95 - Amount of solid fuel import (Provincial Directorates of Environment and Urbanisation, 2016)

Purpose of Fuel	Fuel Type	Number of Approved Documents	Number Unapproved Documents	Approved Amount of Fuel import (ton)
HEATING	Hard Coal	1.034	1	1.210.698.473,407
INDUSTRY	Hard Coal	264		208.711.705,170
	Bituminous Coal	48		3.261.876,201
	Anthracite	127		618.973,370
	Non-Calcined Petroleum Coke	449		4.153.014,034
	Calcined Petroleum Coke	56		16.520,118
	INDUSTRY TOTAL	**943**	**1**	**216.762.088,893**
GRAND TOTAL (Heating +Industry)		**1.977**	**2**	**1.427.460.562,300**

(Amount of Imported Fuel and Number of Approved Documents for 2015)

Within the scope of the communique, “Solid Fuel Importer Document” is prepared by the Ministry of Environment and Urbanisation for 11 solid fuels listed in the annex of the communique (anthracite, hard coal, lignite, petroleum coke, etc.) that are subject to control.

Within the scope of Solid Fuel Importer Registration Document prepared by the Ministry of Environment and Urbanisation, compliance inspections are carried out for imported solid fuels by the Provincial Directorate of Environment and Urbanisation of the province where imported fuels enter. During these inspections, samples are taken from the imported fuel and sent to authorized laboratories for analysis. Approval letter is prepared for the fuels that are approved at the end of analysis and their import is permitted.

H.5.1.5. Waste export

Waste import depends on whether the waste is hazardous or nonhazardous. Transboundary movement of hazardous wastes is regulated by The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal acceded by Turkey, and hazardous wastes may be exported to EU, OECD countries and Liechtenstein it there is no facility with necessary technical capacity for recycling and disposal of the wastes.
Exporter should obtain approval of the authorities of the receiving country listed in Basel for the wastes to be exported from Turkey by making advance notification. Exportation process cannon start without approval of the receiving countries.

After the approval of the transit country is obtained for hazardous waste import, the Ministry of Environment and Urbanisation sends documents stating that “there is no inconveniency regarding hazardous waste export” to Customs Offices that will carry out export procedures, and exportation process continues.

Pursuant to the By Law on Waste Management published in the Official Gazette No. 29314 dated 02.04.2015, no document is prepared by The Ministry of Environment and Urbanisation for the process of exporting non-hazardous waste to EU and/or OECD countries and Liechtenstein; however it is required to notify the Ministry before the export process and the export is registered by the Ministry. On the other hand, it is required to obtain permit from authorities of the receiving country and apply to the Ministry to export non-hazardous waste to countries other than EU and/or OECD countries and Liechtenstein. No export process can be carried out without approval of the ministry.

Table 96 - Amount of nonhazardous waste export (Ministry of Customs and Trade, 2016)

GTIP	MATERIAL	2013 (AMOUNT-Kg)	2014 (AMOUNT-Kg)	2015 (AMOUNT-Kg)
2618.00.00.00.00	Granulated slag (slag sand) from the manufacture of iron or steel	253.275.359,00	178.746.682,00	87.516.313
2619.00.90.00.11	Blast-furnace dust	124.527.310,00	228.565.985,00	7.513.285
2619.00.90.00.13	Removable rust, a corrosion product consisting of hydrated oxides of iron (Dross)	383.726.795,00	257.000.606,00	110.154.843
2620.11.00.00.00	Wastes and scrap containing Hard zinc spelter	2.610.898,77	909.064,00	840.008
2620.19.00.00.00	Others	513.685,00	452.336,00	466.440
2620.30.00.00.00	Containing mainly copper	826.405,00	1.073.066,00	771.211
2620.40.00.00.00	Containing mainly aluminum (waste aluminum oxide)	1.868,90	53,00	0
39.01-39.14	Granules and bulk forms recycled from scrap plastics for secondary use.	569.327.309,80	72.181.768,00	108.604.419
3915.10.00.00.00	Polymers of ethylene	556.441,00	435.735,00	397.322
3915.20.00.00.00	Polymers of styrene	1.000,00	10,00	17.114
3915.30.00.00.00	Polymers of vinyl chloride	3.082.023,00	1.066.920,00	492.370
3915.90.11.10.00	Addition polymerization products	0,00	6.000,00	0
3915.90.11.90.00	Others	3.817.953,90	5.439.658,00	4.287.851
3915.90.80.00.11	Polyethylene-Terephthalate (PET)	7.758.640,00	1.308.788,00	734.669
3915.90.80.00.19	Others	11.004.108,14	12.293.881,00	11.984.649
4004.00.00.00.11	Parings and scraps	1.103.661,22	1.506.031,00	1.014.071
4004.00.00.00.12	Wastes	451.140,00	648.140,00	940.730
4004.00.00.00.13	Powder and granules	3.988.308,56	2.946.200,00	1.207.411
4012.20.00.90.00	Solid or cushion tires-others	1.805.964,33	1.995.001,00	3.239.851
4017.00.00.10.12	Rash, waste and powder of hardened rubber	517.652,00	435.658,00	123.769
4707.30.10.00.00	Old and unsold newspapers and magazines, telephone directories, brochures and printed advertising material	4.546,89	10.023,00	711.355
4707.30.90.00.00	Others	49,92	0,00	4.045
4707.90.10.00.00	Unsorted	16.874.240,00	14.779.270,00	21.201.440
4707.90.90.00.00	Sorted	22.726.970,00	28.450.110,00	38.133.930
7001.00.10.00.00	Cullet and other waste and scrap of glass	160.012,81	729.693,00	306.132
7112.91.00.00.00	gold, including metal clad with gold but excluding sweepings containing other precious metals	332.000,00	84.829,00	590
7112.92.00.00.00	platinum, including metal clad with platinum but excluding sweepings containing other precious metals	2.786,36	2.965,00	2.313
7112.99.00.90.00	Others	1.087.759,50	1.610.686,00	1.983.138
7204.10.00.00.11	Sorted or graded Waste and scrap of cast iron	0,00	635.600,00	0
7204.21.10.00.11	Sorted or graded waste and scrap of stainless steel containing by weight 8 % or more of nickel	20.181.032,00	60.813.199,00	57.769.347
7204.21.10.00.19	Waste and scrap of stainless steel containing by weight 8 % or more of nickel	57.868.499,00	68.160.534,00	46.205.304

Table 96 - Amount of nonhazardous waste export (Ministry of Customs and Trade, 2016)(cont.)

GTIP	MATERIAL	2013 (AMOUNT-Kg)	2014 (AMOUNT-Kg)	2015 (AMOUNT-Kg)
7204.21.90.00.11	Other sorted or graded waste and scrap of stainless steel	0,00	358.580,00	827.620
7204.21.90.00.19	Other waste and scrap of stainless steel	16.962.852,00	14.350.463,00	10.925.664
7204.29.00.00.11	Other sorted and graded waste and scrap of alloy steel	0,00	16.726,00	0
7204.29.00.00.19	Other waste and scrap of alloy steel	1.984.464,20	9.102.669,00	12.184.884
7204.30.00.00.00	Waste and scrap of tinned iron or steel	23.780,00	501.165,00	99.603
7204.41.10.00.00	Other waste and scrap of turnings, shavings, chips, milling waste, sawdust and filings	370.654,00	281.701,00	402.802
7204.41.99.00.00	Trimmings and stampings	3.350,00	1.208.900,00	2.407.240
7204.49.10.00.00	Other Fragmentized (shredded) waste and scrap	0,00	21,00	251.060
7204.49.30.00.00	Other waste and scrap in bundles	5.000,00	0,00	0
7204.49.90.00.11	Other wastes and scraps neither sorted nor graded	185,00	2.003,00	0
7204.49.90.00.19	Other wastes and scraps	2.731.596,91	7.997.716,00	11.792.892
7404.00.10.00.00	Waste and scrap of refined copper	4.771.784,00	4.709.169,00	3.701.853
7404.00.91.00.00	Waste and scrap of copper-zinc base alloys (brass)	7.959.855,00	2.002.923,00	3.802.322
7404.00.99.00.00	Waste and scrap of other copper alloys	10.543.295,00	10.766.519,00	4.537.030
7503.00.10.00.00	Waste and scrap of nickel, not alloyed	124.620,50	47.426,00	0
7503.00.90.00.00	Waste and scrap of nickel alloys	899.645,39	1.076.961,00	948.674
7602.00.19.00.00	Other waste and scrap of aluminum (including factory rejects)	5.390.515,00	3.152.278,00	5.631.462
7602.00.90.00.00	Aluminum scraps	7.959.781,38	16.786.647,00	17.014.327
7902.00.00.00.00	Waste and scrap of zinc	1.903.301,00	1.468.836,00	831.300
8002.00.00.00.00	Waste and scrap of tin	37.141,00	17.199,00	50.481
8101.97.00.10.00	Waste of tungsten (wolfram)	0,00	2.925,00	0
8101.97.00.90.00	Scrap of tungsten (wolfram)	178.498,81	154.211,00	63.613
8102.97.00.90.00	Waste of molybdenum	462,00	833,00	2.050
8103.30.00.90.00	Waste of tantalum	1.096,00	0,00	0
8104.20.00.00.12	Scrap of magnesium	70.693,00	33.585,00	0
8105.30.00.00.12	Scrap of cobalt	672,00	4.704,00	5.150
8106.00.10.00.13	Scrap of bismuth	0,00	2.900,00	0
8108.30.00.00.11	Waste of titanium	126.959,00	110.671,00	120.920
8108.30.00.00.12	Scrap of titanium	57.162,02	158.803,00	66.134
8111.00.19.00.12	Manganese scrap	0,00	28.770,00	0
8112.22.00.00.12	Scrap of chrome	26.762,50	116.850,00	814.516
8112.92.21.00.21	Waste of vanadium	296,00	0,00	0
8113.00.40.00.12	Scrap of cermets	0,00	46.120,00	
8542.39.90.00.00	Others	1.107.531,99	708.625,00	1.152.559
GRAND TOTAL		**1.552.367.252,12**	**1.018.920.392,00**	**585.262.824**

Table 97 - Amount of hazardous waste export (Ministry of Environment and Urbanisation, 2016)

WASTE CODE	WASTE	2012 AMOUNT (Ton)	2013 AMOUNT (Ton)	2014 AMOUNT (Ton)
20 01 19*	Pesticides	136	-	
16 06 02*	Ni-Cd batteries	27	-	
16 06 05	Other batteries and accumulators	9,396	-	
13 02 05*	Mineral-based non-chlorinated engine, gear and lubricating oils	748,19	2.653,95	8.510,580
10 02 07*	Solid wastes from gas treatment containing dangerous substances	6.104,32	0	0
11 01 09*	Sludges and filter cakes containing dangerous substances	37,56	0	406,510
06 08 02*	Waste containing dangerous silicones	0	0	2,875
07 05 04*	Other organic solvents, washing liquids and mother liquors	0	0	15,465
070104* ve 070504*	Other organic solvents, washing liquids and mother liquors	0	0	3,193
080121*	Waste paint or varnish remover	0	0	21,032
160305*	Organic wastes containing dangerous substances	0	0	19,033
160504*	Gases in pressure containers (including halons) containing dangerous substances	0	0	1,310
16 08 02*	Spent catalysts containing dangerous transition metals or dangerous transition metal compounds	0	0	292,950
16 05 06* ve 18 01 06*	Laboratory chemicals consisting of or containing dangerous substances including laboratory chemicals and chemicals consisting of or containing dangerous substances and chemicals	0	0	33,140
GRAND TOTAL		**7.062,466**	**2.653,95**	**9.306,088**

H.5.1.6. Waste Transit

Transit pass permits are granted only for end-of- life tires in transit of wastes. Transit pass of end-of- life tires is permitted only if approval letter is obtained from the authority of receiving country. Customs offices of transit pass are notified on the movement after the necessary documents are submitted. The Ministry of Environment and Urbanisation grants transit pass permits only by making assessments through these documents.

Table 98 - Amount of end of life tire transit (Ministry of Environment and Urbanisation, 2016)

Waste	2013 NUMBER/YEAR	2014 NUMBER/YEAR	2015 NUMBER/YEAR
End of life tires	150.673	889.510	30.602

H.5.1.7. Permit Certificate for Petcoke Use

The Ministry of Environment and Urbanisation allocates non-calcined petroleum coke only to cement and lime production plants. Industries that use non-calcined petroleum coke are obliged to obtain permits from the Ministry and necessary amount is allocated according to their capacities. Energy unit is taken as 7.500 kcal/kg in calculations of petroleum coke allocations. Thus it is not allowed to import non-calcined petroleum coke without permission and allocation.

The Ministry of Environment and Urbanisation allocates non-calcined petroleum coke to cement and lime production plants over the period of their environmental permits and petroleum coke utilization is controlled by Ministry permits. Energy unit is taken as 7.500 kcal/kg in calculations of petroleum coke allocations.

H.6. Environmental Inspections

Under Article 56 of the Constitution, it is stated that “Everybody has the right to live in a healthy, balanced environment” and “improving of the environment, protecting the environmental health and preventing environmental pollution are the duty of both the government and the citizens”. Thus, the government uses its authority to “make By Laws” and “conduct inspections”, to protect the environment and prevent pollution.

One of the most effective means of environmental management is environmental inspection. In order to carry out environmental inspections under the Environmental Law, legal frameworks, “procedures and principles determined by the Ministry, had to be designated. This was achieved through the “By Law on Environmental Inspection” published in the repeated Official Gazette No. 24631 dated 05 January 2002. The Ministry of Environment and Urbanisation executes environmental inspections under the By Law on Environmental Inspection.

Environmental inspection, in general, is a process whose aim is to determine whether provisions of the Environmental Law and related By Laws are implemented by monitoring the activities of a facility, to inspect the compliances with related legal and technical requirements, to examine the compliance between activity and permit, that is to determine whether the facilities comply with the terms and conditions of permit, and to encourage the facilities to comply with the environmental legislation.

H.6.1. Number of Environmental Inspections

Within the frame of the organizational structure of the Ministry of Environment and Urbanisation, By Law on Environmental Inspection is implemented by General Directorate of Environmental Impact Assessment, Permit and Inspection and 81 Provincial Directorates of Environment and Urbanisation.

Additionally, he Environmental Law stipulated in the Article 12 that the Ministry shall, when necessary, delegate the power of inspection to the following units:

- Provincial special administration,
- Municipalities having established environmental inspection units,
- Undersecretariat of Maritime Affairs,
- Coast Guard Command,
- The inspectors determined in accordance with the Highways Traffic Act No. 2918 dated 13/10/1983.

Table 99 – Public institutions and authorities delegated with the power of inspection by the Ministry of Environment and Urbanisation and topics (Ministry of Environment and Urbanisation, 2016)

RELATED By Law	NOTICE NO	INSTITUTIONS DELEGATED WITH AUTHORITY	NUMBER
By Law on Control of Vegetable Waste Oil	2872-12 mad.	11 Metropolitan Municipalities, 83 Mayorships	95
Excavation Soil, Construction And Demolition Wastes	2008/6	Metropolitan Municipalities of İstanbul, Kocaeli, Sakarya, Gaziantep, Bursa, Ordu, Ankara	7
Control of Air Pollution Resulting from Heating	2006/19	17 Metropolitan Municipalities 149 Mayorships	166
Assessment and Management of Environmental Noise	2006/16	6 Metropolitan Municipalities, 83 Mayorships, Coast Guard Command Traffic Control Team	101
Fish Farms to be Established in Seas	2010/11	Coast Guard Command	1
Marine Pollution From Ships	2011/9	Coast Guard Command The Undersecretariat of Maritime Affairs, Metropolitan Municipalities of İstanbul, Kocaeli, Mersin, Antalya	6

Table 100 – Distribution of the number of environmental inspections by years (Ministry of Environment and Urbanisation, 2016)

	2011	2012	2013	2014	2015
Central Org.	729	543	271	295	323
Provincial Directorates	50.313	38.058	37.196	43.674	48.358
TOTAL	**51.042**	**38.601**	**37.467**	**43.969**	**48.681**

H.6.2. Amounts of Imposed Administrative Sanctions

Provisions on monitoring and inspecting whether obligations are fulfilled, decisions relating administrative enforcements (administrative fines, termination of activity) to be applied in the case of non-compliance with the obligations in the Law and By Laws, authorities to impose enforcements, exceptions against decisions, judicial punishments and responsibilities of the polluter are stated in the Environmental Law No. 2872 and related By Laws. Some other judicial punishments are also regulated in Article 26 of the Law as well as administrative enforcements.

Besides, Law No.5326 on Misdemeanor, as well as the Environmental Law No. 2872 should also be taken into consideration while framing and implementing the decisions of administrative enforcements. Crimes of polluting the environment recklessly, polluting the environment deliberately and making noise are regulated in the Chapter of Offenses against the Environment in Turkish Criminal Code N.5237.

Through the “Law on Amendments to the Environmental Law” dated 26 April 2006, abrogated Ministry of Environment and Forestry was delegated with the power of inspection (Article 12) and administrative enforcement (Article 24). The only exception about administrative enforcement is Article 15, in which the provision of suspension of activities is stated. In Article 15, it is stated that “any activities started without preparing project introduction file shall be suspended by the highest local administrative authority without granting any extension of time.” Since 26 April 2006, the authority of implementing the provisions of the Environmental Law N. 2872, inspection and enforcement is vested in the Ministry of Environment and Urbanisation.

Moreover, it is stated in the Article 24 of the Environmental Law that the power to carry out environmental inspections and impose sanctions, if necessary, can be delegated by the Ministry to special provincial administrations, municipalities which have established environmental inspection units, Undersecretariat of Maritime Affairs, Coastal Guard Command.

Table 101 – Total amount (TL) of fines, by years, imposed by the Ministry of Environment and Urbanisation under the Environmental Law (TL), (Ministry of Environment and Urbanisation, 2016)

Years	Central Organization	Provincial Directorates	TOTAL
2011	4.295.737	52.136.032	56.431.769
2012	1.383.702	57.164.230	58.547.932
2013	14.315.119	62.730.471	77.045.590
2014	14.755.057	83.894.172	98.649.229
2015	4.031.453	114.845.656	118.877.109

Table 102 - Distribution of the number of suspension of operation taken by the Ministry of Environment and Urbanisation under the Environmental Law (Ministry of Environment and Urbanisation, 2016)

Years	Central Organization	Provincial Directorates	TOTAL
2011	46	151	197
2012	11	108	119
2013	12	162	174
2014	42	77	119
2015	50	61	111

H.6.3. Market Surveillance and Inspection Activities

The "Law No.4703 on Preparation and Implementation of the Technical Legislations Regarding the Products" which constitutes the legal basis for the establishment of a system in parallel with the European Union's Market Surveillance and Inspection system in our country and the "By Law on Market Surveillance and Inspection of Products" prepared pursuant to the mentioned Law have been in force since 11 January 2002. The Law No.4703 stipulates that the producers shall introduce only safe products to the markets and empowers the public intuitions to prepare and implement specific By Laws to be applied to such products.

Solid fuel inspections, which are under the responsibility of the Ministry and the institutions/organizations to which the related authority is delegated, are carried out under the environmental Law No.2876 and the secondary legislations published within the scope of this Law.

Data on market surveillance and inspection activities regarding solid fuels, performed by Provincial Directorates of Environment and Urbanisation and institutions/organizations which are entrusted with authority, is presented in Table 103.

Table 103 – Distribution of Market Surveillance and Inspection activities by years (Ministry of Environment and Urbanisation, 2016)

	2011	2012	2013	2014	2015
Number of MSI (item)	1.662	28.220	24.141	20.573	17.023
Imposed Fine Amount (TL)	2.756.617	1.082.012	1.003.346	519.681	199.952

H.7. Environmental Qualification Works

H.7.1. EIA Qualification Works

Qualification certificates are granted to the institutions/organizations which will prepare Environmental Impact Assessment Application File, Environmental Impact Assessment Report and Project Introduction File under the Communiqué on Qualification Certificate by the Ministry of Environment and Urbanisation. Additionally monitoring and inspection activities have been carried out on the institution with qualification certificates under the communique.

Table 104 – Distribution of the number of firms with EIA Qualification Certificate by years (Ministry of Environment and Urbanisation, 2016)

Years	Number of Certificated Firms	Number of Inspected Firms
2004 - 2010	191	211
2011	21	2
2012	20	45
2013	14	90
2014	25	181
2015	14	114
TOTAL	**285**	**643**

H.7.2. Qualifications of Environmental Representatives, Environmental Consulting Firms and Environmental Management Units

Concepts such as “Environmental Representative”, “Environmental Management Units” and “Environmental Consulting Firms” have been formed in order to enable the plants and facilities to carry out a more active process in respect to prevention of environmental pollution and increase professionalism and efficiency with regard to compliance with the law, and it has been aimed to ensure that the environmental representatives can manage the activities of the institutions, organizations and facilities which may damage the environment or cause environmental pollution as a result of their activities and thereby contribute to the protection of the environment by preventing the pollution.

The legal framework of the issue has been established by the amendment to the Environmental Law No. 2872 made by the Law No.5491 in 2006 and thereby the 2nd Supplementary Item of the Law requires the institutions, organizations and facilities which, as a consequence of their activities, may cause environmental pollution or harm the environment to establish environmental management units, employ environmental representatives or procure service from the institutions or corporations authorized by the Ministry.

Related procedures and principles are regulated by the Ministry, for the first time, in the By Law on Environmental Inspection which entered into force on 01 January 2009 following its publication in the Official Gazette No. 27061 dated 21.11.2008. Later on, related procedures and principles were regulated in a more comprehensive manner in the “By Law on Environmental Representatives, Environmental Management Unit and Environmental Consulting Firms” published in the Official Gazette N.28828 dated 21.11.2013 (Amended: 06/05/2014-28992).

Authorization of the Environmental Representatives, Environmental Management Units and Environment Consulting Firms under the By Law in question is carried out by Directorate General of EIA, Permit and Inspection through “Online Environmental Representatives and Environmental Permits Portal”.

Table 105– Number of qualification certificates for environmental consultancy (Ministry of Environment and Urbanisation, 2016)

ACTIVITY	2011	2012	2013	2014	2015
Cumulative Number of Environmental Consultancy Qualification Certificates granted online	241	559	736	794 626 (active)	*632
Cumulative Number of Environmental Representative Qualification Certificates granted online	7.253	9.644	12.533	13.292	14.676
Cumulative Number of Environmental Management Unit Qualification Certificates granted online	-	-	-	144	216
Number of Inspections to Environmental Consultancy Firms	-	94	111	229	199

* The By Law on Environmental Representatives, Environmental Management Unit and Environmental Consulting Firms No. 28828 dated 21.11.2013 was revised and published in the Official Gazette No. 28992 dated 06.05.2014. Since some of the firms were closed as they did not fulfill their liabilities according to the new provisions of the By Law, the number of certificates has been determined as 632 as of the end of 2015.

H.7.3. Laboratories Authorized to Carry Out Environmental Measurements

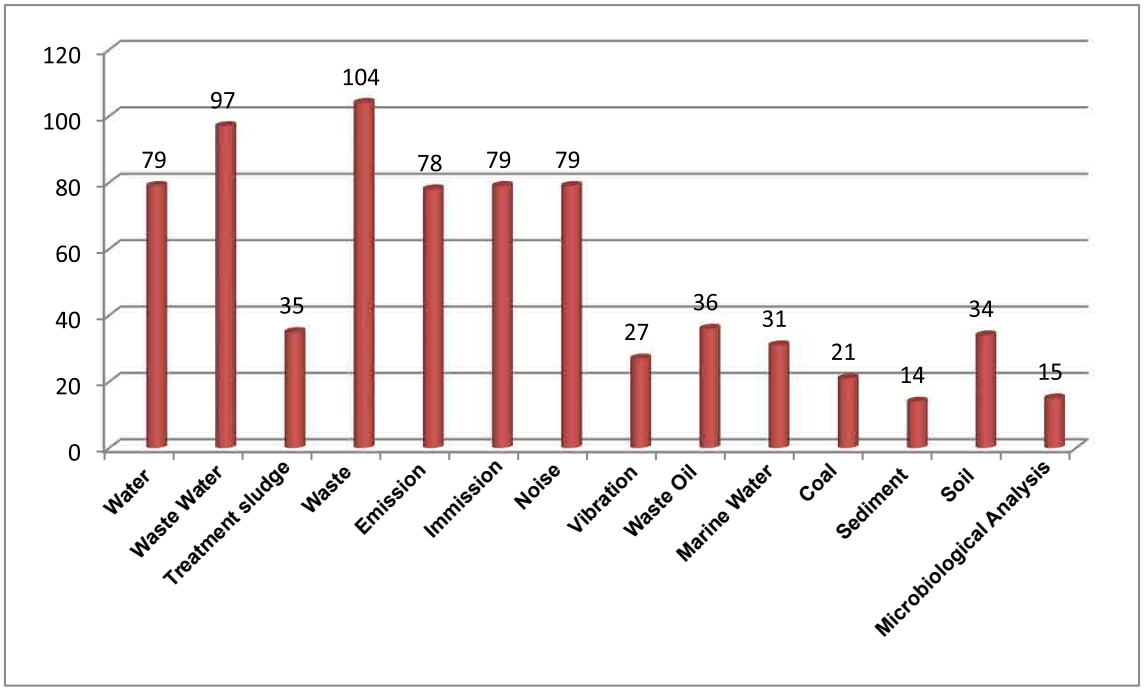
"Qualification Certificates for Environmental Measurement and Analysis" have been granted to private and public laboratories operating within the scope of Environmental Legislation, since 2004.

The By Law on Qualification of Environmental Measurement and Analysis Laboratories published in the Official Gazette N. 26988 dated 05.09.2008 was revised and amended in line with the new requirements encountered during the application of the By Law, and the revised version was published in the Official Gazette N. 28862 dated 25.12.2013.

The number of laboratories which are authorized by the Ministry Environmental Reference Laboratory between 2011 – 2015 to conduct measurements and analyses within the scope of environmental legislation is presented in Table 106.

Table 106– Changes, by years, in the number of laboratories authorized to conduct measurements/analyses within the scope of environmental legislation (Ministry of Environment and Urbanisation, 2016)

THE NUMBER OF AUTHORIZED LABORATORIES			
YEARS	PUBLIC	PRIVATE	TOTAL
2011	42	100	142
2012	51	102	153
2013	46	113	159
2014	41	115	156
2015	42	118	160



Graph 48 – Distribution of the laboratories authorized to conduct measurement/analysis within the scope of environmental legislation by year 2015 (Ministry of Environment and Urbanisation, 2016)

72 of 160 authorized laboratories operating within different scopes under the Environmental Legislation were inspected on-site as of 2015. Laboratories are able to access updated data about their licenses on the official web site of the Ministry.

H.7.4. Confirmatory institutions

The "By Law on Monitoring of Greenhouse Gas Emissions" entered in force after being published in the Official Gazette No. 28274 dated 25 April 2012.

Within the scope of the legislation, it is aimed to monitor greenhouse gas emissions from sectors such as electricity and vapor production, cement, iron-steel, ceramic, lime, paper and glass production which creates a substantial amount of national greenhouse gas emissions.

Confirmation of greenhouse gas emission reports and authorization of confirmatory institutions will be executed by Autonomous Confirmatory Institutions and facilities will be reported by certified institutions. Responsibility of reporting will be imposed on facilities on 30 April 2016 within the scope of the By Law. An important step has been taken in EU Environmental Stage negotiations thanks to this By Law.

Confirmatory institutions have to be accredited by Turkish Accreditation Agency (TÜRKAK) before obtaining authorization certificate from the Ministry of Environment and Urbanisation. Qualification of confirmatory institutions for confirmation activities, their periodical inspections and principles regarding their accreditation are determined by TÜRKAK according international or/ and national standards and methods.

Communique on Confirmation of Greenhouse Gas Emission Reports and Authorization of Confirmatory Institutions took effect after being published in the Official Gazette No. 29314 dated 2 April 2015.

The communique aims to designate procedures and principles on confirmation of greenhouse gas emission reports under the By Law on Monitoring of Greenhouse Gas Emissions and qualifications of the confirmatory institutions that will carry out these works.

The communique is the last component of the legislation on monitoring, reporting and confirmation of greenhouse gas emissions and the legislation was completed with publication of the communique. The legislation that was prepared in concordance with the European Union Emission Trade system is also an important step in Environment Stage.

The communique includes provisions on qualities of confirmatory institutions and personnel, how the works and transactions will be conducted, and responsibilities of facilities in confirmation process and objectivity and independence of confirmatory institutions.

Greenhouse gas emission reports regularly prepared by facilities every year will be confirmed by confirmatory institutions authorized by the Ministry and will be submitted to the Ministry.

Responsibility of reporting will be imposed on facilities on 30 April 2016 within the scope of the By Law on Monitoring of Greenhouse Gas Emissions.

H.7.5. Mobile Tracking Service Providers for Waste

Procedures and principles regarding determination of qualifications of Mobile Tracking Service Providers for Waste are designated within the Communique on Road Transportation of Waste published in the Official Gazette No. 29301 dated 20.03.2015.

These procedures and principles were designated with the intent of controlling transportation of waste from producer to disposal facility. The communique aims to prevent unorganized disposal of wastes by controlling transportation of waste from producer to disposal facility without loss by certified firms.

Only one (1) firm has been certified within the scope of the procedures and principles regarding determination of qualifications of Mobile Tracking Service Providers for Waste.

H.7.6. Clearance of Soil Pollution

“By Law on Soil Pollution Control and Point Source Contaminated Sites” took effect after being published in the Official Gazette No. 27605 dated 08.06.2010. “The Communique regarding Qualification Documents for Soil Pollution Control and Clearance of Point Source Contaminated Sites” was also put into effect pursuant to Article 34 of the above mentioned By Law after publishing in the Official Gazette No. 28323 dated 14.06.2012. The communique covers the topics concerning required qualifications of organizations/institutions, their operation procedures and principles, evaluation of their applications and inspections. However, liabilities of the certified firms under the communique started after 08.06.2015. Within this context, 17 firms have been granted with “Qualification Documents” as of March 2016 and 1 firm has been decertified. There are totally 16 certified operating institutions and organizations.

H.7.7. Risk Assessment on Prevention of Pollution in Marine Environment

Communique on Authorization of Institutions and Organizations that will prepare Risk Assessment Concerning Pollution of Marine Environment by Oil and other Hazardous Substances and Emergency Response Plans took effect after being published in the Official Gazette No. 29203 dated 12.02.2014. The communique was prepared pursuant to “The By Law regarding implementation of the Law Pertaining to Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Harmful Substances” published in the Official Gazette No. 26326 dated 21.10.2006.

The communique covers the topics concerning required qualifications of organizations and institutions that will prepare risk assessment and emergency response plans, their operation procedures and principles, evaluation of their applications and inspections.

Document applications of the institutions and organizations are evaluated and concluded by the Ministry of Environment and Urbanisation. Within this scope, 6 (six) institutions and organizations have been granted with "Qualification Document" as of March 2016 at the end of their applications pursuant to the communique.

H.8. EU Environmental Investments

Within the scope of the Environment Operational Programme (IPA 1st Period 2007-2013) applications were made to European Commission for 39 environmental infrastructure projects that cost around 981 million Euros as of 2015. Data on implementation status of these projects is provided on Table 107 below.

Within this frame, 143,29 million Euros was granted from the budget of Environment Operational Programme for the projects in 2015 and a total amount of 337,31 million Euros has been granted so far. 50,60 million Euros of the total amount and 21,49 million Euros of the amount in 2015 was granted from the national budged.

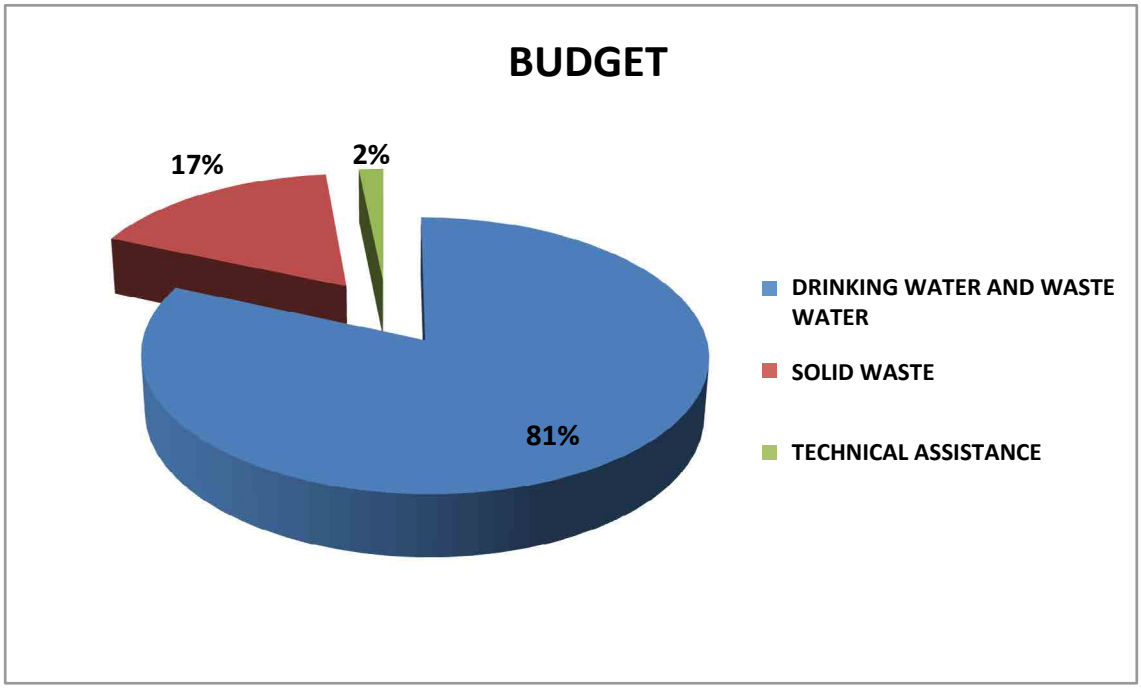
Table 107 - The projects submitted for IPA (Ministry of Environment and Urbanisation, 2016)

State and Total Amount of Investment	Number
Projects Decided to Be Financed (845 Million Euros)	31 (Ordu, Erdemli, Doğubayazıt, Manavgat, Ceyhan, Amasya, Lüleburgaz, Siverek, Erzurum, Erzincan, Diyarbakır, Konya, Adıyaman, Balıkesir, Merzifon, Soma, Seydişehir, Çorum, Bulancak, Nizip, Akçaabat, Akşehir, Bartın, Polatlı, Silvan, Kahramanmaraş, Erciş, Diyarbakır Solid Waste, Kütahya, Şanlıurfa, Mardin)
Projects that are planned to suspend for IPA II Period (121 Million Euros)	7 (Van, Batman Katı Atık, Aksaray, Suluova, Çarşamba Atıksu, Sorgun, Kars)
Project revoked from IPA (15 Million Euros)	1 (Ereğli Solid Waste Project)
Total Amount of Investment	**981 Million Euros**

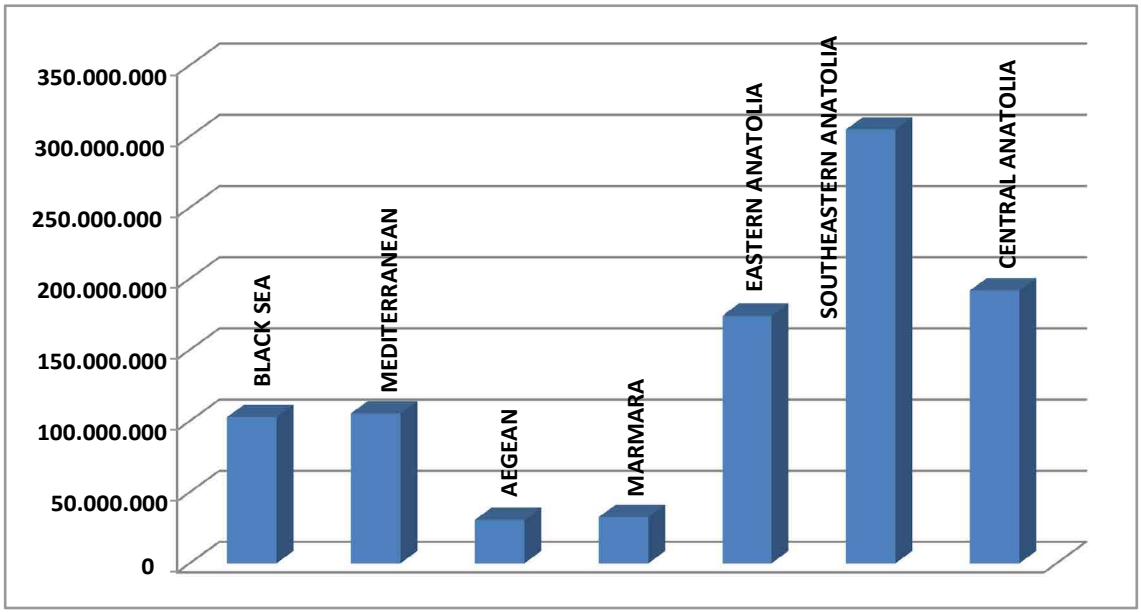
	Amount
European Union IPA Fund	834 Million Euros
National Fund	147 Million Euros
• Ministry Fund	59 Million Euros
• Municipal Fund	88 Million
Total Amount of Investment	**981 Million Euros**

Preparation works for 21 integrated water and 15 solid waste projects (36 in total) which cost around 1 billion Euros are under progress within the scope of IPA II Period (2014-2010).

Additionally, preparation works for IPA II Period started in February 2014 and a workshop on prioritization of investment projects was held in March 2014. Proposals for capacity building projects were received in 2014 and evaluation process still continues. All beneficiaries were demanded to revise their capacity building projects, proposed in 2015, according to revised "Project Identification Document" that is an annex of IPA II Period Financing Memorandum. Evaluation and prioritization works of revised project proposals are still in progress.



Graph 49 - Distribution of budget by project priorities (Ministry of Environment and Urbanisation, 2016)



Graph 50 - Project budgets by regions (Ministry of Environment and Urbanisation, 2016)

H.8.1 Implementation Activities

There are 31 projects started to be implemented by the Ministry of Environment and Urbanisation by the end of 2015:

1. Manavgat Water and Wastewater Project
2. Erdemli Water and Wastewater Project
3. Lüleburgaz Wastewater Project
4. Siverek Water and Wastewater Project
5. Doğubayazıt Domestic Water Supply Project

6. Ordu Wastewater Treatment Plant
7. Balıkesir Solid Waste Project
8. Erzincan Water and Wastewater Project
9. Erzurum Water and Wastewater Project
10. Diyarbakır Water and Wastewater Project
11. Ceyhan Wastewater and Rainwater Project
12. Amasya Water and Wastewater Project
13. Adıyaman Wastewater Project
14. Nizip Domestic Water Project
15. Bulancak Water and Wastewater Project
16. Konya Solid Waste Project
17. Çorum Solid Waste Management Project
18. Akçaabat Water and Wastewater Project
19. Erciş Domestic Water Supply Project
20. Polatlı Wastewater Project
21. Bartın Wastewater Treatment Plant Construction and İnkumu Wastewater Collector, Preliminary Treatment and Sea Discharge Construction
22. Seydişehir Wastewater Treatment Plant Project
23. Silvan Domestic Water Supply Project
24. Soma Wastewater Project
25. Diyarbakır Integrated Solid Waste Project
26. Kahramanmaraş Water and Wastewater Project
27. Mardin Water and Wastewater Project
28. Merzifon Water and Wastewater Project
29. Şanlıurfa Water and Wastewater Project
30. Akşehir Wastewater Project
31. Kütahya Wastewater Project

Final acceptance process of the construction works for Erdemli Wastewater Collection and Rainwater Drainage Project, Balıkesir Organized Solid Waste Storage Facility, Manavgat Water Supply Project, Doğubeyazıt Domestic Water Supply Project have been completed.

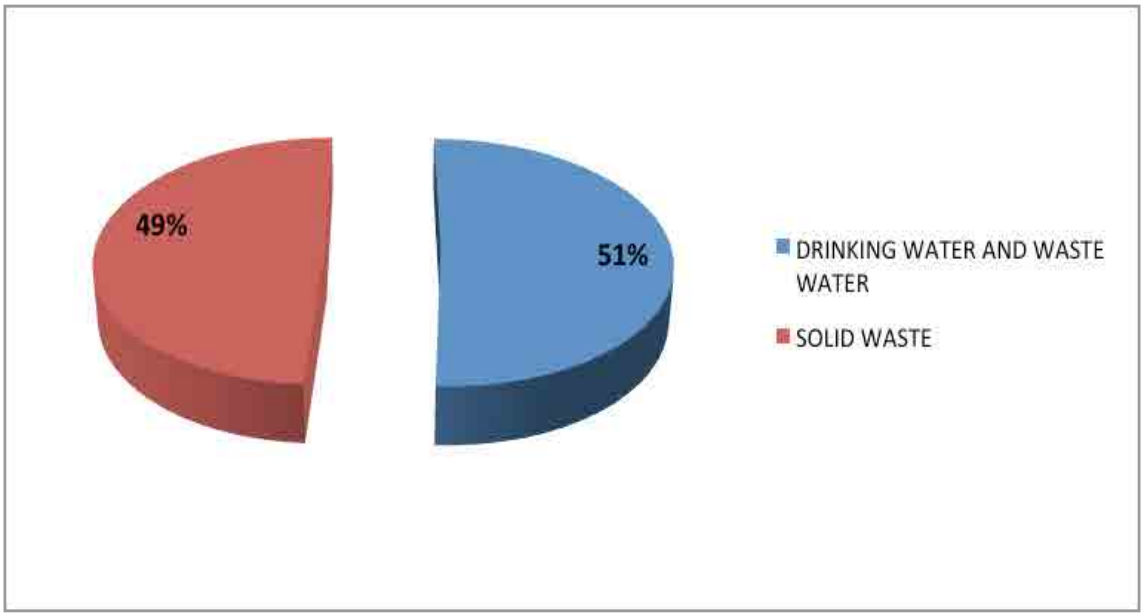
The provisionally accepted projects include: Construction of Lüleburgaz Wastewater Treatment Plant and Rehabilitation of Kavak Creek, Siverek Wastewater Treatment Plant, Ordu Wastewater Treatment Plant, Improvement of Kumbaşı Wastewater Treatment Plant and Construction of Erzurum Wastewater Treatment Plant, Construction of Diyarbakır Wastewater Treatment Plant, Construction of Amasya Wastewater Treatment Plant, Construction of Ceyhan Wastewater Treatment Plant and Ceyhan Wastewater and Rainwater Project.

2. Construction contracts have been signed within the scope of Manavgat, Diyarbakır, Ceyhan, Siverek, Doğubayazıt, Erdemli projects.

95 tenders were made and bounded by contract between 2011-2015 and these tenders included 45 for service procurement, 8 for equipment purchase and 42 for construction works.

Detailed information on the projects that are in implementation process is provided below.

Projects that are Announced and in Tender Phase: Currently 3 service procurement tenders (Project for Technical Assistance on Improving Capacity of the Ministry of Environment and Urbanisation for Environmental Impact Assessment, Water Ambassadors Education and Awareness Raising Project, Technical Assistance and Consultancy for Bartın Project) are in tender phase and total estimated budget of these projects is 4,95 million Euros.



Graph 51- Population served by the project according to priorities (Ministry of Environment and Urbanisation, 2016)

Projects that will be presented for tenders: 33 tenders for 25 projects (Adıyaman, Akşehir, Manavgat, Ceyhan, Şanlıurfa, Bartın, Akçaabat, Doğubayazıt, Erciş, Bulancak, Erdemli, Erzincan, Kahramanmaraş, Polatlı, Diyarbakır, Diyabakır Solid Waste, Seydişehir, Silvan, Soma, Erzurum Water and Wastewater Projects, Merzifon, Siverek, Nizip Domestic Water Projects, Konya, Çorum Solid Waste Projects) will be announced after necessary preliminary approval procedures are completed with EU Delegation of Turkey and tender phase will start. Total budget of the contracts is around 30,17 million Euros.

Table 108- Environment Operational Programme (EOP) (Ministry of Environment and Urbanisation, 2016)

Budget: EOP budget	981 Million Euros
2. Term SOP (Sector Operational Programme)	644,5 million Euros

Projects Starting EOP (25)	Completed Projects EOP (6)	Projects That Do Not Begin EOP (8)
Adıyaman Wastewater Project,	Balıkesir Solid Waste Management Project	Kars Wastewater Project,
Akçaabat Water and Wastewater Project	Doğubayazıt Domestic Water Supply Project	Sorgun Wastewater Project,
Amasya Water and Wastewater Project	Erdemli Water and Wastewater Project	Suluova Water and Wastewater Project,
Bulancak Water and Wastewater Project	Lüleburgaz Wastewater Project	Van Solid Waste Project,
Ceyhan Wastewater and Rain Water Project	Manavgat Water and Wastewater Project	Aksaray Wastewater Project,
Çorum Solid Waste Management Project	Ordu Wastewater Project	Ereğli Solid Waste Project,
Diyarbakır Water and Wastewater Project		Batman Solid Waste Project,
Erciş Domestic Water Supply Project		Çarşamba Solid Waste Project,
Erzincan Water and Wastewater Project		
Erzurum Water and Wastewater Project		
Konya Solid Waste ManagementProjesi		
Nizip Water and Wastewater Project		
Polatlı Water and Wastewater Project		
Siverek Wastewater Project		
Soma Wastewater Project		
Merzifon Wastewater Project		
Seydişehir Wastewater Project		
Akşehir Water and Wastewater Project		
Bartın Wastewater Project		
Silvan Water Project		
Kahramanmaraş Water and Wastewater Project		
Kütahya Wastewater Project		
Diyarbakır Integrated Solid Waste Project		
Şanlıurfa Water and Wastewater Project		
Mardin Wastewater Project		

Objectives for 2016: it is planned to complete tender process and make contracts for 33 tenders, including 6 service procurement, 1 construction and 26 equipment purchase, in tender plan for 2016.

It is planned to complete prioritization works of infrastructure projects within the scope of IPA II and complete the preparation processes of capacity building projects.

Additionally, within the scope of improving the capacity of the Directorate of European Union Investments, framework contracts for technical assistance projects on Monitoring and Assessment Activities, Trainings and Capacity Building , each with a budget of around 300.000 Euros, have been signed and they are in implementation stage.

Table 109 – Number of Environment Operational Programme (Ministry of Environment and Urbanisation, 2016)

Total Number of Projects	39
Number of Solid Waste Projects	7
Number of Water Projects	32

Table 110 - Cost of projects under Environment Operational Programme, (Ministry of Environment and Urbanisation, 2016)

Contract Type	2011 (MEUR)	2012 (MEUR)	2013 (MEUR)	2014 (MEUR)	2015 (MEUR)	TOTAL (MEUR)
Service procurement	6,3	5,8	20	12,9	23,19	68,19
Construction	27,7	30,1	54,3	70,8	171,66	354,56
Equipment Supply	-	-	0,1	0,1	2,36	2,56
TOTAL	**34**	**35,9**	**74,4**	**83,8**	**197,21**	**425,31**

H.9. New Applications in Environmental Matters

H.9.1. Management of Online Environmental Impact Assessment Process

When industrialization process in Turkey for recent years is analyzed, it is observed that the industrial growth continues increasingly. The need for a faster, more efficient and more transparent actualization of EIA processes for new ınDustrial facilities, infrastructure facilities, mines and energy production facilities, which are the major factors in this industrial growth, has required the Ministry of Environment and Urbanisation to carry out EIA procedures electronically.

The project, included in Investment Programme of 2012, was completed after tender process was completed, testing phase was completed, users were trained and the system was put into use on 01.11.2013. Thanks to this system, all assessments performed under EIA By Law can be monitored by Central and Provincial organizations of the Ministry of Environment and Urbanisation. A coordination has been provided between Central and Provincial organizations of Ministry of Environment and Urbanisation and differences in application have been eliminated.

Online EIA Management System that was put into use after revision of EIA By Law was completed is actively used and applications for qualification are only made electronically.

Online EIA Management System was deemed worthy of the first prize in e-Services in Public and Business Sector Category by the jury of the 12th eTurkey (eTR) Awards held by TUSİAD (Turkish Industry and Business Association) and Turkish Informatics Association with a view to accelerate competition increasing, knowledge based and eService oriented transformation during the process of harmonization with EU.

Thanks to this system;

- EIA Authorized institutions and organizations (consultancy firms) are able to make EIA applications by signing in with their system-defined usernames and passwords and by using their e-signatures.
- All procedures and operations in EIA process can be carried out electronically.
- All decisions given under EIA By Law are accessible and a comprehensive database has been created. Database outputs can be used in decision making phases of EIA processes.

Figure 11–Graphic illustration of "Sectoral Distribution" for Annex-1 and Annex-2 projects.

By applying filters on the software;

- Distribution of Environmental Impact Assessment processes in Annex-1 and Annex-2 can be seen on maps,
- Graphic illustrations of "Sectoral Distribution" for Annex-1 and Annex-2 projects can be obtained,
- Graphic illustrations of "Provincial Distribution" for Annex-1 and Annex-2 projects can be obtained,
- "EIA Positive Decisions" can be inquired,
- "EIA not Required Decisions" can be inquired,
- "EIA Required Decisions" can be inquired.

H.9.2. Online Environmental Permit

Works on moving the By Law on Environmental Permit and License on electronic medium are called "Online Environmental Permits".

Online Environmental Permits enables facilities to apply for environmental permits and licenses in a fast, accurate, smooth, transparent and easy way with an integrated approach. The project was among the 11 e-state projects prioritized by the Ministry among 300 e-state projects and it is the first project to be implemented.

Thanks to this system, facilities can apply for permits under any topic of their area of operation for 7/24 from everywhere with an internet connection by using their e-signatures and they can follow the status of their application online. These applications are evaluated by the authorities online and the process is completed without using wet signature in all stages.

Within this system, 4 different permits and 21 different licenses that are granted according to sector and area of operation have been gather under the same roof of "environmental permits and licenses". Simplifications were also made on types of documents and information and the number of required documents has been reduced from 199 to 11. Currently "electronic application" and "electronic/mobile signature" are used instead of applications that was made in the past by wet signature and stamps.

Moreover, the project was deemed worthy of the first prize in e-Services in Public and Business Sector Category by the jury of the 12th eTurkey (eTR) Awards.

H.9.3. Environmental Qualification Works

Online EIA Process Management System (e-EIA) was put into use on 01 November 2013 and has been in use since then. Since this date, processes of granting qualification documents to institutions/organizations that will prepare Environmental Impact Assessment Application File, Environmental Impact Assessment Report and Project Presentation File, and assessment and approval processes of facilities that are owned by institutions/organizations with Qualification Document have been carried out online through e-EIA system. In this way, existing data is kept on electronic medium and paper wastage is reduced considerably.

H.9.4. Certification Works

Within the scope of the "By Law Environmental Representatives, Environmental Consulting Firms and Environmental Management Units", authorization works of environmental representatives, environmental consulting firms and environmental management units are conducted by General Directorate of EIA, Permit and Inspection operating under the Ministry of Environment and Urbanisation. Application, evaluation and approval processes regarding the authorization are carried out electronically through "Online Environmental Representatives and Environmental Permits Portal".

H.9.5. Project for Monitoring Administrative Sanctions Imposed by the Ministry of Environment and Urbanisation (e-inspection)

The e-inspection software that enables implementation of all environmental inspection processes through digital and web-based medium was completed in 2014 and started to be used by all Provincial Directorates in 2015. It is possible through e-inspection program to conduct environmental inspections, prepare and save official reports, inspection reports and administrative sanction reports and follow administrative sanctions and related lawsuit process (if any).

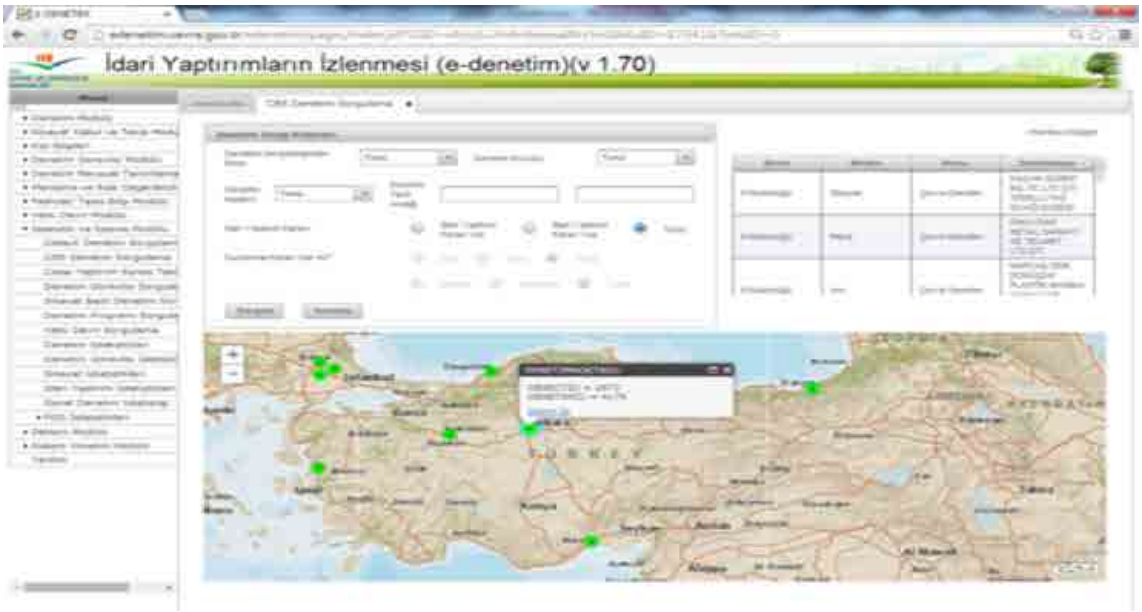


Figure 12 – e-inspection software homepage

H.9.6. Project for Preparing a Sectoral Environmental Inspection Guide on Industrial Facilities

The Research and Development Project for Preparing a Sectoral Environmental Inspection Guide on Industrial Facilities that started in 2014 with the aim of investigating, developing and preparing a guide document for inspectors working at central and provincial organizations by considering the need for a more efficient environmental inspection and institutional capacity improvement, and the project was completed in 2015. The project was conducted with the cooperation of the Ministry of Environment and Urbanisation and Yıldız Technical University.

By this way, all processes in the facilities are analyzed and possible pollutants from sectors and standards to be met under the environmental legislation are considered together. The guide includes general information and flow process Table relating to industrial facilities in Turkey, possible water, air, soil pollution parameters, information on disposal methods of possible pollutants and information on how to limit possible pollutants. The guide document also includes summaries of environmental legislations and information on related legislation is easily accessible in case of necessity.

H.9.7. BEKRA Notification System

Update, development and maintenance of the "Seveso Notification System" software operating under Environmental Information System has been completed within the scope of the "Project for Technical Assistance on Increasing the Implementation Capacity of Seveso II Directive" and name of the system has been changed as BEKRA Notification System.

Architecture of the system has been redesigned, functions associated with the layers of Geographical Information System have been assigned, and system interface has been redesigned to provide a more efficient and easy use. The system was brought into service on 15 January 2016.

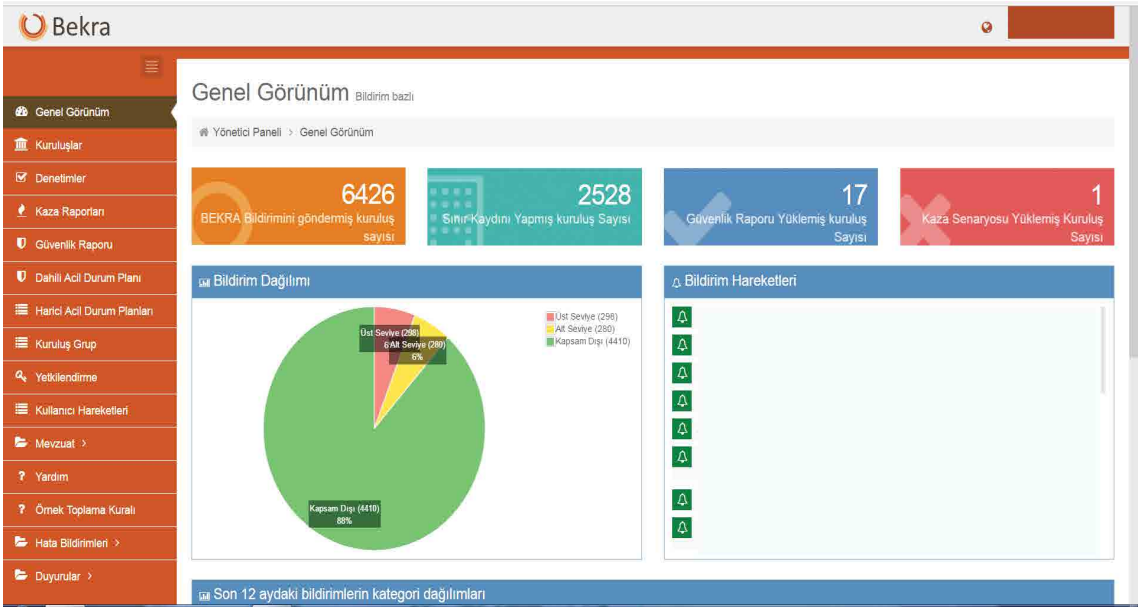


Figure 13 – BEKRA System internet homepage

H.9.8. Strategic Environmental Assessment Works

Works on alignment with EU WFD Directive started in Turkey after the Directive on Strategic Environmental Assessment was published in 2001. Two WFD projects were conducted in 2003-2005 and 2008-2009 by abrogated Ministry of Environment and Forestry through bilateral cooperation programme (MATRA) with Netherlands.

The "Project for Technical Assistance on Implementation of the By Law on Strategic Environmental Assessment", supported by EU IPA fund (1.150.000 Euros, National co-finance 115.000 Euros), started on 12.05.2014 with an intent to increase awareness of all stakeholders on Strategic Environmental Assessment; in order to improve institutional capacity of the Ministry of Environment and Urbanisation and the institutions that are responsible for implementation of Strategic Environmental Assessment, to conduct pilot Strategic Environmental Assessment activities in four different sectors (water management, energy, agriculture, transportation) and to finalize the draft By Law on Strategic Environmental Assessment.

In order to increase communication and accuracy of project management and results, the activities are divided into 4 groups according to their main focus.

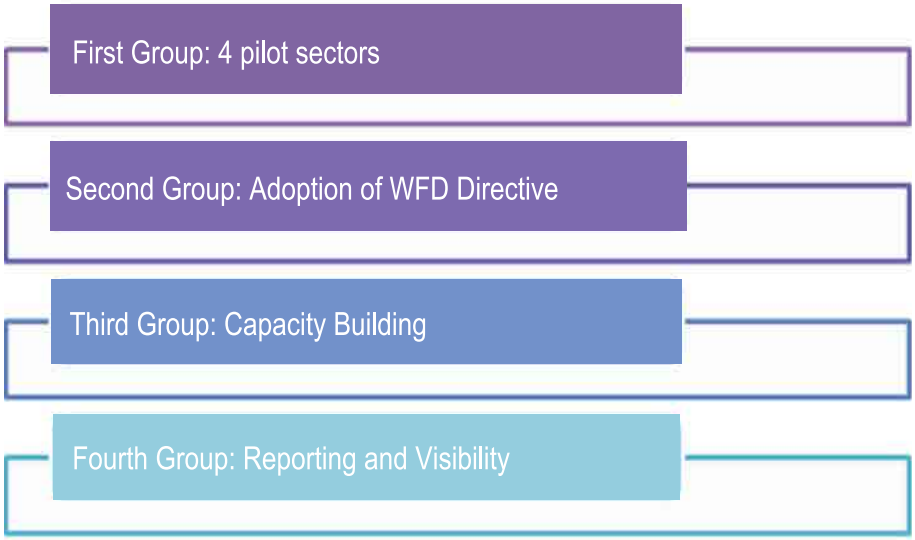


Figure 14 –Activities within the Project for Technical Assistance on Implementation of the By Law on Strategic Environmental Assessment

As can be seen on Table 11, pilot works were conducted in 4 sectors within the scope of the project.

Preliminary contact and consultation meetings were held in Ankara and information was provided to attendants on SEA process within the scope of the Strategic Environmental Assessment activities in water management, agriculture, regional planning and energy sectors.

Table 111 - Pilot projects within the Project for Technical Assistance on Implementation of the By Law on Strategic Environmental Assessment

Sector	Institution	Plan
Water Management	Ministry of Forestry and Water Affairs (General Direc. of Water Management)	Büyük Menderes River Basin Management Plan Draft
Renewable Energy	Ministry of Energy and Natural Resources (General Directorate of Renewable Energy)	Konya-Karapınar Energy Specialization Industrial Area
Agriculture	Ministry of Food, Agriculture and Livestock (General Directorate Of Agricultural Reform)	Bozcaada-Gökçeada Agricultural Master Plan
Regional Planning	Ankara Development Agency	Ankara Regional Plan

Later, SEA Information and Scoping Meetings (Konya, Aydın, Çanakkale and Ankara), in which Draft Scoping Reports prepared et the end of pilot works were shared, were held and the fieldworks were conducted in March, April 2015. SEA Quality Meetings and field works were carried out in September-October 2015 in order to receive opinion and suggestions of the local stakeholders about Draft SEA Reports that were prepared by grounding on Scoping Report. The SEA Reports were finalized after the revision works by considering opinions and suggestions of both local and central stake holders.

Within the scope of aligning the domestic laws of England, Denmark, Netherlands, Italy, Czech Republic and Croatia with EU SEA Directive, reports were prepared on assessment of EIA/SEA processes and organization structure of EIA/SEA.

Additionally, implementation of the By Law on Strategic Environmental Assessment was added to 64th Government Programme in 2016. With enactment of the By Law on Strategic Environmental Assessment, “environment” topic will be integrated into all kinds of planning including energy, industry, agriculture, tourism and spatial planning.

SOURCES

- Ministry of Environment and Urbanisation, General Directorate of EIA, Permit and License
- Ministry of Environment and Urbanisation, Department of EU Investments
- Ministry of Customs and Trade
- Provincial Directorates of Environment and Urbanisation
- 2011 Environmental Inspection Report, Ministry of Environment and Urbanisation
- 2012 Environmental Inspection Report, Ministry of Environment and Urbanisation
- 2013 Environmental Inspection Report, Ministry of Environment and Urbanisation
- 2014 Environmental Inspection Report, Ministry of Environment and Urbanisation

I. ENVIRONMENTAL EXPENSES AND LIABILITY INSURANCE

I. ENVIRONMENTAL EXPENSES AND LIABILITY INSURANCE

I.1. Environmental Expenses

While the environmental expenses were 16,6 billion TL in 2012, it was 19,3 billion TL in 2013, and 20,7 billion TL in 2014. 69,6% of the total amount of environmental expenses in 2014 was current expenditures and 30,4% was for investments and 76,9% of total expenses was by public sector and 23,1% was by business sector.

Both in 2012,2013 and in 2014 rate of total environmental expenses in gross domestic product was 1,2%.

As can be seen on Table 112, municipalities has the biggest share in environmental expenses by public sector in years. Share of municipalities in total expenses by public sector was 79,7% in 2012, 80% in 2013 and 84,3% in 2014.

Table 112 – Environmental Expenses and incomes by sectors, 2012-2014, (TL), (TURKSTAT, 2015)

		TOTAL	Public Sector	Business Sector
2012	Environmental Expenses	16.582.227.650	12.847.762.971	3.734.464.679
	Environmental Incomes	12.958.504.678	8.713.644.789	4.244.859.889
2013	Environmental Expenses	19.274.653.031	14.913.569.045	4.361.083.986
	Environmental Incomes	15.992.055.847	10.242.578.060	5.749.477.787
2014	Environmental Expenses	20.731.867.039	15.935.132.926	4.796.734.113
	Environmental Incomes	18.732.888.604	11.268.098.612	7.464.789.992

35,6% of total environmental expenses in 2012 was for waste management services, 29,4% was for water services, 16,1% was for wastewater management services and 18,9% was for other environmental expenses. 37,6% of total environmental expenses in 2013 was for waste management services, 33% was for water services, 18,3% was for wastewater management services and 11,1% was for other environmental expenses. 41% of total environmental expenses in 2014 was for waste management services, 29,6% was for water services, 20,2% was for wastewater management services and 9,2% was for other environmental expenses.

It is observed that in 2012, 2013 and 2014 water services has the biggest chare in environmental expenses (successively 37,5%, 42,3% and 38%), and waste management services has the biggest share in business sector (successively 55,2%, 65,9% and 69%).

Total environmental income was 12,96 billion TL in 2012, 15,99 billion TL in 2013 and 18,73 billion TL in 2014, and 60,2% of environmental incomes in 2014 was from public sector and 39,8% was from business sector.

Table 113- Statistics on environmental employment, incomes and expenses, 2012-2014, (TURKSTAT, 2015)

		Environmental Expenses (TL)			Environmental Incomes (TL)
	Year	Total	Current	Investment	
TOTAL	2012	**16.582.227.650**	**10.891.437.616**	**5.690.790.034**	**12.958.504.678**
	2013	**19.274.653.031**	**13.045.521.637**	**6.229.131.394**	**15.992.055.847**
	2014	**20.731.867.039**	**14.431.149.964**	**6.300.717.075**	**18.732.888.604**
PUBLIC SECTOR	2012	12.847.762.971	7.973.180.883	4.874.582.088	8.713.644.789
	2013	14.913.569.045	9.147.080.451	5.766.488.594	10.242.578.060
	2014	15.935.132.926	10.240.364.351	5.694.768.575	11.268.098.612
Municipalities	2012	10.236.991.552	7.432.203.038	2.804.788.514	8.401.084.845
	2013	11.929.012.415	8.508.087.850	3.420.924.565	9.849.138.270
	2014	13.431.172.359	9.723.246.955	3.707.925.404	10.933.608.782
Provincial Special Administrations	2012	280.841.873	97.457.272	183.384.601	-
	2013	329.328.330	104.490.285	224.838.045	-
	2014	145.156.943	55.539.461	89.620.482	-
Local Administrative Unions	2012	420.982.105	201.762.169	219.219.936	180.474.302
	2013	558.595.173	263.507.958	295.087.215	229.615.747
	2014	307.323.621	173.667.825	133.655.796	127.725.908
Other Public Institutions[1]	2012	1.908.947.441	241.758.404	1.667.189.037	132.085.642
	2013	2.096.633.127	270.994.358	1.825.638.769	163.824.043
	2014	2.051.480.004	287.913.111	1.763.566.893	206.763.922
BUSINESS SECTOR	2012	3.734.464.679	2.918.256.733	816.207.946	4.244.859.889
	2013	4.361 083.986	3.898.441.186	462.642.800	5.749.477.787
	2014	4.796.734.113	4.190.785.613	605.948.500	7.464.789.992
Initiatives	2012	3.527.204.871	2.766.483.820	760.721.051	4.059.159.056
	2013	4.066.703.368	3.710.304.489	356.398.879	5.517.966.908
	2014	4.431.107.552	3.980.868.469	450.239.083	7.189.271.651
Organized Industrial Areas	2012	207.259.809	151.772.914	55.486.895	185.700.833
	2013	294.380.618	188.136.697	106.243.921	231.510.879
	2014	365.626.560	209.917.143	155.709.417	275.518.341

[1] Includes ministries and subsidiary and related institutions.

- No information.

The numbers on the Table may not be equal to the total number due to rounding.

Table 114- Environmental Expenses by sectors and topics, 2012-2014, (TURKSTAT, 2015)

	2012	2013	2014
Total (TL)	**16.582.227.650**	**19.274.653.031**	**20.731.867.039**
Conservation of outdoor air and climate	895.689.428	491.894.919	387.826.063
Wastewater management	2.664.966.519	3.527.271.073	4.197.858.467
Waste management	5.905.921.727	7.245.754.620	8.502.428.967
Conservation of soil and groundwater	122.279.308	168.672.511	170.686.356
Reducing noise and vibration	21.460.282	45.760.411	20.375.681
Preservation of biodiversity and landscape	338.230.197	384.661.949	444.419.596
Protection against radiation	7.734.014	9.110.839	10.099.939
Research and development	24.952.364	40.281.977	50.399.015
Water services	4.877.884.720	6.369.589.056	6.141.939.052
Energy	24.912.985	42.433.342	142.864.772
Other environmental expenses	1.698.196.105	949.222.333	662.969.129
Public sector	12.847.762.971	14.913.569.045	15.935.132.926
Conservation of outdoor air and climate	17.764.286	4.024.522	17.412.045
Wastewater management	2.124.810.212	2.821.255.850	3.447.254.985
Waste management	3.844.875.826	4.373.553.453	5.191.328.785
Conservation of soil and groundwater	95.110.719	139.066.981	135.164.317
Reducing noise and vibration	3.482	1.962.066	6.640.490
Preservation of biodiversity and landscape	313.483.024	359.729.258	422.641.890
Protection against radiation	2.100	133.201	3.180.573
Research and development	7.629.755	18.333.922	31.496.202
Water services	4.817.204.972	6.302.016.185	6 059.640.152
Energy	18.377.665	20.855.826	34.817.652
Other environmental expenses[1]	1.608.500.930	872.637.781	585.555.836
Business Sector	3.734.464.679	4.361.083.986	4.796.734.113
Conservation of outdoor air and climate	877.925.142	487.870.397	370.414.018
Wastewater management	540.156.307	706.015.223	750.603.482
Waste management	2 061.045.901	2.872.201.167	3.311.100.182
Conservation of soil and groundwater	27.168.589	29.605.530	35.522.040
Reducing noise and vibration	21.456.800	43.798.345	13.735.191
Preservation of biodiversity and landscape	24.747.173	24.932.691	21.777.707
Protection against radiation	7.731.914	8.977.638	6.919.367
Research and development	17.322.609	21.948.055	18.902.813
Water services	60.679.748	67.572.871	82.298.900
Energy	6.535.320	21.577.516	108.047.120
Other environmental expenses[1]	89.695.175	76.584.552	77.413.293

[1] Includes general environmental management, environmental training, activities whose expenses cannot be separated and activities that are not stated elsewhere.

The numbers on the Table may not be equal to the total number due to rounding.

As can be seen on Table 115, 68.486 people were employed in public institutions, special provincial administrations, organized industrial areas and environmental activities in 2014. Of those employed in environmental activities, 10% was female and 90% was male.

Table 115- Environmental employment by sectors, 2012-2014, (TURKSTAT, 2015)

	2012			2013			2014		
	Total	Female	Male	Total	Female	Male	Total	Female	Male
Total	63.331	6.570	56.761	65.124	6.401	58.723	68.486	6.883	61.603
Public Sector [1]	6.921	2.035	4.886	6.799	2.049	4.750	6.447	2.072	4.375
Provincial Special Administrations	1.855	207	1.648	1.847	222	1.625	1.003	103	900
Other public institutions [2]	5.066	1.828	3.238	4.952	1.827	3.125	5.444	1.969	3.475
Business sector	56.410	4.535	51.875	58.325	4.352	53.973	62.039	4.811	57.228
Enterprises	55.564	4.457	51.107	57.393	4.271	53.122	61 068	4.727	56.341
Mining and quarrying	758	91	667	812	106	706	592	67	525
Manufacturing industry	9.113	1.283	7.830	9.440	1.246	8.194	8.566	1.147	7.419
Production and distribution of electricity, gas, vapor and air conditioning	1.168	140	1.028	1.022	143	879	1.393	153	1.240
Water supply, sewerage, waste management and improvement services	26.526	1.722	24.804	30.577	1.597	28.980	33.695	1.598	32.097
Other Sectors	17.999	1.221	16.778	15.542	1.179	14.363	16.822	1.762	15.060
Organized industrial areas	846	78	768	932	81	851	971	84	887

[1] Environmental employment of municipalities and local administrative unions is not included.

[2] Covers ministries and subsidiary and related institutions.

I.2. Environmental Liability Insurance

Pursuant to 13th Article of the Environmental Law, those who engage in production, sales, storage, use and transportation of dangerous chemicals and who engage in collection, transportation, temporary and interim storage, recycling, reuse and disposal of hazardous wastes are obliged to have dangerous chemical and hazardous waste liability insurance in case of any harm to third parties as a result of an accident during their operational activities.

The risk concept accompanies incsurance concept so that coverage of possible risks can be assured. Within this context, environmental liability insurance is used as a tool in management of environmental risks today. The facilities with a potential to cause environmental pollution are able to assure possible environmental risks and any harm to third parties in case of a harm to the environment. Within the scope of the environmental legislation; General Conditions of Coastal Facilities Sea Pollution Liability Insurance entered in force on 01 July 2007; General Conditions of Hazardous Substances and Hazardous Waste Compulsory Liability Insurance entered in force on 11 March 2010; and General Conditions of Environmental Pollution Liability Insurance entered in force on 01 September 2011.

Coastal Facilities Sea Pollution Liability Insurance indemnifies the legal liability in cases of Sea Pollution at the Turkey›s Sea Areas consisted of Inland Waters, Territorial Waters and Exclusive Economic Zone; cleaning charges, transportation and elimination of the collected waste required for such pollution; damages stemming from the injury and death of third parties; and damages that may be inflicted on private properties. While the number of Coastal Facilities Sea Pollution Liability Insurance policies were 439 in 2014, this number reached to 534 in 2015 and premium production was 6.497.475 TL.

Table 116– Coastal facilities sea pollution liability insurance (Undersecretariat of Treasury, 2016)

	2010	2011	2012	2013	2014	2015
Number of Policy	140	203	295	434	439	534
Amount of Premium (TL)	2.067.525	2.068.738	1.956.053	4.186.604	4.016.666	6.497.475

The Environmental Pollution Liability Insurance covers the costs of pollution that policy owners have to pay pursuant to environmental legislation in the event of a pollution or pollution risk of one of or more than one of soil, groundwater, air, seas and inland waters. With this insurance, the insurer compensates the expenses, for material damage, death, disability, injury to third parties and expenses for cleaning, waste removal and disposal works that are done out of the facility, that result from any pollution within operational area of the facility. While the number of Environmental Pollution Liability Insurance policy was 61 in 2014, this number reached to 104 in 2015 and premium production was 4.561.078 TL.

Table 117 -Environmental Pollution Liability Insurance (Undersecretariat of Treasury, 2016)

	2010	2011	2012	2013	2014	2015
Number of Policies	209	39	32	38	61	104
Amount of Premium (TL)	1.369.406	2.499.595	664.645	3.275.234	1.649.396	4.561.078

Hazardous Substances and Hazardous Waste Compulsory Liability Insurance covers the expenses for body injuries of third parties and material damage resulting from hazardous waste and substance accidents due to activities of the facility. While the number of Hazardous Substances and Hazardous Waste Compulsory Liability policies was 44.420 in 2014, this number reached to 54.175 in 2015 and premium production was 37.987.455 TL.

Table 118 –Hazardous Substances and Hazardous Waste Compulsory Liability Insurance (Undersecretariat of Treasury, 2016)

	2010	2011	2012	2013	2014	2015
Number of Policy	27.484	32.383	32.998	36.298	44.420	54.175
Amount of Premium (TL)	15.508.967	18.265.577	20.265.890	24.291.389	29.864.204	37.987.455

SOURCES

- Turkish Statistical Institute
- Undersecretariat of Treasury

J. DPSIR EVALUATION

J. DPSIR EVALUATION

DPSIR, is the abbreviated form of **D**riving **F**orces, **P**ressure, **S**tate, **I**mpact, **R**esponse. DPSIR framework is used to evaluate and manage environmental problems. This model includes following 5 elements:

Driving Forces: These are socio-economic and socio-cultural activities that increase or decrease the pressure on the environment and effect human activities.
Pressure: Pressures on the environment caused by human activities.
State: Means condition of the environment.
Impact: Effects of environmental degradation.
Response: Responses by society to state of the environment.

DPSIR framework (Figure 15) was created by EEA in 2004 as an extension of the pressure-state-response model in order to define the relationship between society and environment. Thanks to this framework, it is possible to measure effectivity of the measures, in other words, it is possible to explain causal relationship between driving forces and impacts.

DPSIR model shows how pressure is exercised upon the environment by human activities known as driving forces and how the state of the environment changes. State of the environment has impacts on public health, ecosystems and natural resources. These impacts may lead to responses in the form of activities/actions that change management approaches, policies or driving forces, pressures and state of the environment. Changes in the impact in time may lead to changes in society which respond to these impacts.

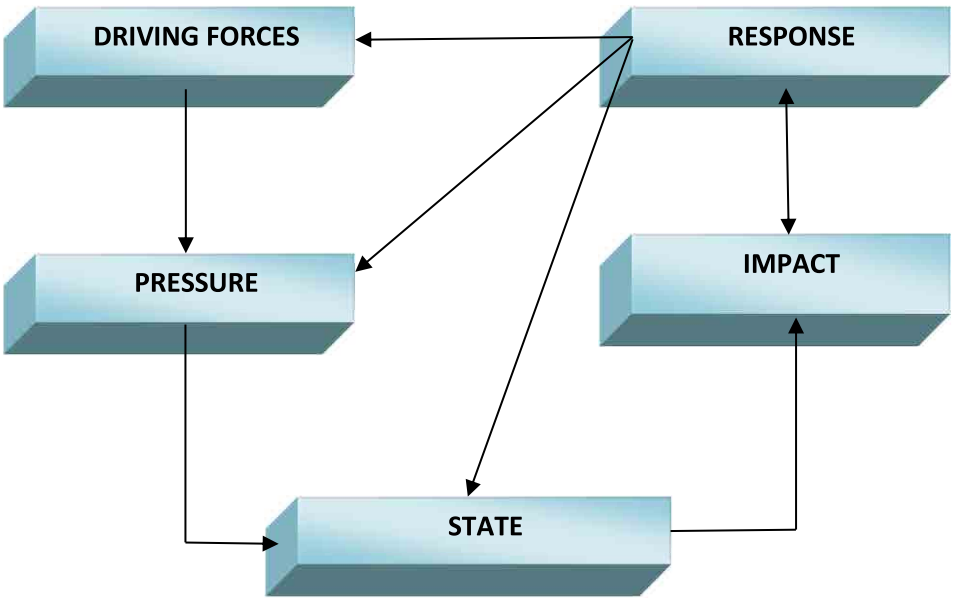


Figure 15 - DPSIR model

An indicator that is developed according to DPSIR model can be classified as a “driving force”, “pressure”, “state”, “impact” or “response” indicator and it provides information according to type of information. For example, indicator of greenhouse gas emissions is pressure indicator, because increase in greenhouse gas emissions creates the pressure on the atmosphere and leads to climate change.

Table 119 – DPSIR Evaluation for Turkey (Environmental Indicators 2014, 2016)

POPULATION	
Population	↑
Population Growth Rate	↓
Urban Population	↑
ECONOMY	
Environmental Expenses	↑
Share of Environmental Expenses within GDP (%)	↓
Share of Agriculture in Employment	→
CLIMATE CHANGE	
Greenhouse Gas Emissions	↓
Total Amounts of Greenhouse Gas Emissions by Sectors	↓
Precipitation	↑
Temperature	↑
Sea Water Temperature	↑
AIR POLLUTION	
SO_2, NO_X, NMVOC, CO, PM_{10} Emissions	↓
NH_3 Emissions	↑
Average of PM_{10} and SO_2 Parameters in Turkey	↓
Number of Air Quality Limit Value Exceedings	↓
Number of Air Quality Monitoring Stations	↑
WATER- WASTEWATER	
Water Use	↑
Oxygen Depleting Substances in River Waters in Ergene Basin	↓
Oxygen Depleting Substances in River Waters of Gediz, Northern Aegean, Küçük Menderes Basins	↑
Oxygen Consuming Substances in River Waters	↑
Nutrients in Fresh Waters	↑
Nutrients in Sea and Coastal Waters	X
Chlorophyll-A Concentration in Coastal and Sea Waters	X
Bathing Water Quality	↓
Amount of Water Drawn for Domestic Water Supply Network by Municipalities	↑
Rate of Population Served by Wastewater Treatment Plants	↑
Repayment of Energy Incentives for Wastewater Treatment Plant	↑
Rate of Population Served by Sewerage Systems	↑
Average Daily Amount of Wastewater Discharge per capita	↓
WASTE	
Number of Landfills	↑
Population benefiting from Landfills	↑
Rate of Hazardous Waste Recovery	↑
Rate of Packaging Waste Recovery	↓
Rate of End of Life Vehicles in Total Amount of Vehicles on Traffic	↓
Number of Ports Providing Waste Receiving Service	↓
LAND USE	
Artificial Areas	↑
Farmlands	↓

Table 119– DPSIR Evaluation for Turkey (Environmental Indicators 2014, 2016) (cont.)

Forests and Semi-Natural Areas	↓
Wetlands	→
Misused Farmlands	X
Areas under Risk of Erosion	X
BIOLAGICAL DIVERSITY	
Total Number of Species, Endangered Species, Endemism Rate	X
Number of Invasive Foreign Species	↑
Protected Areas	↓
Length of Protected Coast Line	→
Wild Life Conservation Activities	↑
By Law and Inspection of Wild Animal Trade Pursuant to International Conventions	↑
Forest Areas	↑
Forest Allocation Works	↓
Distribution of Forests to Plant Species	X
Functional Forestry	X
INFRASTURCTURE AND TRANSPORTATION	
Road Network	↑
Railway Network	↑
Passenger Transport on Road	↓
Cargo Transport on Road	↑
Passenger Transport on Railway	↑
Cargo Transport on Railway	↑
Greenhouse Gas emission from Transportation	↑
Air Pollutants from Transportation	↓
Number of Motor Vehicles	↑
ENERGY	
Solid Fuel Primary Energy Consumption	↓
Lignite Consumption	↓
Primary Energy Consumption per capita	↓
Total Primary Energy Consumption	↑
Total Energy Consumption	↑
Primary Energy Production	→
Share of Renewable Energy Resources in Consumption	↑
Rate of Energy Production from Renewable Resources	↓
Primary and Total Energy Intensity	↓
Energy Efficiency in Buildings	↑
AGRICULTURE	
Farmland Area per Capita	→
Chemical Fertilizer Use	↑
Pesticide Use	→
Share of Organic Agricultural Area in Total Farmlands	↑
Good Agricultural Production Area	↑
FISHERIES	

Table 119– DPSIR Evaluation for Turkey (Environmental Indicators 2014, 2016) (cont.)

Sea Fishery	↓
Aquaculture	→
Number of Licenses for Fishing Boats	↓
TOURISM	
Number of Tourists	↑
Environment Friendly Resorts	↑
Number of Tourists Staying Overnight out of 100 and Number of Beds	↑
Blue Flag Applications	↑
DISASTERS	
Forest Fires	↓
Coastal Facilities Marine Pollution and Environmental Pollution Liability Policy Premium Amount	↓
Wastes and Hazardous Substances Liability Policy Premium Amount	↑
Number of Risk Assessment and Emergency Response Plans by Coastal Facilities	↑
OTHER	
Number of Laboratories Operating under the Environmental Legislation	↓
Environmental Impact Assessment Decisions	↑

KEY

↑	Negative Developments Increasing Trend
↓	Negative Developments Decreasing Trend
↑	Positive Developments Increasing Trend
↓	Positive Developments Decreasing Trend
→	Neutral Developments
X	No Comparative Data

SOURCES

- European Environment Agency, 1999, Environmental Indicators: Typology and overview, Technical Report No 25
- European Environment Agency, 2005, EEA core set of indicators, EEA Technical Report No 1/2005
- Environmental Indicators 2014, Ministry of Environment and Urbanisation, General Directorate of Environmental Impact Assessment, Permit and Inspection, 121 pages, 2016

General Directorate of Environmental Impact Assessment, Permit and Inspection
Department of Environmental Inventory and Information Management
Division for State of the Environment Reports

ANKARA, 2016
www.csb.gov.tr

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