OECD Environmental Performance Reviews

TURKEY

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and in Turkish

FOREWORD

A healthy economy needs a healthy environment. In line with its mission to promote sustainable economic growth and rising living standards, the OECD emphasises better integration of environmental concerns into economic, social and sectoral policies. In this context, the OECD's Environmental Performance Reviews – conducted since 1992 – provide a systematic analysis of countries' efforts to reach their domestic environmental goals and international commitments, as well as specific recommendations to improve their environmental outcomes.

The present OECD environmental review – the third one of Turkey – builds on a long-standing OECD-Turkey environmental collaboration, and is part of a wider co-operation with Turkey encompassing numerous other studies, such as the regular Economic Surveys and the recent territorial review of Istanbul.

Turkey has achieved consolidation of environmental progress and its environmental legislation is increasingly incorporating the EU environmental acquis. But pollution, energy and resource intensities still need to be reduced, and environmentally related health problems persist and need to be addressed.

To meet these challenges, the OECD Environmental Performance Review of Turkey provides 45 specific recommendations, including that the country should strengthen its efforts in managing air, water and nature assets and in building environmental infrastructure (e.g. for waste and waste water treatment), and further integrate environmental concerns into economic decisions. Turkey also needs to enhance its international co-operation on environmental issues.

The OECD is grateful to the members of the OECD Working Party on Environmental Performance (which has approved the recommendations), and the experts from Germany, Japan, Portugal and the European Commission for their substantive contributions, as well as the Government of Turkey for its excellent co-operation during the review process. We very much hope this report will contribute to environmental progress in Turkey.

Angel Gurría
OECD, Secretary-General

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Signs

The following signs are used in Figures and Tables:
. .: not available
– : nil or negligible
. : decimal point
* : indicates that not all countries are included.

Country Aggregates

OECD Europe: All European member countries of the OECD (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey and United Kingdom).

OECD: The countries of OECD Europe plus Australia, Canada, Japan, the Republic of Korea, Mexico, New Zealand and the United States.

Country aggregates may include Secretariat estimates.

Currency

Monetary unit: New Turkish Lira (TRY)
1998: TRY 0.260 = USD 1
2007: TRY 1.305 = USD 1
2007: TRY 1.789 = EUR 1

Cut-off Date

This report is based on information available up to 31 May 2008.

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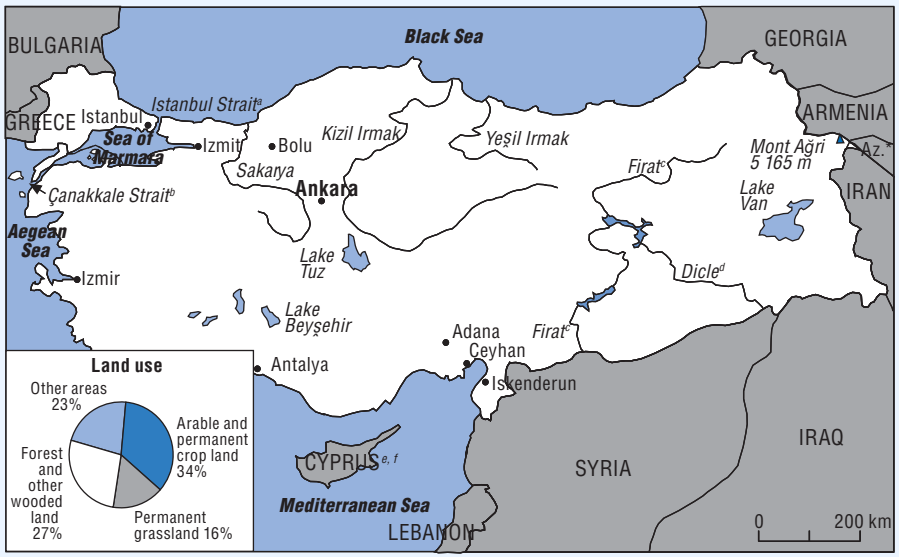
Map of Turkey



* Azerbaijan.

a) Bosphorus.

b) Dardanelles.

c) Euphrates.

d) Tigris.

e) Footnote by Turkey: The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

f) Footnote by all the European Union member States of the OECD and the European Commission: The Republic of Cyprus is recognized by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Source: OECD.

1 CONCLUSIONS AND RECOMMENDATIONS*

This report examines Turkey's progress since the previous OECD Environmental Performance Review in 1999 and the extent to which the country has met its *national objectives and international commitments* regarding the management of the environment and natural resources. The report also reviews Turkey's progress in the context of the OECD Environmental Strategy,** and compares to the recommendations of the 1999 OECD review. Progress has stemmed from environmental and economic decisions and actions by national and territorial authorities, as well as by enterprises, households and non-governmental organisations. 45 recommendations are made that could contribute to further environmental progress in Turkey.

In the review period, the *2000/2001 economic crisis* was followed by an impressive recovery and Turkey presents one of the strongest economic growth rates among OECD countries in recent years (7.5% of yearly average growth since 2002). Turkey has also been undergoing structural changes (further privatisation of enterprises, price liberalisation, integration in the European and global economy). However, the share of the informal sector in the Turkish economy remains high. Turkey's *population* has reached 73 million*** and remains one of the fastest growing in the OECD. Per capita income is the lowest among OECD countries. Major migrations from rural areas to urban, industrial and tourist areas continue. Turkey is surrounded by Armenia, Azerbaijan,

* Conclusions and Recommendations reviewed and approved by the Working Party on Environmental Performance at its meeting on 3 June 2008.

** The following objectives of the OECD Environmental Strategy for the First Decade of the 21st Century are covered in the Conclusions and Recommendations: maintaining the integrity of ecosystems (Section 1), decoupling of environmental pressures from economic growth (Section 2) and global environmental interdependence (Section 3).

*** Refers to 2006 present population. Resident population in 2007 was 71 million.

Bulgaria, Georgia, Greece, Iran, Iraq, Syria as well as the Aegean, Black, Marmara and Mediterranean seas.

Turkey confronts the challenge of ensuring that economic growth is associated with environmental and social progress, namely sustainable development. It has experienced *increasing environmental pressures* from energy, industry, agriculture, transport and tourism. They translate in a range of environmental challenges concerning air quality, water services, water resources, waste management, soil erosion and nature protection, as well as marine issues. A range of institutional and legislative elements of environmental reform have been put in place, largely as pre-accession efforts of *convergence with the EU environmental acquis*. The national development planning effort is remarkable. Although current emissions and discharges per capita remain low compared to OECD per capita averages, much of the necessary *environmental infrastructure* must still be created in urban and industrial areas. Environment has had a relatively low priority in Turkey. Strengthened environmental efforts from national government, municipalities and the private sector are required to achieve environmental convergence with other OECD countries. Turkey is a founding member of OECD and adheres to all the environmental Acts of the OECD Council.

Looking to the future, to face its *environmental challenges effectively*, it will be necessary for Turkey to i) strengthen environmental policies and their implementation where appropriate; ii) further integrate environmental concerns into economic and sectoral decisions and iii) further develop international environmental co-operation.

1. Environmental Management

Strengthening the implementation of environmental policies

In the review period, the *EU harmonisation process* has become the main driving force in a major national environmental reform. It translates in a large number of *new environmental legislation and regulations*. The 2006 "comprehensive amendment" of the 1983 Environmental Law, and the new Law on Municipalities contributed to the clarification of environmental responsibilities amongst the various levels of administration. *Enforcement capacities* have been strengthened by new regulations and the creation of a separate division in the Ministry responsible for co-ordination of enforcement efforts. Integration of environmental concerns in *land-use planning* is progressing, though challenges related to unregistered operations remain.

Industry is being engaged in voluntary approaches, notably in cement and chemical sectors. Turkey is the OECD country which has the largest revenues from environmentally related taxes (i.e. energy and transport taxes): 4.8% of GDP and 25% of total tax revenue, although these taxes were not designed for environmental purposes. *Public-private partnerships* have been strengthened, including the establishment of Organised Industrial Zones that provide comprehensive environmental services to industry. Estimates of pollution abatement and control expenditure (PAC expenditure) have increased from 1.1% to *1.2% of GDP*.

Despite progress in aligning with the EU environmental legislation, transposition is still waiting for several pieces of legislation concerning air, water and nature protection, and several standards are not consistent with EU limit values. *Allocation of environmental responsibilities* among government institutions could benefit from review and revision. Environmental concerns have been too often superseded by development interests in local decision-making. *Implementation and enforcement* remain challenging; a special autonomous environmental agency should be established to drive and conduct environmental inspections at national and territorial levels with appropriate resources, as well as training and monitoring support systems. The *permitting system* needs particular attention, as the current media based procedure is not sufficient, burdensome and needs regular renewal provisions. Despite the introduction of environmental charges, as well as fuel and motor vehicles tax differentiation, the use of a variety of *economic instruments* for environmental purposes (including specific taxes, charges, emission trading systems) in Turkey should be considered to meet objectives of efficiency and financing, with due regard to social issues. Low landfill charges hamper the recycling industry. A number of unregistered installations, mostly small and medium size, operate without environmental management systems. Adoption of environmental management systems *in industry and public organisations* as well as development of public-private partnerships should be promoted. Turkey faces the challenge of mobilising substantial *financial resources* for environmental investment, especially to work towards its new environmental objectives. This will require engaging *private and public fundings* for environmental improvement, to match external resources provided by the new EU instruments for accession, and strengthening the *capacity of provincial and local authorities* to prepare detailed projects and implement them. This will also require moving progressively to the *full implementation of polluter pays and user pays principles*.

Recommendations:

- continue to *harmonise the national environmental legislation with the EU environmental acquis*, following the EU Integrated Environmental Approximation Strategy, with particular attention to framework Directives and EU emissions and quality standards;
- strengthen the *permitting system*: moving from media based permitting to integrated pollution prevention and control, distinguishing large and small/ medium size installations; using periodic permit renewals to gradually introduce stricter emission standards; and promoting best available technology;
- strengthen the *enforcement system*, through: an autonomous environmental agency in charge of inspection at national and territorial levels, increased resources for inspections and compliance monitoring, and increased training for inspectors; integrate environmental concerns (i.e. pollution, natural resources, nature concerns) at all levels of *land-use planning*, and strengthen land-use plans enforcement;
- develop the use of economic instruments, seeking *an effective and efficient mix of instruments*, with due regard to social issues; promote the implementation of the *polluter pays and user pays principles*, with a progressive shift from public to private funding, and a time limit for environmental subsidy schemes;
- develop *public-private partnerships* and industry-driven environmental initiatives with appropriate involvement of the Turkish Business Associations;
- strengthen the *emergency preparedness and response* system (e.g. establishing a commission to support the implementation of legislation concerning natural and industrial disasters, extending institutional co-ordination, acquiring appropriate equipment, performing regular drills and simulations);
- increase the *capacity* of provincial and municipality authorities to prepare and implement environmental infrastructure projects, including those with EU funding; continue the reform of the Bank of Provinces to increase the efficiency in transfers of public funds to municipalities and in municipal investments.

Air

During the review period, Turkey achieved a strong *decoupling of SO_2 and CO emissions from economic development*. The use of high-sulphur coal in residential heating has been prohibited, and its substitution by gas (mostly from Russia and Iran) has expanded in urban areas. Turkey has also developed

significant lignite washing capacity. Energy intensity has improved, and air quality concerns have been better integrated into *energy policies*. The new Energy Efficiency Law and the Law on Utilisation of Renewable Energy Resources for Generating Electricity aim to promote energy efficiency and the use of renewables. There are lower tax rates for natural gas, LPG and bio-diesel. Part of these changes were brought about by the new regulations on *air emissions from stationary sources*. All coal fired power plants have been equipped with flue gas desulphurisation units. In the *transport sector*, several new regulations on emissions from motor vehicles and quality standards for motor fuels have promoted vehicle fleet renewal, with an increasing proportion of the car fleet being equipped with catalytic converters. The use of leaded gasoline was banned in 2004. Turkish *gasoline and diesel prices* (at current exchange rates) are among the highest in OECD member countries, due to relatively high taxes and the supply conditions in the region.

Recommendations:

- strengthen regulatory *standards*, including those for air emissions and fuel quality, to bring them in line with EU legislation, and ensure that they are *implemented* effectively and efficiently;
- continue to promote the use of *cleaner fuels* for motor vehicles and for residential uses;
- develop the use of *economic instruments* to reduce air emissions from stationary and non-point sources; review and revise, as appropriate, existing taxes on fuels and motor vehicles to support air pollution reduction objectives;
- continue, and strengthen, efforts to improve *energy efficiency* in the energy, transport, industry, residential and services sectors, to capture related multiple benefits, including those of reduced air pollution and reduced GHG emissions;
- strengthen efforts to integrate air quality concerns into *transport* policy, including modal shift from road to public transport (e.g. railways), with appropriate cost-benefit analysis of investments and co-operation among levels of government and relevant sectors; extend the use of cleaner motor vehicles;
- continue and strengthen efforts to improve the *information base* for air management: including additional pollutants in the air emission inventories; extending ambient air quality monitoring; adopting and implementing the draft Regulation on Air Quality Evaluation.

However, much remains to be done. In some urban and industrial centres, ambient *air pollution* by SO_2, NO_X and particulates exceeds national air quality standards. Information about ambient air quality is limited, particularly regarding NO_x and O_3. Although SO_x standards for emissions from medium-sized solid fuel plants were strengthened during the review period, *emission standards for power plants* using high-sulphur oil are still lenient compared to EU regulations. After a notable drop in 2000-01, both *road freight and passenger traffics* have increased rapidly and are a major source of air pollution, including in urban centres. *Taxes* on some motor fuels and vehicles still do not reflect their impact on air quality. For example, the tax rate for high-sulphur diesel fuel is lower than for fuel with a low sulphur content. *CO_2 emissions* have continued to increase. There are cross-subsidies concerning electricity prices. Even though Turkey is the first country in Europe that uses solar energy for heating (e.g. water heating) on a wide scale the large potential for use of heat from *renewables* (geothermal, solar thermal and biomass) has not been effectively utilised. Despite major upgrading of the *rail network*, railway freight traffic has not increased and railway passenger traffic has decreased.

Water

Ensuring availability of water for the economy and the population was among the highest priorities in the 8th and 9th National Development Plans of Turkey. These plans also included a number of other objectives related to water management, which are gradually being met. For example, all *river basins* have now their water management plans, and water quality problems are being addressed. Investment in *water supply and waste water infrastructure* has increased, with funding from municipalities and the Bank of Provinces. The rate of connection of the population to waste water treatment plants has increased to reach about 40%. Out of 19 larger municipalities, 16 have waste water treatment plants. Almost all *irrigation infrastructure* (95%) was transferred to user associations and their operation is becoming more efficient. In line with the EU legal framework, a number of regulations have been adopted relating to: discharges of dangerous substances into water, quality of surface water intended for the abstraction of drinking water, protection of water against nitrate pollution from agriculture, urban waste water treatment, and the use of water for aquaculture and bathing. The MoEF is now responsible for both water quality and water quantity management.

However, *surface water quality* has remained low in many water bodies, or deteriorated due to insufficient pollution control, reaching alarming levels for surface waters in some large municipalities. Despite some progress, still

approximately 53% of total *waste water from industry* is discharged into rivers and coastal waters without any treatment, often containing mercury, lead, chromium and zinc. *Groundwater quality and levels* are of concern, as groundwater is often contaminated by leakages from waste water and waste dumps, and increasingly used by households and agriculture. Unaccounted water uses and losses (e.g. unbilled uses, illegal uses, leakages) is about 55%. Although *prices* for drinking water have increased, with the attempt to recover operational costs, water for industry and agriculture, as well as waste water services continue to be underpriced. This results in inefficient use of water, excessive demands for water infrastructure and heavy indebtedness of municipalities. Nitrate and pesticide pollution from agriculture is continuing. Two thirds of agricultural land is prone to erosion. *Large scale hydraulic engineering works*, such as dams, remain a main feature of water management responding to objectives of economic development and population needs.

Recommendations:

- adopt a *comprehensive water law*, balancing the demand and supply side of water resource management;
- further develop *water resource management by river basin*, addressing both quantity and quality issues; establish basin councils to reinforce co-operation and partnership among authorities and water users (municipalities, industries, farmers), on the basis of pilot projects;
- promote better *water supply and waste water infrastructure*; encourage water saving and investment to reduce water losses;
- promote *adequate pricing of water services*, for household, industry and agriculture, with attention to efficiency, cost-recovery, and affordability;
- strengthen efforts to promote compliance with waste water legislation for *industry* (e.g. appropriate permitting, responses to non-compliance);
- reduce water pollution from *agriculture* (e.g. identification of nutrient vulnerable zones, action plans to address pollution, codes of good agriculture practices, effective inspection and enforcement);
- continue efforts to promote *water monitoring*, promote the analysis of health and economic impacts of water pollution.

Nature and biodiversity

The area of forest and other wooded land has increased to 27.2% of the national territory. *Afforestation* efforts, partly to combat soil erosion, have reached 250, 350 and 400 million planted seedlings respectively in 2005, 2006 and 2007, a major contribution to the UNEP goal of at least 1 billion tree planting worldwide each year. *Legislation* concerning biodiversity has improved, as have related institutional co-operation and co-ordination. The total extent of *protected areas* has increased during the review period and now accounts for 5.3% of Turkey's total land area. Turkey has further strengthened the protection of these areas through management plans. *Public participation* has become an important part of nature inventories, conservation projects and management plans. Considerable progress has been achieved in public awareness and education related to nature conservation (e.g. large-scale programmes in schools, summer camps and training for various groups including prayer leaders and the military). Initial economic measures have been adopted to promote *environmentally friendly agriculture*, especially to address problems of salinity of soils and to support organic agriculture. Turkey has ratified all the main *international conventions* on nature conservation, except the Bonn Convention on the Conservation of Migratory Species of Wild Animals.

However, some parts of Turkey's *rich biodiversity* are threatened and will face increased pressure in the future. This is largely due to the effects of tourism, urbanisation, industrial and agricultural developments, as well as those of major infrastructure projects in rural areas. *Protected areas* should be extended and connected with each other. Turkey should consider strict protection of parts of its natural coastline, including beaches, deltas and wetlands. The Ministry of Environment developed a *National Biodiversity Strategy and Action Plan* in 2001, and is in the process of adoption of an updated 2006 version. There are a number of separate laws to protect and regulate biodiversity, habitats and landscapes, but no *overall framework legislation*. Monitoring and inventories are carried out by MoEF and by NGOs, but few country-wide *inventories* are available. These include incomplete inventories of endangered species and corresponding red lists that still need to be completed and published. *Erosion* is widespread. Further efforts are needed to integrate nature and biodiversity concerns within agriculture, forestry, and land use planning.

Recommendations:

- prepare and adopt a *framework law* to cover all areas of nature and biodiversity;
- finalise, approve and implement the National *Biodiversity Strategy* and Action Plan prepared in 2006, including time-bound targets, as proposed by the CBD; set objectives with regard to integration of biodiversity considerations into *agriculture* and other sectoral policies;
- create *protected areas*, so as to reach the 10% domestic target by 2010; establish them in an interconnected network; complete, adopt and implement management plans for all protected areas;
- continue afforestation and *sustainable forestry* efforts; continue and expand all *erosion* combating efforts;
- improve *coastal management*; set and implement an objective for strict protection of sensitive parts of the coast; integrate nature conservation in tourism development;
- finalise the inventory of endangered species; publish the corresponding *Red List*; improve *statistics and indicators* on biodiversity;
- continue to promote *education* and *awareness* concerning nature conservation.

2. Towards Sustainable Development

Integrating environmental concerns into economic decisions

Within a strong national *economic and development planning* founded on National Development Plans (NDP), increasing integration of environmental concerns has been achieved in several sectors, thus providing some progress in the practice of sustainable development. High road fuel prices and taxes (among the highest among OECD countries) provided incentives to reduce the use of petrol and diesel fuel and to renew the motor vehicle fleet. Turkey's *energy intensity* improved as did its *resource intensity*. *Lignite*, which generates significant pollution when used for energy production, does not receive direct subsidies any more. The structure of *agriculture subsidies* has changed promoting more environmentally friendly practices. *Absolute decoupling* took place for municipal waste generation and the use of fertilisers. The regulatory framework for *environmental impact assessment* of projects has been

strengthened and steps launched for the introduction of strategic environmental assessment of policies.

However, Turkey is facing a number of environmental challenges due to unsustainable production and consumption patterns. The overall *material intensity* of its economy is still among the highest in the OECD area, as are the *pollution intensities* (e.g. SO_x and NO_x emissions per unit of GDP). This partly reflects the structure of its economy (e.g. with the highest imports of scrap metal in the world and their conversion into exports of metal products to the middle-east, with high imports and production of cotton and high exports of cotton products to Europe). Efforts to speed up economic and social development do not always take environmental concerns into account, especially at *sub-national level*, where environmental priorities are not high. Environmentally harmful subsidies, especially in the energy sector, continue to promote polluting activities. With rapid economic growth, a continued increase in motor vehicles ownership and traffic, as well as in municipal and industrial waste generation can

Recommendations:

- establish a "*green tax commission*" to review and revise the full range of economic instrument of relevance for the environment (i.e. taxes, charges, trading, others); consider a comprehensive green tax reform, possibly in a revenue neutral perspective; review *motor vehicle related taxes*; introduce taxes on polluting products and inputs (e.g. detergents, batteries, pesticides, fertilisers, CFCs);
- reduce *environmentally harmful subsidies*, in particular in the agriculture and energy sectors, with appropriate measures to deal with competitiveness and distributive implications;
- expand *economic information* on the environment (e.g. environmental expenditure, environmentally-related taxes, resource prices, employment); develop *economic analysis* (e.g. cost-benefit analysis of environmental projects);
- undertake strategic *environmental assessment* concerning transport and agriculture policies;
- maintain a focus on *sustainable development* within the government, and the country more broadly, through an interministerial committee and associated advisory council that provide for broad participation by private sector institutions and the public.

be expected. Waste management will require significantly larger collection and treatment infrastructure. While Turkey's preparations for and immediate follow-up to the 2002 World Summit on Sustainable Development, were widely complimented, the efforts to integrate sustainability into sectoral policies has been implemented via a EU project and should be developed through further steps.

Integration of environmental and social decisions

Important efforts have been made to increase *access of the public to information in general and to environmental information in particular*. Annual *state of the environment* reporting at provincial level has been supplemented by nation-wide reports. Environmental *information units* formed in government agencies, together with the state of the environment reports and national environmental statistics produced by the Turkish Statistical Institute inform the public about environmental issues. *Public participation* in the management of protected areas, in rural development and in EIAs procedures have become common and the number of environmental NGOs has increased. Initiatives to raise *public environmental awareness*, including training courses on environmental issues and environmental information dissemination have been developed for rural communities, the armed forces and prayer leaders. Several court cases for non-compliance and for environmental or health damages have proceeded. During the review period, significant progress in extending *environmental education* to all levels of the formal system was made, particularly for pre-school, primary and secondary schools.

Turkey continues to experience important *regional disparities*, with poverty affecting more rural areas of Eastern and South-eastern Anatolia, and suburbs of metropolitan areas. Even though a number of *regional programmes* support economic development of disadvantaged regions, their environmental and sustainable development content is often not sufficient. Studies of the relations between *public health* and environmental services are few and links between health and environmental policies should be developed. Large health related benefits could be derived from improved environmental conditions, including increased labour productivity, reduced health expenditure, and increased well being of the population. Environmental concerns should be integrated in technology development and innovation and could stimulate *employment*, especially in industry. *Environmental NGOs* face challenges, including establishing themselves, co-operating with other NGOs and raising funds. Turkey has not yet become a party to the Aarhus Convention.

Recommendations:

- develop a white paper on the *health-environment* interface; develop and implement a national action plan on health and environment; further implement the national children's environmental health action plan;
- reduce the share of people without *access to environmental services*, (e.g. water supply, water sanitation and waste services) to improve health and the quality of life, in particular for low income households;
- integrate environmental and sustainable development concerns in *regional development* programmes, with particular attention to rural and disadvantaged regions;
- promote environmental policies which contribute to *increased income and job creation*, especially in rural areas and poorer districts of large cities;
- continue to monitor the implementation of the right of *access to environmental information* and of *access to courts* concerning environmental issues, and correct implementation as needed ;
- continue to strengthen *environmental education*; develop further efforts by public authorities and environmental NGOs to increase *environmental awareness*.

3. International Co-operation

Turkey significantly expanded its engagement within the international community in the field of environment over the review period. It is currently a party to most *key regional and global environmental accords* and programmes, and has made effective use of a variety of international mechanisms to acquire technical and financial assistance in support of its national environmental priorities. Its *co-operation with the EU* on pre-accession convergence efforts has helped keep Turkey's international environmental commitments and responsibilities before national policy makers**.** It met its commitments under the Montreal Protocol to phase out *ozone-depleting substances* four years ahead of the target date, which was especially noteworthy given its policy of rejecting international pollution reduction targets based on its "special circumstances" (i.e. Turkey's low per capita income level requires it to emphasise economic growth). It has made impressive improvements in the area of *maritime safety* by establishing a high-tech Vessel Traffic Services system for the Turkish Straits, and developing oil spill contingency plans at the regional and (in some instances)

municipal levels, supported by increased manpower, training and equipment. A progression of increasingly stringent regulations for the management of transboundary movement of *hazardous wastes* has brought Turkey into compliance with the Basel Convention and OECD rules. Good progress has been made in pursuing national follow-up to the Conferences of the Parties on the UN Convention on Biological Diversity and the UN Convention to Combat

Recommendations:

- continue to strengthen national actions in support of *multilateral and regional environmental accords* and programmes in which Turkey participates, and to utilise fully the technical and financial support available from the international community through these mechanisms;
- maintain progress in contributing to international efforts to address climate change by preparing a comprehensive *National Climate Change Plan*, with clear goals, priorities and milestones, which also sets out responsibilities for all sectors of Turkish society; and consider setting nationally-determined voluntary targets (e.g. for energy use, renewable energy, afforestation and greenhouse gas emissions). This would maintain momentum in pursuing the national strategy and to provide an important signal to other countries of Turkey's commitment and intent;
- continue efforts leading to accession to the *Kyoto Protocol*;
- strengthen national policies, guidance and requirements governing the *environmental performance of industry*, both in Turkey and elsewhere. This would entail a "greening" of foreign direct investment and export credit decisions, as well as rigorous application to Turkish industry of the environmental aspects of the OECD Guidelines for Multinational Enterprises;
- maintain an open, active dialogue with neighbouring countries on issues related to *transboundary rivers*, with a view to ensuring sound management of water quality and quantity and increasing co-operation among riparian countries;
- accelerate efforts to protect Turkey's *coastal waters* from land-based pollution, given the substantial risk to economic growth, tourism and public health if water quality degradation is allowed to persist;
- introduce a dedicated environmental component into Turkey's expanding *development assistance* programme, including the possible establishment of an Environmental Focal Point in the International Co-operation and Development Agency to oversee and co-ordinate environmental assistance efforts, as well as help ensure the environmental soundness of the overall ODA programme.

Desertification, and in responding to obligations under the UN Framework Convention on Climate Change, which Turkey ratified in 2004. Turkey has recently initiated a procedure of accession to the Kyoto Protocol.

Despite some advances in regional co-operation to address *marine pollution* in the Black, Mediterranean, Aegean and Marmara seas, water quality is under heavy pressure in Turkey's coastal waters, particularly from the discharge of untreated or lightly treated municipal and industrial waste water. Although *marine fisheries* management has been improved by a series of new regulations (on fishing practices, closed areas and seasons, and controls on equipment), the state of a number of fish stocks is of concern. With respect to *industry*, lack of inspection and enforcement capacity and political commitment is constraining the country's ability to improve environmental conditions in the workplace, and to reduce the potential for environmentally damaging industrial accidents; expanded efforts are needed to promote environmentally sound industrial growth by attaching effective environmental criteria and conditions to foreign direct investment, export credits, and the requirements of Turkish industry operating in other countries. The chemicals area has been cited in recent EU analyses as falling considerably short of EU legislation and requirements for the sound management of potentially toxic chemicals involved in international trade. Recognising efforts already accomplished (e.g. training programmes, brochures) Turkey's response to CITES requirements for controlling *trade in endangered species* has been limited, and needs further strengthening of inspection by customs agents. Turkey has not lived up to its commitments for data provision and action under the ECE Convention on Long-range Transboundary Air Pollution.

2
AIR MANAGEMENT*

Features

- Decoupling air emissions from economic growth
- New regulations on air emissions from stationary sources
- Curbing air emissions from the energy sector
- Regulations and economic incentives for reducing pollution from the transport sector

* The present chapter reviews progress in the last ten years, and particularly since the previous OECD Environmental Performance Review of 1999. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Turkey:

- strengthen regulatory *standards*, including those for air emissions and fuel quality, to bring them in line with EU legislation, and ensure that they are *implemented* effectively and efficiently;
- continue to promote the use of *cleaner fuels* for motor vehicles and for residential uses;
- develop the use of *economic instruments* to reduce air emissions from stationary and non-point sources; review and revise, as appropriate, existing taxes on fuels and motor vehicles to support air pollution reduction objectives;
- continue, and strengthen, efforts to improve *energy efficiency* in the energy, transport, industry, residential and services sectors, to capture related multiple benefits, including those of reduced air pollution and reduced GHG emissions;
- strengthen efforts to integrate air quality concerns into *transport* policy, including modal shift from road to public transport (e.g. railways), with appropriate cost-benefit analysis of investments and co-operation among levels of government and relevant sectors; extend the use of cleaner motor vehicles;
- continue and strengthen efforts to improve the *information base* for air management: including additional pollutants in the air emission inventories; extending ambient air quality monitoring; adopting and implementing the draft Regulation on Air Quality Evaluation.

Conclusions

During the review period, Turkey achieved a strong *decoupling of SO_2 and CO emissions from economic development*. The use of high-sulphur coal in residential heating has been prohibited, and its substitution by gas (mostly from Russia and Iran) has expanded in urban areas. Turkey has also developed significant lignite washing capacity. Energy intensity has improved, and air quality concerns have been better integrated into *energy policies*. The new Energy Efficiency Law and the Law on Utilisation of Renewable Energy Resources for Generating Electricity aim to promote energy efficiency and the use of renewables. There are lower tax rates for natural gas, LPG and bio-diesel. Part of these changes were brought about by the new regulations on *air emissions from stationary sources*. All coal fired power plants have been equipped with flue gas desulphurisation units. In the *transport sector*, several new

regulations on emissions from motor vehicles and quality standards for motor fuels have promoted vehicle fleet renewal, with an increasing proportion of the car fleet being equipped with catalytic converters. The use of leaded gasoline was banned in 2004. Turkish *gasoline and diesel prices* (at current exchange rates) are among the highest in OECD member countries, due to relatively high taxes and the supply conditions in the region.

However, much remains to be done. In some urban and industrial centres, ambient *air pollution* by SO_2, NO_X and particulates exceeds national air quality standards. Information about ambient air quality is limited, particularly regarding NO_x and O_3. Although SO_x standards for emissions from medium-sized solid fuel plants were strengthened during the review period, *emission standards for power plants* using high-sulphur oil are still lenient compared to EU regulations. After a notable drop in 2000-01, both *road freight and passenger traffics* have increased rapidly and are a major source of air pollution, including in urban centres. *Taxes* on some motor fuels and vehicles still do not reflect their impact on air quality. For example, the tax rate for high-sulphur diesel fuel is lower than for fuel with a low sulphur content. *CO_2 emissions* have continued to increase. There are cross-subsidies concerning electricity prices. Even though Turkey is the first country in Europe that uses solar energy for heating (e.g. water heating) on a wide scale the large potential for use of heat from *renewables* (geothermal, solar thermal and biomass) has not been effectively utilised. Despite major upgrading of the *rail network*, railway freight traffic has not increased and railway passenger traffic has decreased.

♦ ♦ ♦

1. Policy Objectives

The *8th National Development Plan* (2001-05) called for strengthening the air pollution monitoring system, especially drawing up an emission inventory, building management capacity and using economic instruments more widely. The plan also put special emphasis on reducing greenhouse gas (GHG) emissions through increasing energy efficiency.

An important impetus to strengthen air management policy in the review period came from the *EU accession negotiation* process. In 2007, Turkey adopted its EU Integrated Environmental Strategy which, *inter alia* , called for the full harmonisation of the Turkish legal framework with the EU Air Quality Framework Directive (and its four sister Directives), the EU Fuel Quality Directive, and other Directives related to

climate change and the availability of consumer information on fuel economy and CO_2 emissions from new vehicles.

Global environmental concerns have also influenced policy development. Turkey ratified the *United Nations Framework Convention on Climate Change (UNFCCC)* in May 2004, with the status of an Annex I country. Under the Convention, Turkey's obligations include developing national inventories of GHG emissions and removals, formulating and implementing national programmes against climate change, co-ordinating relevant economic and administrative instruments with other parties, as appropriate, and communicating information to the Conference of the Parties. Turkey initiated a procedure of accession to the Kyoto Protocol in 2008 (Chapter 7).

The *1999 OECD Environmental Performance Review recommended that Turkey*:

- establish and improve procedures to calculate and publish periodic emission inventories at national level for a range of pollutants, including SO_x, NO_x, VOCs and particulates;
- extend the national air quality monitoring system in industrial as well as urban areas, and increase the number of pollutants monitored to include, in particular, NO_x, ozone, and lead and other heavy metals;
- link air management policy measures to quantitative targets for emission reductions and for improvement of air quality in regard to all major air pollutants, with an implementation schedule;
- review and upgrade standards relating to air pollution, notably those for ambient air quality, fuel quality and emissions from stationary sources, with due regard to the impact of air pollution on human health and the environment and associated damages;
- improve enforcement of all air quality regulations by ensuring that appropriate human and financial resources are made available for this task, and by applying penalties for non-compliance;
- clarify institutional responsibilities at all levels of government for air pollution licensing, regulation inspection and enforcement; encourage use of cleaner technologies and develop voluntary agreements with selected industrial sectors;
- continue efforts to improve energy efficiency and to encourage use of cleaner fuels and alternative energy sources;
- develop a master plan for transport which would take account of the development of all transport modes and of interactions between transport and other economic activities, along with environmental objectives.

2. Performance

2.1 Emissions

Conventional pollutants

Turkey has achieved decoupling of SO_x, NO_x and CO emissions from economic growth. *SO_2 emissions*, estimated at 1.9 million tonnes in 2005, increased by 6% between 1998 and 2005, while GDP and fuel consumption increased by 26 and 23% respectively. SO_x emission intensity (per unit of GDP) fell by 16% between 1998 and 2005 (from 4.1 to 3.4 kg/USD 1 000). However, SO_x emission intensity is still over three times higher than the OECD average (Figure 2.1)**.** Major contributors to SO_x emissions continue to be power plants (66.3%) and industrial combustion (26.1%).

NO_x emissions, estimated at 1.1 million tonnes in 2005, had increased by 17% since 1998. NO_x emission intensity (per unit of GDP) decreased between 1998 and 2005 from 2.1 to 1.9 kg/USD 1 000. However, NO_x emission intensity still exceeded the OECD average by more than 50% (Figure 2.1)**.** The major contributor to NO_x emissions continued to be mobile sources (42.2% of the total). Their share in total emissions increased by 5% compared with 1998. Power stations and industrial combustion accounted for 16.9 and 18.8% respectively (Table 2.1).

CO emissions amounted to 3.6 million tonnes in 2005, a 30% decrease since 1998 (Table 2.1). CO emissions mostly come from non-industrial (40.5%) and mobile (40.9%) sources (Table 2.1). Since 1998, the contribution from non-industrial fixed sources has increased while that from mobile sources has decreased by 13%.

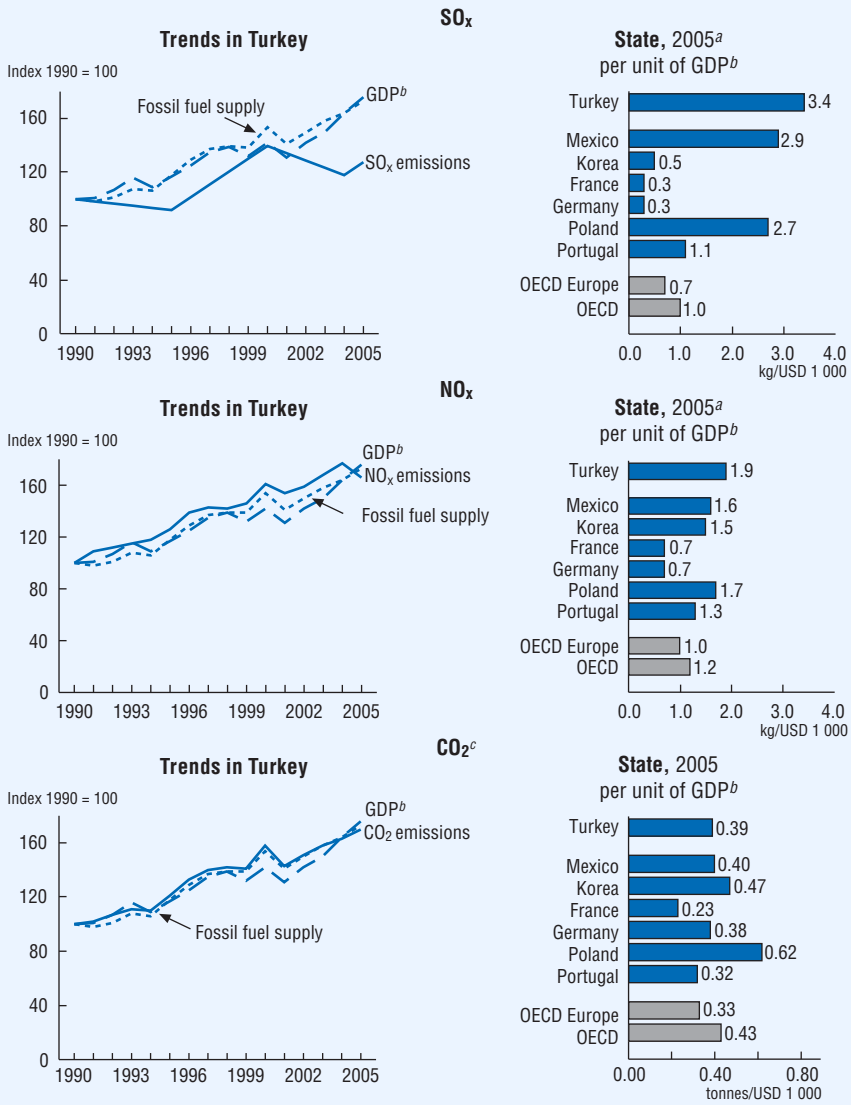
Non-methane volatile organic compound (NMVOC) emissions have increased slightly. Total emissions were estimated at 554 400 tonnes in 2004, with non-industrial fixed sources contributing 31.5%, mobile sources 22.7% and solvents 28.4% of total VOC emissions (Table 2.1).

Greenhouse gases

Between 1990 and 2005 *total greenhouse gas (GHG) emissions* increased by 84% (from 170 Tg/CO_2eq in 1990 to 312.4 Tg/CO_2eq in 2005),[1] in line with GDP growth (MoEF, 2007). The energy sector accounted for 77.3% of the total in 2005. The other contributing sectors are the waste sector (9.5%, with a rapid increase), industrial processes (8.1%) and agriculture (5.1%) (MoEF, 2007).

CO_2 emissions account for 82.1% and CH_4 emissions for 15.8% of total GHG emissions. Most (92%) of total CO_2 emissions are from fossil fuel combustion. The

Figure 2.1 **Air pollutant emissions**



a) Or latest available year.
b) GDP at 2000 prices and purchasing power parities.
c) Emissions from energy use only; excludes international marine and aviation bunkers; sectoral approach.
Source: OECD-IEA (2007), CO_2 Emissions from Fuel Combustion; OECD (2007), OECD Economic Outlook No. 82; OECD-IEA (2007), Energy Balances of OECD Countries 2004-2005.

energy sector was responsible for the highest emission increase.[2] The replacement of lignite and coal by oil and natural gas in energy supply resulted in stabilising emission trends after 1998.[3]

CO_2 emission intensities increased between 1990 and 2005: CO_2 emissions per capita and per unit TPES increased by 32.7 and 5.8% respectively (Chapter 7). During the same period, the OECD Europe average decreased (by 4.3 and 10.6% respectively). On the other hand, CO_2 emissions per unit of GDP decreased by 3.1% in Turkey while they decreased by 25% in OECD Europe. Turkey's CO_2 emissions per capita in 2005 were 3.0 tonnes/capita, far below the OECD Europe average (7.6 tonnes/capita) (Figure 2.2).

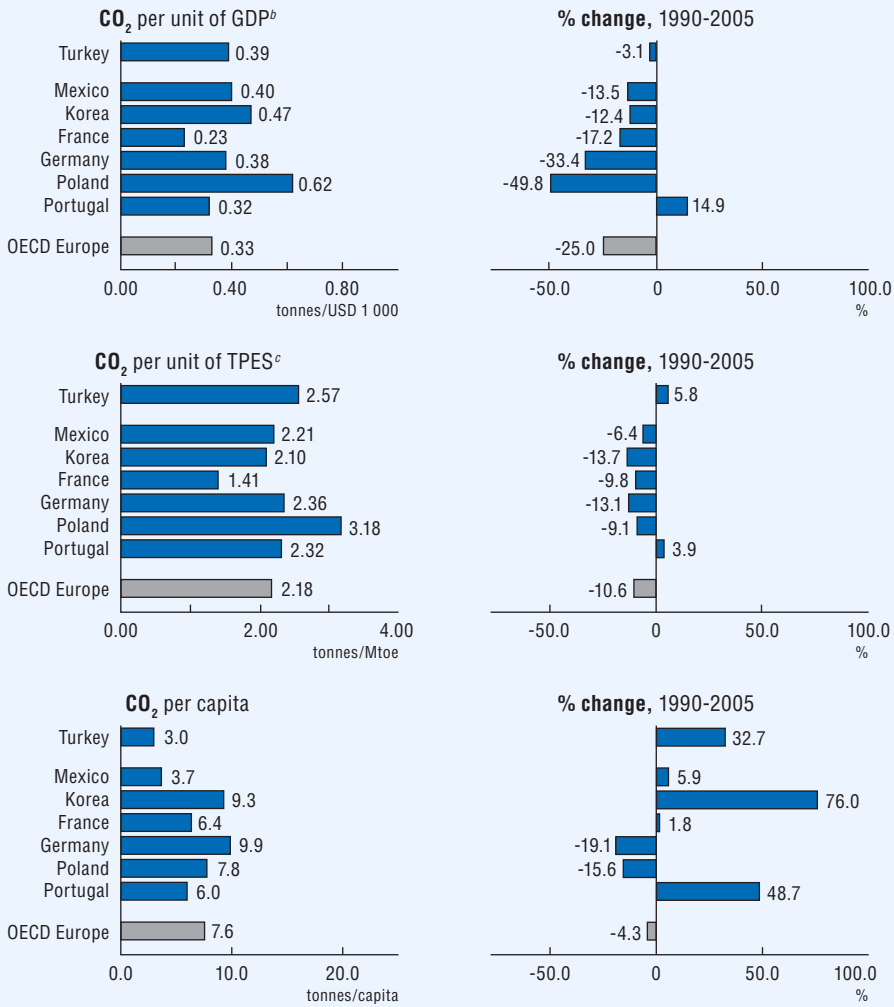
Table 2.1 **Air pollutant emissions,**[a] by source

(1000 t)

		SO_2	(%)	NO_x	(%)	NMVOC[b]	(%)	CO	(%)
Power stations	1998	1 151.2	*62.8*	187.3	*20.3*	6.4	*1.2*	14.9	*0.3*
	2005	1 285.3	*66.3*	182.4	*16.9*	7.5	*1.4*	23.1	*0.6*
Industrial combustion	1998	474.5	*25.9*	168.4	*18.3*	3.2	*0.6*	64.1	*1.2*
	2005	506.8	*26.1*	203.3	*18.8*	3.4	*0.6*	78.0	*2.2*
Non-industrial combustion	1998	94.9	*5.2*	191.0	*20.7*	196.0	*35.8*	1 779.2	*34.4*
	2005	75.5	*3.9*	207.4	*19.2*	174.5	*31.5*	1 461.5	*40.5*
Industrial processes	1998	48.7	*2.7*	21.9	*2.4*	44.1	*8.1*	16.4	*0.3*
	2005	48.6	*2.5*	18.2	*1.7*	49.0	*8.8*	6.7	*0.2*
Mobile sources	1998	62.5	*3.4*	341.8	*37.1*	88.2	*16.1*	2 791.0	*54.0*
	2005	22.2	*1.1*	456.0	*42.2*	125.7	*22.7*	1 473.4	*40.9*
Solvents	1998	–	–	–	–	172.1	*31.5*	–	–
	2005	–	–	–	–	157.7	*28.4*	–	–
Miscellaneous	1998	–	–	11.4	*1.2*	37.0	*6.8*	501.6	*9.7*
	2005	–	–	12.9	*1.2*	36.7	*6.6*	561.9	*15.6*
Total	1998	1 831.7	*100.0*	921.9	*100.0*	547.0	*100.0*	5 167.0	*100.0*
	2005	1 938.5	*100.0*	1 080.2	*100.0*	554.4	*100.0*	3 604.8	*100.0*
Change 2005/1998 (%)			*5.8*		*17.2*		*1.4*		*-30.2*

a) Data include estimates.
b) 2005: 2004 data.
Source: EMEP (2006); TurkStat.

Figure 2.2 **CO_2 emission intensities,**[a] 2005



a) Includes CO_2 emissions from energy use only; excludes international marine and aviation bunkers; sectoral approach.
b) At 2000 prices and purchasing power parities.
c) Total primary energy supply.
Source: OECD-IEA (2007), CO_2 Emissions from Fuel Combustion; OECD (2007), OECD Economic Outlook No. 82; OECD-IEA (2007), Energy Balances of OECD Countries 2004-2005.

2.2 Air quality

Air quality trends

Trends in reducing annual average *concentrations of SO_2 and particulate matter* (PM) in cities showed overall progress between 2002 and 2008. In cities such as Ankara, Gaziantep, Izmit (city centre), Samsun, Sivas and Diyarbakir pollutant concentrations decreased, particularly during winter seasons, in some cities from levels over 260µg/m^3. This progress reflects major changes in energy supply for domestic heating, with i) natural gas substituting for coal in a number of cities and ii) prohibition of the use of high-sulphur coal in 2005. For example, in Samsun the SO_2 concentration in winter decreased to 33µg/m^3. In Diyarbakir the SO_2 concentration in winter decreased from 128 to 59µg/m^3. Average annual concentrations of SO_2 and PM are below the long-term target limit value (TLV) (TurkStat, 2006).

However, in *cities where industry has continued to expand* (e.g. Bursa, Denizli, Kayseri and Kütahya), SO_2 and PM concentrations have not decreased. Average winter concentrations have exceeded TLV, and average concentrations of SO_2 and PM_{10} have remained above the WHO guideline of, respectively, 20 and 50µg/m^3. For instance, in Denizli, Batman, Kütahya, Karabük and Van PM_{10} concentrations reached over 130µg/m^3 in 2007; in Kayseri, PM concentrations in the 2004/2005 winter season reached 125µg/m^3 and SO_2 concentrations 151µg/m^3(though the latter decreased to 57µg/m^3 in 2007/2008 (TurkStat, 2006, 2008).

Health impacts

Benefits from air pollution reductions through *full compliance with EU air-related Directives* (decreased health expenditure, increased labour productivity, increased well-being) have been estimated at EUR 3-9 billion (ECOTEC, 2001). A study comparing provinces that used natural gas with others that used other fossil fuels estimated the incidence of air quality related respiratory disease at 5 and 8% respectively (Özdilek, 2006).

Air quality monitoring

Only *SO_2 and PM* concentrations in ambient air have been monitored on a regular basis across the country. In certain cities other pollutants have also been monitored: in Istanbul NO_x, CO, O_3 and HC are monitored by the municipality. A draft 2006 Regulation on Air Quality Evaluation and Management aimed to expand air quality monitoring to include 13 additional pollutants on a regular basis, in line with Turkey's commitment to transpose the EU Air Quality Framework Directive and its sister Directives.

Historically, *air pollution monitoring in urban areas* has been performed by the Ministry of Health. Recently responsibilities have shifted to the Ministry of Environment and Forestry (MoEF)[4] and the monitoring network has expanded, benefiting from the efforts of provincial environmental departments and of universities. In 2004, 191 semi-automatic measurement stations monitored SO_2 and PM concentrations in 71 provinces. Today, all the provinces have at least one automatic measurement station for SO_2 and PM_{10}, part of the national Air Quality Monitoring Network. In addition, mobile air quality monitoring vehicles have been introduced. A national reference laboratory (under MoEF) is in the process of accreditation with support from the Marmara Research Center.

Many Organised Industrial Zones have their own laboratories to monitor and analyse on-site conditions (Chapter 5). There are only a few *self-monitoring* obligations, except for large combustion plants which have to continuously monitor stack emissions. Real-time information from industry, as well as from urban monitoring, is forwarded to the National Reference Laboratory and is made available to the public.

Results of SO_2 and PM concentrations measurement are provided periodically to the Turkish Statistical Institute (TurkStat). Data are evaluated and published as monthly, winter and annual news bulletins. All bulletins and the air quality database are available on the TurkStat website. Information on SO_2 and PM concentrations is continuously provided by MoEF on its website and sent to the media by e-mail. When air quality limit values are exceeded, necessary measures are taken by Governorships, and information on air quality is provided to the public by local TV and radio.

Overall, monitoring practices have progressed but do not yet seem to provide a complete and reliable picture of pollution across the country. Networks are still incomplete, and staff and equipment are lacking for data collection and processing. An *investment planning* study estimated that over 200 additional air quality measurement stations were needed to implement air monitoring in line with EU Directives. Related investment cost estimates vary between EUR 11.5 and 18 million. Maintenance cost estimates vary between EUR 1.3 and 1.5 million annually (ENVEST Planners, 2004).

2.3 Regulatory instruments

Emissions from stationary sources

The regulatory framework for managing emissions from *stationary sources* has improved during the review period. The 2005 Regulation on Control of Air Pollution Resulting from Heating introduced new emission standards for burning facilities and

required emission certificates before facility operations could begin. It also prohibited the marketing and use of coal not in compliance with quality standards.[5] This regulation contributed to switching from coal to other fuels for heating purposes. Coal consumption in Istanbul was expected to be 1-1.5 million tonnes in the winter of 2006-07, down from 8-10 million tonnes in earlier years.

The 1986 Regulation on Air Quality Protection was further modified in 2004 and 2006, with the aim of strengthening the *air emission permitting system* through: clearer definition of the roles of MoEF and its Provincial Directorates in issuing permits; shortening of review periods for permit applications; and linking of preliminary permits with EIA decisions. A better division of permitting responsibilities has also been achieved between the Ministry of Health (which historically undertook many environmental management functions) and MoEF. Installations emitting air pollutants continue to be subject to two categories of permitting procedures (preliminary and full), with a distinction between large installations (List A) and smaller ones (List B).[6] However, emissions from waste incinerators and co-incinerators are regulated mainly by waste legislation.

In 2003, MoEF launched a simplification of permitting procedures with a regulation introducing a combined environmental permit. Discussions have focused on how to introduce *integrated pollution prevention and control procedures* in line with the EU IPPC Directive. The creation of a Turkish IPPC Centre is envisaged with information, or both information and executive, responsibilities for integrated permitting matters. The introduction of these new permitting procedures would parallel the introduction of new limit values and standards required by the transposition of EU legislation (MoEF, 2006).

The 2007 amendments to the 1983 Law on Environment introduced provisions for *tougher penalties for non-compliance with permitting procedures*. For example, an administrative fine of TRY 24 000 was introduced for: operation of installations without a permit; continuing operation in spite of permit cancellation; performing changes on a facility without prior approval by competent authorities; not carrying out changes requested by authorities as a result of inspections. In cases where emission levels exceed the limits determined by regulations, an administrative fine of TRY 48 000 can be imposed (IMPEL, 2005).

Emissions from mobile sources

During the review period, *regulations for emissions from motor vehicles* have been substantially revised, with EU requirements providing important benchmarks. For example, Euro III level standards, which had been applied to vehicles manufactured in the EU or imported after 2000, became applicable in Turkey in 2003.

The Euro IV level standard has been applied since January 2008 for new vehicles and will be applicable in 2009 for vehicles registered before 2008. Compliance is evaluated and certified through bi- or tri-annual inspections that have to be conducted at authorised stations under the 2005 Regulation on Opening and Operating of Vehicle Examination Stations and on Vehicle Examinations. The 2003 Regulation on Informing Consumers on Fuel Economy and CO_2 Emissions of New Passenger Cars, which is in line with the EU Consumer Information Directive regarding fuel consumption and CO_2 emissions, will enter into force on 1 January 2009 (MoEF, 2006).

Regulations on *fuel quality* have also been revised, in line with the EU Quality of Petrol and Diesel Fuels Directive. The use of leaded gasoline was totally banned in 2004. The Ministry of Industry and Trade employs 620 inspectors, 600 of whom work in Provincial Directorates located in 81 cities and perform market surveillance activities.[7] From 1 January 2007, the sulphur content of diesel oil was restricted to 50 mg/kg, which is 80 times lower than before. There are plans to further restrict the levels to 10 mg/kg in 2009. Sulphur content standards for unleaded gasoline are lowered to the same levels, in line with the Directive regulating the sulphur content of liquid fuels. The date of the full transposition remains set for 2010.

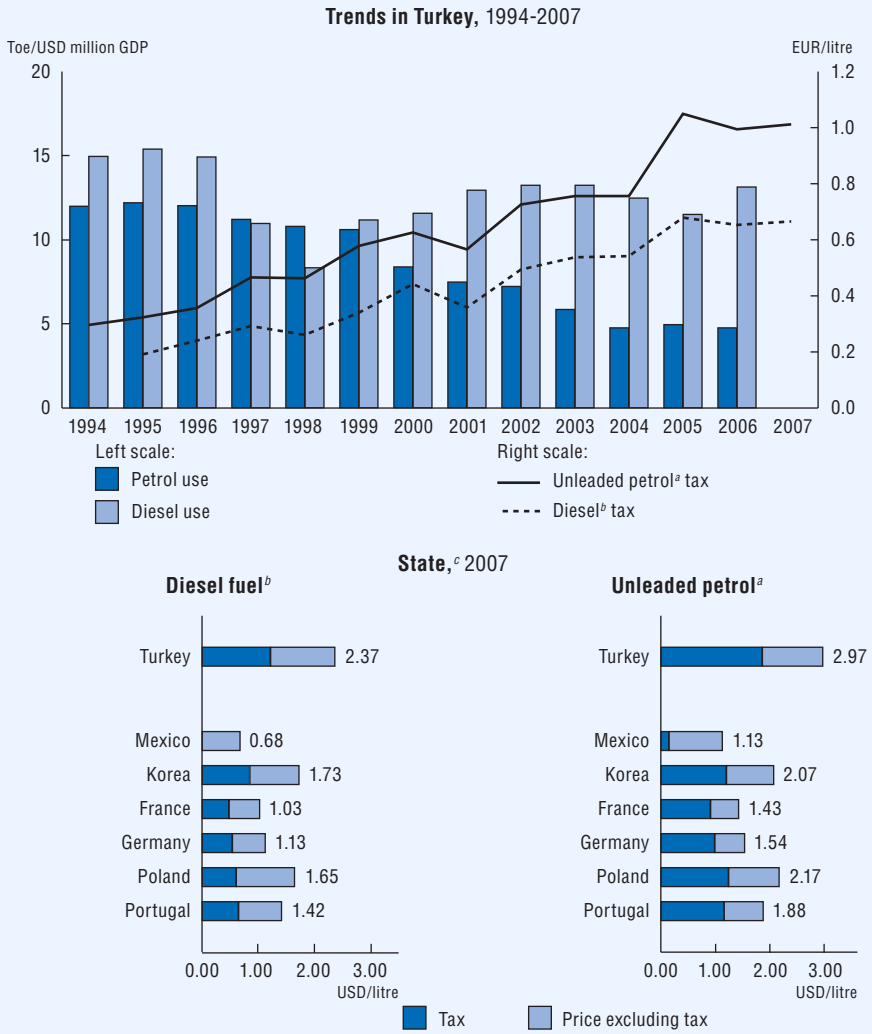
2.4 Economic instruments

Currently, no *environmental charges or taxes* for managing air pollution are applied directly. Previous funding arrangements, with part of the revenue from motor vehicle inspection fees, vehicle sales and fees on airplane tickets going to the Environmental Pollution Prevention Fund, were discontinued with the Fund's elimination in 2001 (Chapter 5).

Environmentally related taxes

Environmentally related taxes include taxes on fuels and on vehicles. Road fuel prices in Turkey are among the highest in OECD countries. A *special consumption tax on motor vehicle fuels* (gasoline and diesel) was introduced in 2002 and its increase over the last five years is associated with a decrease in the use of motor fuels per unit of GDP (Figure 2.3). Given that many low-income households in Turkey do not own a car, this reform has touched middle-income and higher-income households. Since the tax rate for diesel fuel with sulphur content below 0.05% (EUR 0.52/l) is higher than for fuel with a higher sulphur content (between 0.05 and 0.20%), the wrong incentive is given from an environmental perspective (OECD, 2007).

Figure 2.3 **Fuel taxes and energy efficiency of road transport**



a) Unleaded premium (RON 95); Korea: unleaded regular.
b) Automotive diesel for commercial use; Korea: for non commercial use.
c) In USD at current prices and purchasing power parities.
Source: IEA-OECD (2008), Database of End-Use Prices.

The annual *tax on motor vehicles* also has environmental ramifications. Its rates increase with cylinder volume (the tax is 84% higher for SUVs). As vehicles with larger cylinder volumes emit more pollutants, this provides incentives to purchase smaller vehicles. However, the tax decreases with the vehicle's age, which is inconsistent with pollution reduction objectives (ENVEST Planners, 2004).

The replacement of *older vehicles in the fleet* has been encouraged by separate economic incentives. In 2003 and 2004, the *special consumption tax* imposed on the purchase of new vehicles was lowered when a discarded vehicle was at least 20 years old. Overall, between TRY 2.25 and 4.5 million in tax rebates were granted for purchases of 247 000 new vehicles. In 2006, unpaid vehicle-related taxes, interests and fines were cancelled when vehicles at least 20 years old were delivered for scrapping at designated places.

Preferential tax rates apply to other fuels, such as *LPG and bio-diesel*. For example, the LPG tax rate is EUR 0.27/l compared to EUR 0.75/l for low-octane unleaded gasoline. This differentiation provides incentives to use LPG. When gasoline or diesel is mixed with bio-fuels (ethanol and bio-diesel) manufactured from domestic agricultural products, a lower tax rate is applied according to the mixing ratio.[8]

Energy prices

Retail *electricity prices* are relatively high in Turkey, at approximately USD 0.163/kWh for households and USD 0.1/kWh for industrial consumers (Table 2.2). Turkey currently has implicit cross-subsidies between regions and for certain subcategories of consumers. The government is considering a transition period, with a tariff equalisation method, to reduce cross-subsidies and progressively introduce cost-effective tariffs in the medium term.

For households, the *price of natural gas for heating* is relatively low (adjusted for purchasing power parities). On the contrary, the price of oil is three times as high as in OECD Europe (Table 2.2). Differences in energy prices are mainly due to tax differentiation by fuel types: the special consumption tax on natural gas is much lower than on fuel oils. However, no special consumption tax is applied to coal.

3. Integration of Air Quality Concerns into Energy Policy

The basic principle of Turkish energy policy, as set out in the *8th National Development Plan* (1999-2005), was to ensure sufficient energy supply to meet the increasing demand, at the lowest cost possible (Box 2.1). The 8th NDP also

Table 2.2 **Energy prices** in selected OECD countries, 2007

	Electricity		Oil		Natural gas	
	Industry (USD[a]/kWh)	Households (USD[b]/kWh)	Industry[c] (USD[a]/tonne)	Households[d] USD[b]/1 000 litres	Industry (USD[a]/10^7 kcal)	Households (USD[b]/10^7 kcal)
Turkey	0.109	0.163	786.0	2 278.0	440.8	696.1
Mexico	0.102	0.135	259.3	..	347.1	917.0
Korea	0.069	0.129	551.9	1 269.1	551.1	902.5
France	0.056	0.130	407.9	728.7	414.1	646.5
Germany	0.094[e]	0.200[e]	..	677.5	..	..
Poland	0.082	0.216	354.1	1 281.1	375.1	983.1
Portugal	0.128	0.222	x	1 032.7	428.8	1 119.3
OECD Europe	0.106[e]	0.169[e]	..	755.2	..	..
TUR price/OECD Europe (%)	*94*[e]	*104*[e]	..	*302*	..	..

. .: not available.
x: not applicable.
a) At current exchange rates.
b) At current PPPs.
c) High-sulphur oil.
d) Light fuel oil.
e) 2006 data.
Source: OECD/IEA (2008), Energy Prices and Taxes, Quarterly Statistics, first quarter.

introduced provisions for minimising negative environmental impacts, improving energy efficiency and increasing the share of renewable energy in energy consumption.

3.1 Reducing pollution from energy production

In the review period, the government further *reformed the regulatory framework* to reduce pollution from energy production. In 2006, the new Regulation on Control of Air Pollution from Industrial Plants set standards for emissions of NO_x, SO_2, CO and PM from combustion plants, an important step towards aligning air quality standards with EU regulations. PM and CO standards were lowered for both solid and liquid fuel-fired power plants. PM standards were tightened from 150 to 100 mg/m^3 for solid fuel-fired power plants. CO standards were lowered from 250 to 200 mg/m^3 (for solid fuel-fired plants) and from 175 to 150 mg/m^3 (for liquid fuel-fired plants) (IEA, 2005).

Box 2.1 **Trends in energy supply and consumption**

Energy supply and mix

Energy intensity decreased by 8% between 1990 and 2005: Turkey's TPES per unit of GDP (0.15 toe/USD 1 000 in 2005) was lower than the OECD average (0.18 toe/USD 1 000). Per capita TPES (1.18 toe) is much lower than the OECD average and is projected to continue to grow while the OECD average declines.

Total primary energy supply (TPES) in 2005 was 85 Mtoe, a 60.9% increase since 1990 in line with the increase in GDP. In 2005, oil accounted for 35.1% of TPES, followed by natural gas (26.7%), coal (26.4%) and hydro and other renewables (11.9%). In 2006, Turkey imported 90% of its oil, mostly from Iran (37%), Russia (28%), Libya (17%) and Saudi Arabia (14%). The supply of natural gas, most of which is imported, grew almost seven-fold between 1990 and 2005. In 2006, imports of natural gas were mostly from Russia (64%), Iran (18.5%) and Algeria (14%).

Domestic energy production decreased slightly between 1990 and 2005 (from 25.8 to 23.6 Mtoe). Over half (57%) of domestic energy was produced from fossil fuels, including coal (44%) (mostly lignite) and oil and natural gas (13%). Renewable sources constituted 43% of all domestic energy production, with biomass providing 23% and hydro, geothermal, solar and other renewable sources 20%. Lignite production fell by 13% between 1990 and 2005.

Household supply of *natural gas* has risen rapidly and is now around 25% of TPES. Until recently, only five cities had gas distribution systems. Between 2004 and 2006, licenses were awarded to private investors for building and operating "greenfield" gas distribution systems in 31 additional cities; 20 of these cities are reported to have started to use natural gas. It is expected that with the supply of gas to these cities, natural gas demand will rise sharply in the short to medium term.

Although *nuclear power* has been considered among future energy sources for more than 30 years, difficulties have been encountered in regard to financing, legal issues and public opposition. In April 2006, Turkey's Atomic Energy Agency (TAEK) confirmed that the Black Sea port of Sinop had been chosen as the site of its first nuclear power plant (out of eight possibilities). The 1 800 MW plant (USD 2.7 billion investment) is scheduled to come on line in 2014.

Energy consumption

Since 1990, energy consumption by *industry* has increased; it represents 32% of total final energy consumption (TFC), as industry in Turkey continues to be energy-intensive. The iron and steel sector is the biggest energy consumer, followed by the textile and leather, chemical and petrochemical and cement industries. After a marked decline in energy use by industry due to the economic crisis, rapid growth resumed between 2001 and 2006.

Box 2.1 **Trends in energy supply and consumption** *(cont.)*

Since 1990, energy consumption by the *residential and commercial sectors* has increased and represents 35% of TFC. There are several reasons for this growth, including rising living standards and the 5% annual growth rate in the building stock. Households use various energy sources for heating, including coal (both indigenous and imported), natural gas, oil and geothermal, but biomass is still the dominant fuel. The government is encouraging switching to natural gas where it is available. Solar energy is used increasingly for hot water supply in households. In the residential and services sectors, more than 80% of the energy consumed is used for heating. During the period 2003 to 2010, the government expects 48% growth in energy demand in these sectors.

The emissions standards for *large power plants* remain significantly less stringent than those currently in force in the EU.[9] For example, for very large new solid fuel-fired power plants (more than 300 MW), the NO_x emissions limit in Turkey is 800 mg/m^{3}compared with 200 mg/m^3 in the EU. The SO_2 emission standard for a 100 to 300 MW solid fuel-fired thermal power plant was tightened to 1 300 mg/m^3 (from 2 000 mg/m^3), which remained significantly less stringent than the EU standard (Table 2.3).

Some *investments* have already been made, especially to address the environmental impacts of the high sulphur content of domestic lignite. New lignite-fired power plants have been equipped with flue gas desulphurisation (FGD) technology to comply with regulations. Six of eleven pre-1986 lignite-fired plants have been retrofitted with electrostatic precipitators (ESP) to reduce particulate emissions. However, not all ESPs are working at maximum efficiency. Construction of one power plant based on circulating fluidised bed technology has recently been completed (IEA, 2005). This first application of advanced coal technology in Turkey, designed to use low-quality lignite with high sulphur content, was followed by other plants. Studies on compliance with the EU LCP Directive indicate that an investment of over USD 1 billion would be needed to retrofit installed FGD and ESP facilities and to adopt advanced coal technologies (MoEF, 2006).

A *fuel quality monitoring system* was established with the Regulation on Petroleum Market Information Systems. Supervision and surveillance is the responsibility of the Energy Market Regulatory Authority and the Ministry of Energy and Natural Resources, in co-operation with the Ministry of Industry and Trade, the

Ministry of the Interior, the provincial staff of related administrations and the Marmara Research Center of the Scientific and Technical Research Council of Turkey.[10] Completion of the Regulatory Information System (RIS) project is ongoing and necessary.

Table 2.3 **SO_x emission standards for large power plants,** 2007

(mg/m^3)

	Solid fuel		Liquid fuel		Gas	
	Turkey	EU	Turkey	EU	Turkey	EU
New facilities						
> 300 MW	1 000	200	800	200	60	35
100 to 300 MW	1 300	200	1 700	200-400	60	35
50-100 MW	2 000	850	1 700	850	100	35

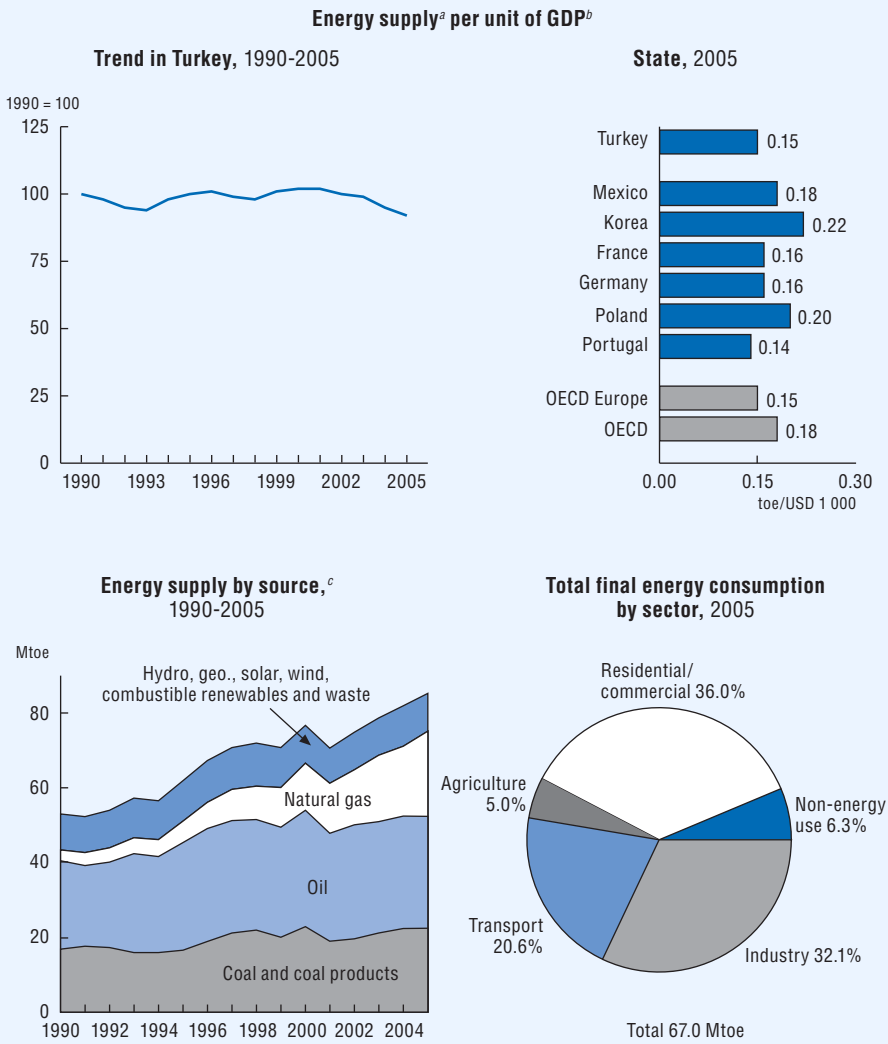
Source: MoEF.

3.2 Improving energy efficiency

Energy intensity decreased by 8% between 1990 and 2005 and is below the OECD average (Figure 2.4). Its improvement through improved sectoral energy efficiencies is an important objective of Turkey, which should bring *multiple benefits*: economic benefits (e.g. higher economic efficiency, reduced energy imports), environmental benefits (e.g. reduced air pollution, reduced emissions of GHG) and related health benefits.

Official studies have demonstrated that Turkey has large (25-30%) *energy conservation potential*. Energy efficiency policies have been implemented in the industrial, residential and services sectors (Box 2.2). General investment support programmes (e.g. for less developed regions, small and medium-sized enterprises and the manufacture of more energy-efficient equipment) also have an indirect positive impact on energy efficiency. There are no direct tax incentives to encourage end-use energy efficiency, nor is there any other kind of direct financial incentives.

Figure 2.4 **Energy structure and intensity**



a) Total primary energy supply.
b) GDP at 2000 prices and purchasing power parities.
c) Breakdown excludes electricity trade.
Source: OECD-IEA (2007), Energy Balances of OECD Countries 2004-2005; OECD (2007), OECD Economic Outlook No. 82.

The *National Energy Conservation Centre* (EIE/NECC)[11] has provided training to consumers on energy conservation measures, conducted energy audits in industry, maintained energy consumption statistics for the industrial sector and public buildings, and co-ordinated dialogue and co-operation with the relevant institutions. In 2004, the *Energy Efficiency Strategy* was adopted to support, in a more comprehensive way, energy efficiency in the final energy consumption sectors and more actively engage ministries and stakeholders in applying energy efficiency measures.

Box 2.2 **Energy efficiency in the industrial, residential and services sectors**

Industrial sector

In 1995, the Ministry of Energy and Natural Resources (MENR) issued a regulation on increasing energy efficiency in industry. All industrial establishments that consume more than 2 000 toe/year (600 establishments, representing 70% of total industrial energy consumption) had to establish an energy management system and carry out audits to determine their *energy saving potential.* The regulation was updated in 2005, to align it better with EU legislation, and the Energy Efficiency Law was adopted in 2007.

The *National Energy Conservation Centre* (EIE/NECC) has been performing energy audits itself and through two certified companies in various industrial plants since 1990. The audits have usually been carried out by a team of engineers over a period of one or two weeks. To date, approximately 100 detailed audits and pre-audits have been conducted in different industrial sectors. However, there have been some difficulties, causing delays in the implementation of the audit results by companies. A good monitoring system to overcome this problem does not yet exist; however, the EIE/NECC does maintain a close relationship with industries on an informal basis.

Industrial energy management courses began in 1997 and are now provided by four organisations in different parts of the country. Engineers from other countries in the region also come to the EIE/NECC Training Centre. The EIE/NECC has a number of activities for *raising awareness* on energy efficiency in industry. These include operating a training bus; providing free publications; preparing technical manuals for energy managers; organisation of national and international conferences, seminars and workshops; and granting energy conservation awards to companies.

Box 2.2 **Energy efficiency in the industrial, residential and services sectors** *(cont.)*

Residential and services sectors

Approximately 10% of buildings have roof insulation and/or double-glazing; however, 70% of new buildings have double glazing. The first mandatory standards for *heat insulation in buildings* were adopted in Turkey in 1985. In 1998, the standards were strengthened; in June 2000, their implementation was made mandatory. Heat loss limits from the building envelope have been reduced by half compared with old standards. The standards divide Turkey into four climatic zones and must be implemented if large-scale renovations are carried out in existing buildings. In May 2000, the standards were complemented by the Regulation on Heat Insulation in Buildings, which sets limits for the annual heating energy requirements of buildings, also differentiated according to climatic zones. Each new building has to possess an energy certificate that shows its energy consumption per square and cubic metre.

Since 1997, all governmental organisations have to prepare annual reports on energy consumption in their buildings. About 2 000 reports are evaluated yearly by the EIE/NECC. According to evaluation results, the energy consumption in these buildings was high, exceeding 250 kWh/m^2. While 48% of public buildings had double glazing, 40% had roof insulation and 17% had automatic heating control systems, the *energy efficiency improvement potential of public buildings* was estimated at 30%.

Energy efficiency labels for consumer appliances have been introduced by the Ministry of Industry and Trade within the harmonisation programme for EU Directives. A labelling system for air-conditioning has been proposed by the Ministry, but is awaiting parliamentary approval. Energy efficiency regulations are in place for refrigerators and freezers and their combinations (since 2002) and for new hot water boilers (since 2004), and are being prepared for street lighting. Boilers and stoves using wood, coal or fuel oil must have a certificate based on a heat efficiency test.

In 2007, to facilitate the implementation of the strategy, the *Energy Efficiency Law* was adopted. Its main provisions include: increasing energy efficiency awareness; training for energy managers and the staff of future energy service companies; and improving administrative structures for energy efficiency services. The law envisages establishing an Energy Efficiency Co-ordination Board (EECB), introducing third-party financing for all sectors and voluntary agreements for industrial plants, and setting up the financial mechanisms for energy efficiency investments.

3.3 Promoting renewable energy

Renewables represent about 12% of TPES. More than half of the renewables used in Turkey are combustible fuels and waste, the rest being mainly hydro, solar and geothermal.[12]

Turkey is richly endowed with hydropower, wind and geothermal resources. Sectoral studies have indicated that small-scale *hydropower* (less than 30 MW) is underdeveloped, with 88 plants in operation compared with 350 prospective development sites and a total potential production of 33 TWh of electricity per year (about 25% of current demand). It is estimated that Turkey has the potential for up to

Box 2.3 **Law on renewable energy**

The 2005 Law on Utilisation of Renewable Energy Resources for Electricity Production Purposes (the Renewable Energy Law) provides *various incentives* to encourage investing in renewable energies for electricity generation. The renewable energy resources (RER) targeted by this law are wind, solar, geothermal, biomass, biogas, wave, current and tidal energy resources for electric generation, and hydraulic generation plants. Renewable energy resource certificates are issued by the Energy Market Regulatory Authority, which identifies and monitors them.

The law introduces *feed-in tariffs and a purchase obligation* for the distribution companies from certified renewable energy producers. Under the new law, each new project implemented before 2011 will benefit from seven years of feed-in tariffs. Moreover, hydro and geothermal power producers will receive a fixed feed-in tariff of 15% above the wholesale electricity price of the Turkish Electricity Trading and Contracting Company (TETAS). Producers of all other renewables, except large-scale hydro, will receive a tariff of 20% above the wholesale electricity price. However, a minimum price of EUR 0.05/kWh and a ceiling of EUR 0.06/kWh will be applied. It is expected that the feed-in tariffs would principally encourage small-scale hydropower, followed by wind and geothermal energy. Distribution companies will be obliged to purchase a certain minimum amount of power from eligible renewable energy sources, defined as a percentage of their sales. This share will gradually be increased to a minimum of 8% by 2011, when the feed-in tariff system will be fully replaced by this quota system. The government has also expressed some interest in certificate trading, but the Renewable Energy Law does not include provisions for it.

Under the law, a 50% deduction in the fee permitting the use of State-owned land is applied to RER electricity generation projects. The Regulation on Electricity Market Licensing provides further incentives for RER generation facilities, including exemption from *license fees* for the first eight years following the facility completion.

11 000 MW of *wind power capacity* (mostly along the coasts), capable of generating about 25 TWh of electricity per year (IEA, 2005).

There is also large potential for *geothermal and solar thermal applications* in Turkey.[13] Solar collectors are already a significant, market-driven business. The government expects the use of geothermal and solar thermal energy to double between 2003 and 2010. The Geothermal Energy Law, enacted in 2007, aims to boost geothermal residential heating. The organic component of *waste incineration* is also considered a renewable option in the future, using appropriate technology to meet high health and environmental standards.

In the review period, *commercial use of renewable energy*[14] has not developed rapidly. However, the 2005 *Law on Utilisation of Renewable Energy Resources for Electricity Production Purposes* should modify this (Box 2.3), as well as the recent licensing regulation and associated promotional provisions. *Financial assistance* is being provided for the development of renewable energy projects. In 2004, USD 200 million was made available; by 2008, about half had already been committed to finance 19 projects (13 hydropower, 4 geothermal and 2 windpower) with several other projects under preparation. The private Turkish Industrial Development Bank and the government-owned Turkish Development Bank have served as financial intermediaries. Financing was facilitated by a number of factors, including the new Electricity Market Law, an active local power market and relatively high energy prices (World Bank, 2007).

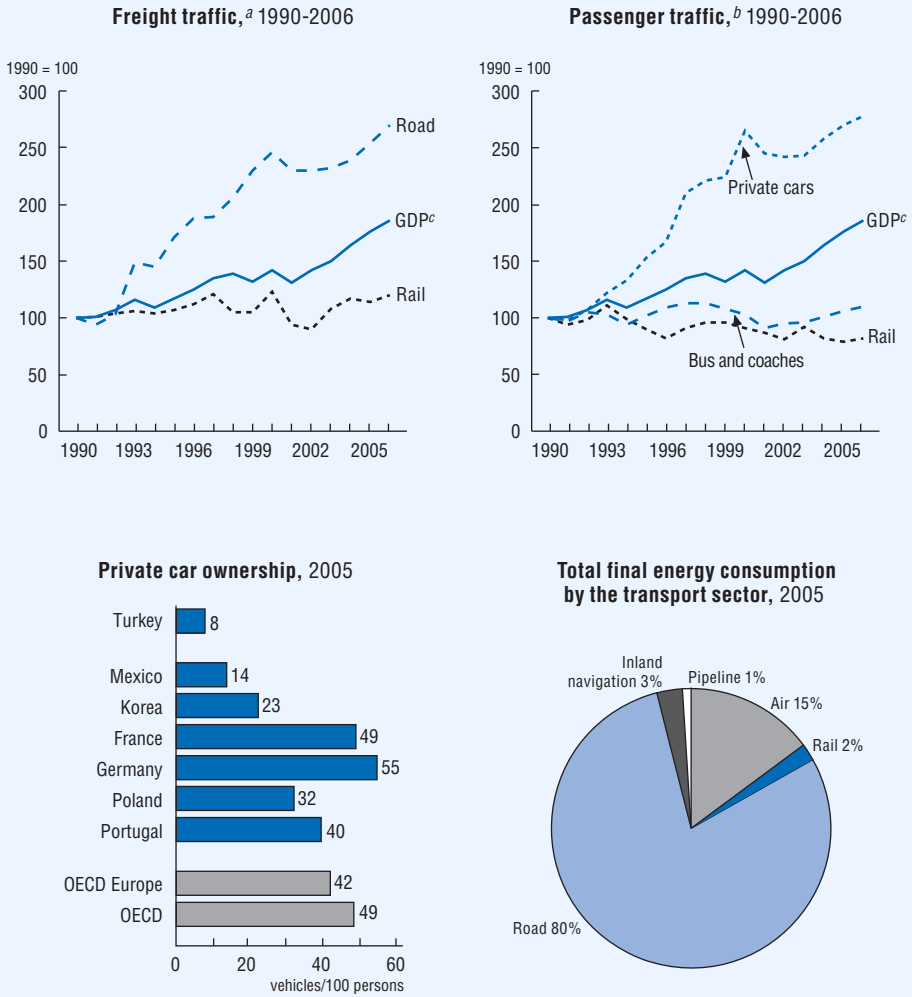
4. Integration of Air Quality Concerns into Transport Policy

4.1 State of transportation

Since 1990, *freight and passenger road traffic* has increased very rapidly, by more than 150% or twice the rate of increase in GDP (Figure 2.5). It represents over 95% of total passenger traffic and 93% of total domestic freight traffic. However, road traffic volume per capita (800 vehicle-km/person in 2004) is still one-tenth of the OECD average (TCDD, 2005) and motor vehicle ownership per capita (8 vehicles/ 100 persons) is one-sixth of the OECD average (Figure 2.5). Vehicle densities are higher in North-western Turkey than in the rest of the country (Box 2.4).

The *railway network* has been extended only slightly since 1990, to 11 000 km, but the length of electrical railway has increased to about 2 500 km (TCDD, 2005). Freight traffic by rail has shown a small increase, while passenger traffic by rail (and bus) has decreased (Figure 2.5). In contrast, air traffic doubled between 2003 and 2006, to close to 60 million passengers in 2006, including 13 million domestic

Figure 2.5 **Transport sector**



a) Index of relative change since 1990 based on values expressed in tonne-kilometres.
b) Index of relative change since 1990 based on values expressed in passenger-kilometres.
c) GDP expressed in 2000 prices and purchasing power parities.
Source: OECD Environment Directorate; OECD-IEA (2007), Energy Balances of OECD Countries 2004-2005.

Box 2.4 **Transport infrastructure**

The backbone of Turkey's transport system consists of a 65 000 km *State and provincial road network*, of which 1 900 km is classified as highways. The overall length of roads is 250 000 km, of which 130 000 km is paved. Parts of the State and provincial road network are old and have deteriorated paving, which implies higher road maintenance and vehicle operating costs.

Over the review period, the rate of *extension of the State and provincial road networks* was slower than in the previous decade. Similarly, the motorway network was extended by much less. Construction of the South Black Sea Road and the Ankara-Samsun route are underway. Financing of USD 831 million for a highway project connecting the Caucasus region, Central Asia and Europe was secured. Projects awaiting financing include a road across the Gulf of Izmit (to reduce the time it takes to drive from Istanbul to the Aegean) and a third bridge over the Istanbul Strait (Bosphorus).

The transport system also includes 11 000 km of *railway network* (8 257 km of which is a single line), some 80 ports (and 100 smaller coastal facilities) and 22 State airports (13 international). The Marmara project aims to upgrade 76 km of the commuter rail system and connect the European and Asian sides with a tunnel under the Istanbul Strait (Bosphorous). The link would also provide an uninterrupted railway connection with the Ankara-Istanbul high-speed train and Kars-Tbilisi projects.

Pipelines (1 200 km) bring Caspian, Central Asian and Middle Eastern energy sources to Europe and world markets. The *Bakü-Tiflis-Ceyhan (Baku-Tbilisi-Ceyhan)* oil pipeline (which started operations in July 2006) delivers 1 million barrels/day of petroleum. In 2007, the South Caucasus pipeline (from the Shah Deniz field) is expected to bring natural gas from Azerbaijan to Turkey. Turkey is also building an interconnect pipeline to Greece, an important step in bringing Caspian natural gas to Europe.

flight passengers (SPO, 2006). *Land-based transport* of oil and gas has greatly increased with the opening of new pipelines, e.g. Bakü-Tiflis-Ceyhan (Baku-Tbilisi-Ceyhan) (Box 2.4).

4.2 Air pollution and transport policies

Road traffic accounts for 80% of total energy consumption by the transport sector (followed by air traffic with 15%, inland navigation with 3% and rail with 2%) (Figure 2.5) and for 87.4% of CO_2 emissions (followed by civil aviation with 7.2%,

inland navigation with 2.4% and railways with 1.6%). The transport sector, which accounted for 18% of *CO_2 emissions* from fuel consumption in 2003 (MoEF, 2007), is also a major source of conventional air pollutants (e.g. NO_x and PM).

The 8th NDP incorporated the *concept of sustainability* into national transport policies. The plan called for the creation of multimodal, integrated and interconnected transport infrastructure, especially to meet the needs of the Europe–Asia transport corridors, as well as for the promotion of methods to evaluate (and measures to internalise) the negative impacts of transport investment. New domestic and international railway lines were to contribute to a reduction in both air pollutant and GHG emissions.

In line with the OECD recommendation, a 2005 *Transport Master Plan Strategy* emphasises reducing air pollution through promoting public transportation, transferring part of inter-city freight traffic to railways or sea routes, and improving road and railway infrastructure. A *Transport Infrastructure Needs Assessment* (TINA) study was completed in 2008 by the State Planning Organisation (SPO) and the Ministry of Transport, with a view to identifying Turkey's main transport infrastructure needs, consistent with the European Community's Trans-European Transport Network (Ten-T) guidelines.

To reduce local air pollution, traffic congestion and energy consumption, large municipalities have implemented *new urban public transport projects* using their own financing. For example, the Ankara subway line, which started operating in 1997, is being extended and a second line is under construction. In Istanbul, the 8 km subway line which opened in 2000 is being extended, as are the light rail (Hafif-Metro) and tramway systems. In four other cities light rail or tramway systems have started to operate over the last five years; 17 intra-city railway systems are under construction (SPO, 2006).

To reduce pollution from motor vehicles, a new law adopted in July 2003 provided financial incentives for *scrapping old cars*. By December 2004, when the programme ended, 247 000 vehicles had been scrapped after USD 723 million in tax deductions were provided as incentives. A new Road Transportation Law has also banned vehicles more than 20 years old, but enforcing this requirement remains difficult.

The 2006 *Railway Transport Action Plan* aims to restructure the railway sector by 2008 and to further involve the private sector in rail transport.[15] There is an emphasis on improving infrastructure (including increasing the number of modern locomotives and the length of electrified rail) and on increasing current capacity by 30%, with priority given to new high-speed lines while improving existing lines.[16]

Major railway construction projects are underway. The Marmaray project will improve public transportation in Istanbul, connecting the Asian and European sides of the Istanbul Strait (Bosphorus). It is expected that the share of rail will increase to 13% for freight transport, and 7% for passenger transport, between 2005 and 2009 through 18 new railway construction projects (Babalik-Sutcliffe, 2007).

Notes

1. 1 teragram (Tg) equals 10^{12} grams or 1 megatonne.
2. The shares of emissions from the residential and transport sectors both dropped, while the shares of emissions from the manufacturing and construction sectors remained stable.
3. In 2004, emissions from lignite-based electricity production accounted for 11.4% (25.4 Tg) of total CO_2 emissions, while the share of emissions from hard coal used for electricity production was only 4.4%.
4. In 2006, MoEF was made the only competent authority for air quality monitoring. The General Directorate of the State Meteorological Service, which is part of MoEF, collects and collates information on air emissions and quality.
5. The applicable fuel standards are determined based on the pollution grading announced for each province.
6. Preliminary permits are temporary and issued prior to operation, based on design characteristics and expected emissions. Full permits are issued after a trial period of operation. List A permits are assessed and issued by MoEF, while List B permits are assessed and issued by Provincial Directorates after approval by provincial environmental councils. Limit values determine whether operators are required to install continuous stack monitoring.
7. According to Article 13 of the regulation on vehicle examinations, periodical and spot checks are performed by these inspectors. If infringing the provision of Article 12 of the regulation, offenders are charged with an administrative fine (e.g. EUR 2 459 or TRY 4 392 in 2006). The amount of fine is adjusted each year.
8. Up to 5% of bio-diesel is allowed to be mixed with regular diesel.
9. As defined by the revised EU Directive on the Limitation of Emissions of Certain Pollutants into the Air from Large Combustion Plants (the LCP Directive), which is applicable to combustion plants with a rated thermal input of 50 MW or more.
10. The Energy Market Regulatory Authority collects, processes and evaluates data provided by refineries, distributors, consumers, lubrication oil producers and bunker delivery licensees, stemming from notification requirements according to the Regulation on Petroleum Market Information Systems.
11. The Energy Resources Survey Department of the Electrical Power Resources Survey and Development Administration (EIE), which is part of MENR, includes the EIE/NECC.
12. Combustible renewables and waste in Turkey are almost exclusively non-commercial fuels, i.e. wood and animal products, used in the residential sector for heating. The use of biomass for residential heating, however, has declined owing to replacement by commercial fuels.
13. Turkey retains one-eighth of the world's geothermal energy potential with up to 4 500 MW potential capacity.
14. Excluding large-scale hydropower.
15. There are currently 25 private companies operating in the country, holding a 25% share in overall transportation.
16. High-speed train initiatives to increase travel speed to 250 km/h are at various stages of progress, including for the Ankara-Istanbul, Ankara-Konya and Ankara-Izmir lines.

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3
WATER MANAGEMENT*

Features

- Management of point source pollution
- Drinking water quality and supply
- Erosion
- Irrigation and the environment
- Integrated water resources management

* The present chapter reviews progress in the last ten years, and particularly since the previous OECD Environmental Performance Review of 1999. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Turkey:

- adopt a *comprehensive water law*, balancing the demand and supply side of water resource management;
- further develop *water resource management by river basin*, addressing both quantity and quality issues; establish basin councils to reinforce co-operation and partnership among authorities and water users (municipalities, industries, farmers), on the basis of pilot projects;
- promote better *water supply and waste water infrastructure*; encourage water saving and investment to reduce water losses;
- promote *adequate pricing of water services*, for household, industry and agriculture, with attention to efficiency, cost-recovery, and affordability;
- strengthen efforts to promote compliance with waste water legislation for *industry* (e.g. appropriate permitting, responses to non-compliance);
- reduce water pollution from *agriculture* (e.g. identification of nutrient vulnerable zones, action plans to address pollution, codes of good agriculture practices, effective inspection and enforcement);
- continue efforts to promote *water monitoring*, promote the analysis of health and economic impacts of water pollution.

Conclusions

Ensuring availability of water for the economy and the population was among the highest priorities in the 8th and 9th National Development Plans of Turkey. These plans also included a number of other objectives related to water management, which are gradually being met. For example, all *river basins* have now their water management plans, and water quality problems are being addressed. Investment in *water supply and waste water infrastructure* has increased, with funding from municipalities and the Bank of Provinces. The rate of connection of the population to waste water treatment plants has increased to reach about 40%. Out of 19 larger municipalities, 16 have waste water treatment plants. Almost all *irrigation infrastructure* (95%) was transferred to user associations and their operation is becoming more efficient. In line with the EU legal framework, a number of regulations have been adopted relating to: discharges of dangerous substances into water, quality of surface water intended for the abstraction of drinking water,

protection of water against nitrate pollution from agriculture, urban waste water treatment, and the use of water for aquaculture and bathing. The MoEF is now responsible for both water quality and water quantity management.

However, *surface water quality* has remained low in many water bodies, or deteriorated due to insufficient pollution control, reaching alarming levels for surface waters in some large municipalities. Despite some progress, still approximately 53% of total *waste water from industry* is discharged into rivers and coastal waters without any treatment, often containing mercury, lead, chromium and zinc. *Groundwater quality and levels* are of concern, as groundwater is often contaminated by leakages from waste water and waste dumps, and increasingly used by households and agriculture. Unaccounted water uses and losses (e.g. unbilled uses, illegal uses, leakages) is about 55%. Although *prices* for drinking water have increased, with the attempt to recover operational costs, water for industry and agriculture, as well as waste water services continue to be underpriced. This results in inefficient use of water, excessive demands for water infrastructure and heavy indebtedness of municipalities. Nitrate and pesticide pollution from agriculture is continuing. Two thirds of agricultural land is prone to erosion. *Large scale hydraulic engineering works*, such as dams, remain a main feature of water management responding to objectives of economic development and population needs.

♦ ♦ ♦

1. Policy Objectives

Recognising the increasing pressures on water resources from steady population growth, industrial development and agriculture practices, the 8th NDP (2001-05) called for *comprehensive improvement of the regulatory and institutional framework for water management*. The planned reform aimed at extending and introducing efficiency in water supply and waste water infrastructure in urban and rural areas, and at encouraging better water use in industry and agriculture.

Key objectives of the 8th NDP (2001-05) included: i) ensuring the supply of safe *drinking water* to the entire population in urban areas and improved access to safe drinking water in rural areas, with emphasis placed on reducing water losses from water infrastructure and stopping illegal use of water; ii) developing *waste water infrastructure* in urban areas to decrease pollution pressures on surface and groundwater resources; iii) implementing *water and waste water pricing* to comply with the polluter- and user- pays principles, ensuring cost recovery and protecting vulnerable consumers; iv) *reforming legal and institutional arrangements,* including

through the development of a framework water law and the harmonisation of water standards with those of the EU (SPO, 2001).

The *9th NDP* (2007-13) reiterated the qualitative objectives of the 8th NDP, with an emphasis on i) strong co-ordination among relevant institutions responsible for water management, and ii) development of integrated water resource management (SPO, 2006).

Other specific plans also contained qualitative objectives related to water management. The National Action Plan Related to Land-based Sources[1] stressed i) identifying all land-based sources of pollution and environmental risks, as well as ii) defining priorities for pollution prevention. The National Action Programme for Combating Desertification outlined strategies to address soil degradation, combat desertification and work towards sustainable land use.

The *1999 OECD Environmental Performance Review of Turkey* recommended that Turkey:

- set quantitative objectives for domestic sewage treatment and speed up connection of the population;
- examine priorities for public investment in water infrastructure and encourage adequate pricing of water services, e.g. through combined water bills, as well as public-private partnerships for financing, building and managing municipal water services;
- continue the transfer to users of irrigation facilities, and establish mechanisms to enable the introduction or strengthening of cost recovery;
- integrate environmental concerns in water withdrawal plans and cost-benefit analysis of water projects;
- develop an overall water resource management strategy by river basin, addressing both quantity and quality issues; establish basin councils to reinforce co-operation and partnership among authorities and water users (municipalities, industries, farmers);
- revise water legislation in line with international developments;
- pursue efforts to monitor water quality and strengthen enforcement of legislation.

2. Water Quality Management

2.1 Water quality trends

Rivers and lakes

The number of *parameters for assessing the quality of freshwater resources* was extended to 45 in 2004 with the amendments to the Regulation on Water Pollution Control (first published in 1988).[2] On a project basis, chemical parameters not mentioned in the regulation are also measured. The waters are classified into four quality classes: I: high quality, II: slightly polluted, III: polluted and IV: highly polluted (Baltaci and Onur, 2007).

Water quality in rivers has not shown major improvements, as population growth, urbanisation and industrialisation continue to exert important pressures, especially in the western part of the country, while agricultural practices generate nutrient and pesticide pollution in southern and eastern Turkey. The south-eastern rivers flowing into the eastern Mediterranean, those flowing into the Marmara Sea and those flowing into the Aegean Sea (except the Küçük Menderes River) are in classes III or IV. The eastern, south-eastern and south-western rivers flowing into the western Mediterranean, as well as rivers flowing into the Black Sea, continue to be in classes II or III except the Sakarya River, which is in class IV (DSI, 2007a).

Water pollution has not become a major problem in the *Dicle (Tigris) and Firat (Euphrates) Rivers,* due to low population density and industrialisation in central and southern Anatolia. However, there is a need to intensify water quality monitoring in these rivers, as problems associated with increased pesticide and fertiliser use may arise with the South-eastern Anatolia irrigation projects (GAP).

Concerning *water quality in lakes*, trends are mixed and depend on pollution prevention measures. For example, Lake Sapanca has improved since 1999 due to investment in waste water treatment around the lake, whereas Lake Gala has deteriorated because of intensive rice cultivation in its catchment. The designation of the area around Lakes Gala and Pamuklu as Gala Lake Natural Park in 2005 paves the way for further protection of the two lakes' water quality (DSI, 2007a).

Coastal waters

Standards for seawater quality for recreational purposes were upgraded in 2006 and follow the 1976 EC Bathing Water Directive, including for both microbiological and physico-chemical parameters. In Turkey's Blue Flag programme[3] water quality criteria are also used.

Coastal water quality has been improving in some areas. In the early 2000s completion of the waste water treatment systems in large metropolitan cities like Istanbul, Izmir and Antalya (representing a sizeable part of the total coastal population) has contributed to limiting the discharge of untreated sewage into the marine environment (PAP/RAC, 2005). The number of Blue Flag beaches increased from 64 in 1999 to 235 in 2007. Most Blue Flag beaches are located in the Aegean region and south-western Turkey.

However, *land-based pollution discharges* along the Turkish shoreline have continued to place important pressures on coastal waters. Waste water discharges enter the Aegean Sea from nearly 50 major locations along the coast, including input from the Black Sea through the Çanakkale Strait (Dardanelles). The total pollution load from these sources is estimated to be equivalent to that of a population of 20 million. Among the major "hot spots" are the northern Marmara coast, Izmit Bay, and Izmir, Aliaga, Nemrut and Iskenderun Bays due to environmental pressures from industrial facilities. Transboundary pollution, such as pollution brought by the Danube River into the Black Sea, and by sea currents from the southern and eastern Mediterranean, maritime transport and yachting, is also an important source of marine pollution (PAP/RAC, 2005). Marine pollution from ships adds to land-based pollution (Chapter 7).

2.2 Management of point source pollution from households and industry

Institutional and regulatory framework

The *regulatory framework* for managing water pollution has been substantially upgraded in the review period. The 1988 Regulation on Water Pollution Control was revised in 2004. It set principles for discharging effluent to ground and surface waters and for treating waste water; provided for water quality planning to meet national requirements; prescribed land use measures to protect reservoirs and lakes used for drinking water; and brought the classification of surface water closer to EU legislation (EU, 2007). Other changes, in the context of EU-Turkey membership negotiations, include new standards for bathing water quality (2006), urban waste water treatment (2006), the quality of surface water intended for drinking water abstraction (2005), water pollution by dangerous substances (2005) and nitrate pollution from agriculture (2004).

All waste water discharges, as well as water withdrawals, continue to require separate *permits and licences*. The waste water discharge permit is granted by metropolitan municipalities (within their jurisdictional areas) and by the governor's office (for areas outside municipalities[4]). It specifies limit values and how to review compliance. Water and waste water administrations[5] issue connection licences to users

in urban and industrial areas. Industrial and mixed discharges are also required to have a prior quality control permit specifying pollution limit values and quantities. Compliance with permit conditions is low: some estimates indicate that 60% of industrial operators (especially small and medium-sized ones) operate without permits (SOGESID, 2005). Enforcement authorities lack staff and resources. Penalties for non-compliance have been strengthened recently (IMPEL, 2005). Better compliance is achieved in Organised Industrial Zones (OIZs), where Industrial Zone Management Organisations (under the supervision of the Ministry of Industry) support permitting procedures and build and operate their own treatment plants to serve industries located in the zone.

Licensing for the exploration and use of *groundwater* is under the authority of the General Directorate of State Hydraulic Works (DSI), which determines the number of locations, depth and other characteristics of wells, and the authorised amount of water to be abstracted. The rate of illegal use of water is high; and in some areas, half of the wells are used without licences (IMPEL, 2005).

The management and control of water pollution has been shared among *many government organisations* (Table 3.1). Each of them has developed plans, monitoring systems and regulatory measures. There are overlapping programmes and projects as well as important gaps, especially in water quality monitoring coverage. Improved institutional arrangements are expected with the integration of DSI in MoEF in 2007. Monitoring, regulatory and control functions related to pollution loads in inland waters are to be integrated with water resources development (e.g. supply of drinking and industrial water, flood protection, irrigation, drainage and hydropower generation).[6] This integration provides a firm basis for better monitoring and for preparing integrated water resource management plans, as well as formulating, financing, implementing and operating water infrastructure and pollution control investment projects.

Monitoring

Water quality monitoring has improved slowly. The number of monitoring stations operated by DSI has increased (from 1 080 in 1996 to 1 150 in 2006), with 82% of them monitoring surface waters and 18% groundwater. Water samples are analysed, using standard methodology, in the laboratories of 21 Regional Directorates of DSI (Baltaci and Onur, 2007). The recent merger of the MoEF and DSI consolidated river and sea water quality networks. MoEF/DSI monitors the quality of surface waters and groundwater intended for human consumption and the Ministry of Health monitors drinking water quality.[7] The Ministry of Agriculture and Rural Affairs operates 1 574 sampling stations (1 026 for surface waters and 548 for groundwater) while 40 provincial control laboratories monitor nitrate parameters.

Table 3.1 **Governmental organisations relating to water management**

Organisation/Ministry	Main tasks and responsibilities
State Planning Organisation (SPO)	– Planning for investment for water resources (e.g. dams, reservoirs, water supply) and pollution control (e.g. sewerage and sewage treatment)
Ministry of Environment and Forestry (MoEF)	– Development and approval of environmental plans and ensuring implementation – Water pollution prevention – Establishment of water quality laboratories – Implementation of the national EIA regulation – Designated Ramsar sites – Co-ordination of harmonisation of Turkish water legislation with the EU acquis – Determination of classification of quality of water resources – Determination of quality criteria related to water resources, including setting bathing water quality standards – Approval of projects concerning waste water treatment plants for industrial installations – Preparation of river basin protection plans and river basin action plans – Preparation of contingency plans for protection of water resources – Rehabilitation of watersheds – Issuing of water discharge permits for installations, monitoring of discharges from industry and waste water treatment plants
General Directorate of State Hydraulic Works (DSI) (under MoEF since 2007)	– Water resource assessments and analysis – River basin development – Planning, construction and financing of water and waste water treatment plants – Water management with 25 Regional Directorates – Protection of surface water and groundwater – Allocation and registration of groundwater – Flood control – Investigation, planning, design, construction and operation for irrigation domestic water supply, hydroelectric energy and environment
Ministry of Health (MoH)	– Setting bathing water quality standards, implementing and monitoring these standards – Monitoring quality of urban waste water collection and treatment – Drinking water legislation, drinking water standards, implementation and monitoring of these standards
Ministry of Agriculture and Rural Affairs (MARA)	– Fisheries and aquaculture legislation – Protection of water resource use in agriculture – Control of waste water discharges in fish production areas – Monitoring of nitrate parameter for freshwater and groundwater – Pesticide control and monitoring
Ministry of Culture and Tourism (MoCT)	– Planning and construction of waste water infrastructure in tourist areas
Bank of Provinces	– Design and financing of public works related to drinking water supply and treatment, sewage systems and urban waste water treatment, and solid waste disposal for municipalities

Source: Moroglu and Yazgan (2006).

Within the framework of the Barcelona and Bucharest Conventions, *comprehensive long-term monitoring of the Mediterranean and the Black Sea* is carried out as part of the UNEP-MEDPOL Mediterranean Pollution Monitoring and Research Programme and the Black Sea Environmental Programme, respectively. The Black Sea programme has been carried out by MoEF since 2004 (Chapter 7), with 69 sampling stations covering all Turkish Black Sea coastal waters.

As water quality data are produced by different organisations, there is a need to reduce variations in the selection of monitoring sites, frequency, tests and analytical methods. There is also a *need to improve water monitoring* in order to respond better to water management, planning and investment, including in the context of integrated water resources management associated with the harmonisation with the EU Water Framework and Nitrate Directives. And there is a need to increase monitoring capacity through the number of sampling sites, sampling frequency and parameters, in accordance with national and international requirements, as well as to employ additional skilled staff and to purchase of modern equipment.

Managing household waste water

The *population connected to sewerage* increased slowly in the review period to reach 72% of the total population in 2006 (TurkStat, 2006). This connection rate varies significantly, from 96% in large urban centres to 55% in settlements below 10 000 inhabitants (Table 3.2). Sewerage systems are often in poor condition, with leakages that contaminate water bodies (MoEF, 2006a).

Table 3.2 **Connection to sewerage and waste water treatment plants,** 2004

Population	Number of settlements	Connection to sewerage (%)	Population connected to waste water treatment plants (%)
< 2 000	35 106	*59*	*5*
2 000-9 999	2 572	*55*	*5*
10 000-49 999	458	*81*	*19*
50 000-100 000	83	*90*	*20*
> 100 000	114	*96*	*69*

Source: MoEF.

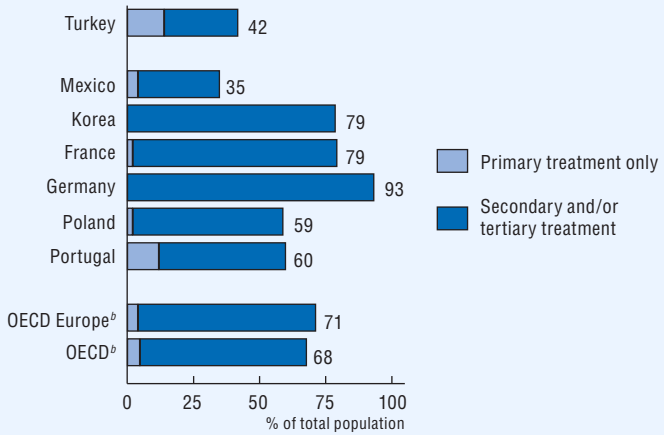
The *population connected to waste water treatment plants* has increased significantly, from 9% in the mid 1990s to 42% in 2006 (OECD, 2007) (Figure 3.1). This connection rate varies from nearly 70% in cities above 100 000 inhabitants to 5% in smaller towns (Table 3.2). The number of waste water treatment plants more than doubled in the review period (SOGESID, 2005), with a notable increase in secondary treatment (OECD, 2007). Many coastal municipalities that have primary treatment facilities discharge their waste water to the sea through outfalls (Muhammetoglu and Yalcin, 2003).

Domestic water users (as well as industrial plants) that are connected to the municipal water supply and sewerage systems have to pay *user charges for water use and waste water disposal*. Tariffs are set by individual municipalities according to the 2004 Law on Municipalities and can take the form of flat rates or block tariffs, increasing according to monthly water use. As a general rule, waste water charges cannot exceed the charges for drinking water (SOGESID, 2005) but this provision was eased recently. Waste water charges provide Water and Sewerage Administrations (SKIs) with part of the financing for operational expenditure. Investment and the rest of operational expenditure are financed by grants and loans from the central government, including through the Bank of Provinces (Box 5.4) (ENVEST, 2004b).

While emphasis was placed on funding the extension of water supply infrastructure in the late 1990s, there was also an emphasis during most of the review period on funding the construction of sewerage and waste water treatment plants (Figure 3.2). For example, in Istanbul more than 90% of waste water is now treated, resulting in a significant improvement of the Golden Horn and coastal water quality (Yuksel, 2004). Most metropolitan municipalities have completed their waste water treatment plants. Some of the construction has been supported by international lending institutions; experience has been gained concerning public-private partnerships with projects in Antalya, Cesme and Alacali. Also, the Ministry of Tourism has carried out a *Mediterranean-Aegean Tourism Infrastructure and Coastal Zone Management* (ATAK) project, covering 130 settlements on 4 000 km of coastline, to respond to environmental infrastructure needs (e.g. water supply, waste water and solid waste). The project provides new institutional arrangements for private sector participation (SOGESID, 2005).

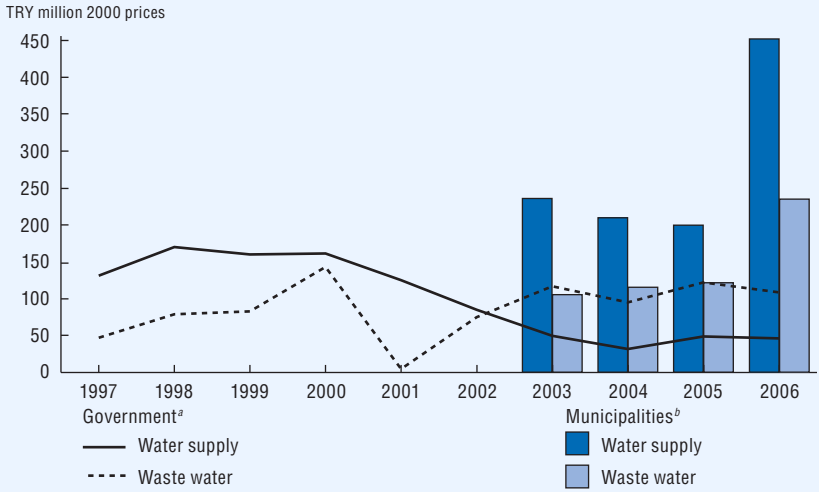
In spite of this good progress, approximately 3 000 new treatment plants remain to be built in towns with populations over 2 000 to implement the EU Urban Waste Water Treatment Directive (Table 3.3) (MoEF, 2006b). EUR 18 billion is estimated to be needed for *investment in and rehabilitation of waste water treatment and networks* between 2007 and 2023 (MoEF, 2006a). The EU funds are expected to support 40%

Figure 3.1 **Population connected to public waste water treatment plant,** 2006[a]



a) Or latest available year.
b) Secretariat estimates.
Source: OECD Environment Directorate.

Figure 3.2 **Water supply and waste water expenditure,** 1997-2006



a) Investments only.
b) Investments and current expenditure.
Source: TurkStat.

of waste water treatment projects (and 50% after 2011), while local administrations will co-finance the EU funded projects using credits from the Bank of Provinces (MoEF, 2006a). Tariff levels should progressively ensure cost recovery, with due regard to social conditions, and the framework for managing external resources allocated for infrastructure projects should be strengthened. Reforms in the Bank of Provinces and DSI should strengthen their independence and help to reduce project delay. Both institutions separate their technical and financial functions.

Table 3.3 **Implementation of the EU Water Framework Directive**

EU members	Turkey		Reference
2000		Directive entered into force	Art. 25
2003	2006	Transposition in national legislation, identification of river basin districts and authorities	Art. 23 and 3
2004	2007	Characterisation of river basin: pressures, impacts and economic analysis	Art. 5
2006	2009	Establishment of monitoring network, start of public consultation	Art. 8 and 14
2008	2011	Presentation of draft river basin management plan	Art. 13
2009	2012	Finalisation of river basin management plan and programme of measures	Art. 11 and 13
2010	2013	Introduction of pricing policies	Art. 9
2012	2015	Making programmes of measures operational	Art. 11
2015	2025	Meeting environmental objectives	Art. 4

Source: Moroglu and Yazgan, 2008.

Managing industrial waste water

Industrial waste water discharged without treatment decreased by 10% in the review period. Out of 638 million m^3 of waste water generated by manufacturing industry, about 36% is treated by industry and 7% by municipal waste water treatment plants; 6% is released to rivers without treatment and 49% discharged to the sea. The greatest amounts of waste water have been discharged by the metallurgical (48%), food and beverages (13%), textile (12%) and chemical (9%) industries. Some 10% of sludge from industrial waste water treatment is used in agriculture (TurkStat, 2006).

The limited waste water treatment capacity of industry continues to pose significant problems for the quality of inland and coastal waters. Despite the good performance in Organised Industrial Zones, many industrial installations are operating without discharge permits (Cakmak, et al., 2007). Environmental authorities have attempted to address *non-compliance* by imposing a pollution prevention charge (KOP) on industrial plants that do not operate their waste water treatment plants for a certain period or are unable to reduce pollution parameters below permitted levels. This charge applies to all industries whether they discharge to the sewerage network or outside. The KOP should provide incentive for industry to build and operate treatment plants. However, lax enforcement and low collection rates often lead industrial operators to discharge waste water without treatment (ENVEST, 2004). Even though a stronger enforcement framework has been introduced recently (creating an enforcement unit in MoEF, strengthening non-compliance instruments in the revised Law on Environment), significant efforts will still be required by national and local authorities to promote compliance and stimulate investment to reduce water pollution by industry. Co-operation with business leaders and their associations will be important.

3. Drinking Water

Overall, 96% of the population has *access to drinking water*: 82% was served by drinking water supply networks in 2006 (compared with 75% in 2001) and 22% of the population has access to safe drinking water from wells and springs (TurkStat, 2006; OECD, 2007). The growth in these percentages has to be considered along with Turkey's rapid population growth to fully recognise the progress achieved. However, while the Millennium Development Goal of cutting by half the proportion of people without sustainable access to safe drinking water by 2015 is within reach, the target of the 7th and 8th NDPs (100% of the population with access to safe drinking water) has not been met.

While 82% of the total population is served by water supply networks, 42% receives water from *water treatment plants*. The amount of drinking water treated in water treatment plants[8] increased by 25% in the review period. Where there are no plants, chlorination systems along the networks have been put in place. Since the 1980s, the occurrence of cholera, measles, pertussis, typhoid fever and diphtheria has decreased sharply because of improved availability of potable water (Chapter 6). Raw water collected from springs, mainly in rural areas, is mostly distributed without treatment. The Istanbul region has the largest municipal water treatment capacity (31% of the municipal plants in the country) followed by the east Marmara region (16%). In Istanbul an upgrading of treatment plants and of the network of distribution

pipes during the review period has raised drinking water quality levels to meet WHO guidelines and cut water losses to 27% of input (Yuksel, 2004).

Water in several *drinking water reservoirs* (e.g. Kucukcekmece, Alibeyköy, Elmali, Buyukcekmece, Omerli) continues to suffer quality problems and thus to require significant treatment before being distributed to households. According to Ministry of Health water quality data, 13% of samples in the reservoirs do not comply with national standards in the provincial centres where 80% of the population is served by drinking water services. However, only 5% of samples do not comply in the urban centres where 60% of the population is served. Non-compliance relates to microbiological parameters (e.g. total coliforms) (23%), overall chemical parameters (21%) and physical parameters (10%) (MoEF, 2006b).

A 2005 regulation introduced *quality standards* for water intended for human consumption, as well as requirements for quality monitoring and reporting. In particular, populations living in the peripheries of the cities (including recent rural-urban migrants) and in smaller towns in the eastern part of the country face a problem of access to safe drinking water. The water supply systems experience relatively high unaccounted water uses and losses (on average 55%) from unbilled uses, illegal uses and leakages.[9]

Water tariffs[10] are set by local authorities and vary from USD 0.30/m^3 to USD 1.0/m^3. The tariffs generally cover operational costs and include a profit rate not less than 10% of all expenditure. They do not cover investment costs, especially in small and medium-sized municipalities, which rely on central transfers, preferential loans from DSI and the Bank of Provinces, and Treasury guaranteed loans (SOGESID, 2005).[11]

4. Agriculture and Water

Over the review period, *pressures from agriculture* on the environment have risen steadily with the intensity of agricultural production. However, this intensity is still considerably lower than in many other OECD countries. The main environmental concerns are: water pollution; overexploitation of water resources; and soil degradation, especially from erosion, salinisation and waterlogging (Box 3.1). Overall, water pollution from agricultural activities is low compared with that in many other OECD countries; however, the pressure on water quality from farming is high in some irrigated areas (Box 3.2).

Box 3.1 **Salinisation and waterlogging**

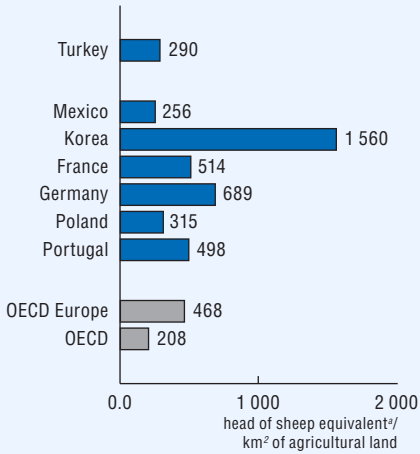
Salinisation affects 6% of arable land with yield limitation, and *waterlogging* affects a further 12%. For instance, salinisation and waterlogging reduce cotton production yields by over 30%. In some parts of the country, such as in the Menemen region of the Gediz delta, inappropriate irrigation and fertiliser management practices, as well as excess extraction of water, have generated soil salinity. This problem has grown rapidly in some parts of the area under the South-eastern Anatolia Project (GAP). *Effective and large-scale afforestation* programmes have helped to combat erosion, with good results in some agricultural areas (Chapter 4). The TEMA Foundation has been active and effective in combating erosion, including in rural development projects, through programmes targeted at i) the armed forces, ii) religious leaders and iii) rural populations (Box 6.3). However, the uptake of *soil conservation practices* should be increased, as only around 4% of the area prone to the risk of erosion is subject to soil erosion prevention programmes, mainly because of inadequate resources and technical capacity.

Soil erosion

The most widespread form of soil degradation is *erosion*: 73% of total agricultural land and 68% of prime farmland are prone to erosion, mainly water erosion. Turkey loses 1 billion tonnes of topsoil annually. High rates of erosion have resulted from i) natural conditions, especially climate and steep topography; ii) unsuitable tillage and irrigation practices; and iii) overgrazing and burning of stubble in some regions. Even though livestock density is less than half OECD Europe levels (Figure 3.3), overgrazing and other inappropriate pasture management practices have left about 60% of rangelands prone to erosion, especially in the Aegean and Marmara regions. The eastern part of the country is less prone to erosion, as pasture is dominant. Off-farm sediment flows have reduced the efficiency of dams through siltation and have impacted on aquatic ecosystems, despite abatement programmes initiated in the 1980s.

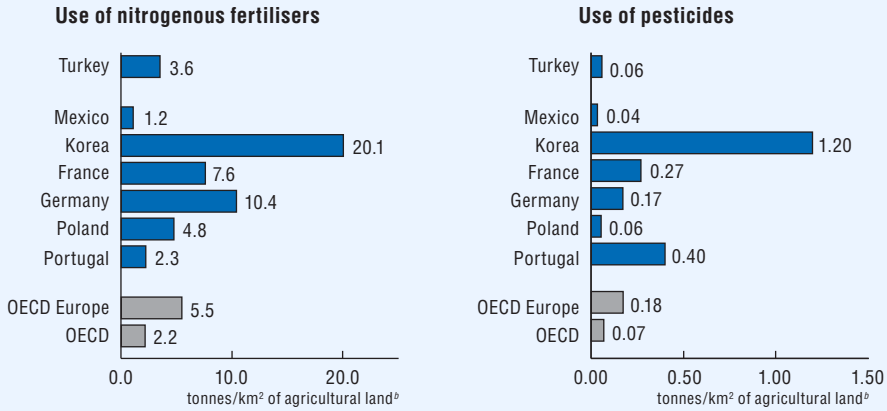
Under the *National Action Programme for Combating Desertification*, strategies and information are developed to address problems of soil degradation, combat desertification, and evolve sustainable land use. The *National Forestry Programme* approved by MoEF in 2004 launched a national mobilisation campaign to increase the forest cover to 30% of the total land of the country and to prevent further soil erosion. NGOs also play a significant role in combating erosion (Box 6.3).

Figure 3.3 **Livestock density,** 2005



a) Based on equivalent coefficients in terms of manure: 1 horse = 1 donkey = 1 mule = 4.8 sheep; 1 pig = 1 goat =1 sheep; 1 hen =0.1 sheep; 1 cow = 6 sheep.
Source: FAO (2006), FAOSTAT data.

Figure 3.4 **Agricultural inputs,** 2004[a]



a) Or latest available year.
b) Arable and permanent crop land and permanent grassland.
Source: IFA (2007); OECD Environment Directorate.

Pressures on water quality

Trends in *inorganic fertiliser use* have fluctuated considerably. During the agricultural policy reform period (2000-02) support for fertilisers was lowered and use fell substantially, by around 30% (in volume). Later, use recovered but remained below the peak of the late 1990s. Inorganic fertiliser application appears to be below requirements, with national nitrogen fertiliser use estimates 65% below soil requirements and national phosphorus fertiliser use 45% below requirements. While fertilisers are used in excess for some commercial farms (e.g. in the Marmara and Mediterranean regions), very little fertiliser is used in relation to soil requirements on smaller, poorer holdings (OECD, 2008).

There have been substantial reductions in agricultural *nutrient surpluses*, with a steady decline in both nitrogen (N) and phosphorus (P) surpluses (in tonnes). This largely reflects the reduction in livestock numbers (poultry numbers have not decreased), which has more than offset fluctuations in inorganic fertiliser use and the large rise in crop production. The intensity of nutrient surpluses (expressed as kg N per ha) has been considerably lower than the OECD average, and is about one-third of the EU15 average for nitrogen surpluses and almost one-half for phosphorus surpluses.

Agricultural pollution of water bodies from nutrients is a concern in specific parts of Turkey, such as the Aegean and Mediterranean regions. In agricultural areas 2.5% of monitoring sites exceed recommended drinking water standards for nitrates in groundwater (OECD, 2008). Evidence suggests that the *uptake rates of nutrient management practices* are low, as many farmers have little access to capital to invest in manure storage and other manure treatment technologies, and knowledge of nutrient management practices is limited.

In the absence of regular monitoring of *pesticides in water bodies*, some studies report the presence of pesticides in rivers, lakes and irrigation canals as well as in greenhouse vegetables. There are concerns about their impacts on human health and the environment in some regions. Some pesticides banned since the 1980s (e.g. DDT, aldrin, dieldrin and other organochlorine pesticides) have been detected in water bodies in recent years, but below toxic levels for human health. This could be due to their persistence in the environment and to illegal use. Overall, the intensity of pesticide use is low compared with that in other OECD countries (Figure 3.4). However, the growth in pesticide use has been among the most rapid across OECD countries (in volume of active ingredients), closely linked to the increase in cropproduction. Horticultural production in irrigated areas of the Marmara, Aegean and Mediterranean regions accounts for over 70% of pesticide use. To a limited extent the increase in organic farming has restricted growth in pesticide use. The extent to

which *integrated pesticide management practices* are being used by farmers is not clear, but there are reports that the growing use of transgenic cotton leads to lower pesticide use (OECD, 2008).[12]

The construction of large water development projects and related increases in irrigated areas exert pressures on *biodiversity, including in wetlands* (Chapter 4). The South-eastern Anatolia Project (GAP) is an example (Box 6.2).

Policy responses

During the review period *agri-environmental policies* have gained momentum. As part of the Agricultural Reform Implementation Project (ARIP) (2001, amended 2005), the Environmentally Based Agricultural Land Protection programme (CATAK) was launched to protect environmentally fragile areas subject to severe erosion. Four pilot provinces, covering 5 000 ha, received annual transition payments (for 5 to 10 years) of TRY 560-1 260 per ha for measures such as taking land out of production and the adoption of environmentally beneficial practices (e.g. contour tillage, pasture rehabilitation, reduced flow irrigation). A 2004 regulation on the reduction of nitrate pollution aims at harmonisation with EU policies. Under the 2006 Agricultural Policy Strategy (2006-10), the share of budgetary support for agri-environmental purposes is to reach 5% (OECD, 2008).

The 1994 Regulation on Organic Agriculture and the 2004 Law on Organic Agriculture defined the standards, definitions, certification and regulations for *organic farming*, now in harmony with the EU regulations. Up to 2006 there were no support payments for organic farming. The 2001 Farmer Transition Programme pays farmers for diverting from overproduced commodities to alternative commodities. It was an opportunity to introduce environmentally beneficial management practices, later reinforced by the 2004 Regulation on Good Agricultural Practices. Despite the increase in organic farming, its share in total agricultural land area is low (0.5%) compared to the EU15 average of 4%. In Turkey organic farming is associated with export markets, mainly for horticultural crops but also for cotton (OECD, 2008).

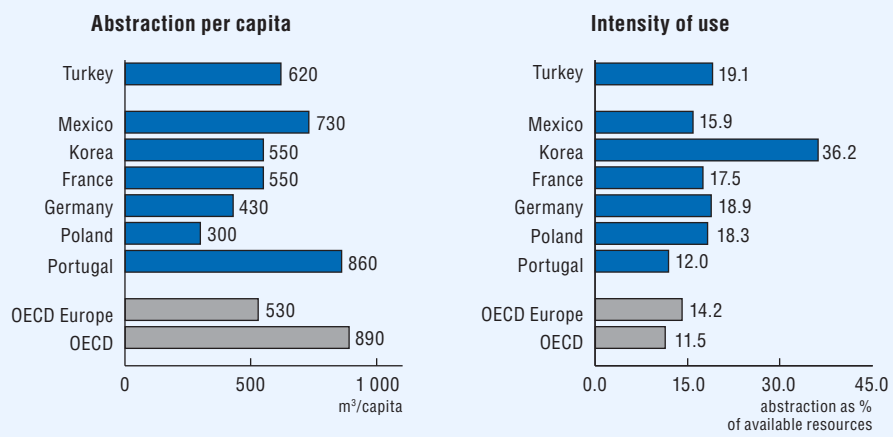
A number of *regional development projects* aim at reducing impacts on the environment from agriculture. Most are partly financed by international development agencies and donors. The Anatolian Watershed Rehabilitation Project, supported by the World Bank with funding of TRY 65 million from 2004 to 2012, aims to restore degraded soils in order to increase farm and forest production in 28 selected upper microcatchments in the watersheds of the Kzlrmak and Yeşilrmak Rivers, which flow into the Black Sea, and supports monitoring and reducing agricultural water pollution in the lower parts of watersheds.

5. Water Availability

Turkey's 25 water basins have gross annual surface *water potential* of about 193 billion m^3 (Eroglu, 2007). While basin water flows vary, the *Dicle-Firat (Tigris-Euphrates)* basin accounts for 28.5% of the country's total water potential. Another 41 billion m^3 is available as groundwater. Turkey's per capita water potential of 3 100 m^3 is lower than the world average (7 600 m^3/person) (Table 7.2).[13] Some estimates consider that high population growth, together with its location in a semi-arid region, will result in Turkey being water-stressed by 2030 (DSI, 2007b).

Out of total water available, an estimated 112 billion m^3 is exploitable under current technical and economic conditions. In 2005 withdrawals were estimated at 45 billion m^3 (DSI, 2007). Overall pressures on the quantities of water resources remain moderate but are growing. *Intensity of water use* increased from 16 to 19% over the review period and is above the OECD and OECD Europe average (11.5 and 14.2%, respectively) (Figure 3.5). The annual water withdrawal per capita also increased, reaching 620 m^3 in 2005 (up from 540 m^3 in the mid 1990s) (Figure 3.5). The figure is higher than the OECD/Europe average (530 m^3) but lower than the average of all OECD countries (890 m^3).

Figure 3.5 **Freshwater use**, 2005[a]



a) Or latest available year.
Source: OECD Environment Directorate.

In 2005, 75% of *water withdrawn* was used by agriculture, 15% by industry and energy producers, and 10% for drinking water purposes (OECD, 2007). Use of water for irrigation increased significantly in the review period, by approximately 25%, with the increase of irrigated land, especially in the south-eastern part of the country (Box 3.2). The use of water for drinking water supply increased by 15%, with the extension of water supply networks. Over 50% of water for municipal use comes from wells and springs, and 47% from surface water (TurkStat, 2006).

Groundwater accounts for 38% of total withdrawals (TurkStat, 2006). In some areas the ability of groundwater stocks to be regenerated is endangered. For example, in the Karapnar plain groundwater tables fell by 14 metres over the last 30 years, with 80% of this decrease occurring in the last ten years. Several areas (e.g. the Konya-Çumra-Karapinar and Sultanhani Obruk plains) will face groundwater availability problems as abstraction from aquifers is much higher than their regeneration potential (Nas and Berktay, 2004).

Box 3.2 **Irrigation and the environment**

By the end of 2005, 4.9 million ha was irrigated out of 8.5 million ha of economically irrigable land. *Agricultural water use* grew by 65% between 1992 and 2005, among the highest rates of growth across OECD countries. Agriculture accounted for nearly 75% of total water use by 2005. Larger farms tend to be irrigated from dams and reservoirs, mainly constructed at government expense, with 1% of farms using 15% of irrigated land. Smaller farms are more likely to irrigate from wells constructed at their own expense. Recent government budgetary constraints have limited growth in irrigated areas. However, large projects such as the South-eastern Anatolia Project (GAP) are being developed largely to produce water for irrigation (Box 6.2).

With the rise in demand for water by the agricultural sector there is *growing competition for water resources,* with other users and increasing environmental concerns. Much of the water for irrigation is derived from reservoirs, but around 35% is pumped from groundwater. Many aquifers are being exploited beyond their natural recharge rate, especially in the Mediterranean region. This is of concern as i) two-thirds of drinking water in the region is supplied from groundwater; ii) intrusion of seawater affects aquifers; and iii) peak demand from the tourism industry occurs in the summer, as in agriculture. Some major irrigation projects, such as the GAP, have also been undertaken with limited consideration of environmental management or impacts (e.g. loss of ecosystems such as wetlands, increased salinity, agro-chemical run-off). Some analysts affirm that water shortages are due to mismanagement of water resources, including illegal uses. Estimates from DSI for the Konya basin suggest that half of the 60 000 irrigation wells are unauthorised.

Box 3.2 **Irrigation and the environment** *(cont.)*

The irrigation system has undergone important changes, leading to *increased effectiveness and efficiency*. While DSI is still responsible for the development and maintenance of large irrigation infrastructure (dams and some multi-functional main canals), small-scale on-farm irrigation works have been transferred from the government to self-financing local *Water User Associations (WUAs)*. As of 2005, 95% of the irrigation infrastructure developed by DSI has been transferred to WUAs. The WUAs have generally demonstrated the ability to operate and maintain the systems satisfactorily through recruiting required staff, equipping their offices, assessing and collecting operation and maintenance water fees, and substantially improving water delivery at a cost generally less than that incurred by DSI.

There has also been *some improvement in irrigation management practices*. Most irrigation water is delivered by gravity flow and only 5% by pumping. The use of more efficient technology, involving low-pressure sprinklers and drip emitters, has risen from a share of 4% to 8% of irrigation water, mainly applied to horticultural crops. In 2005 classical systems were used on 83% of irrigated land, canalet systems on 16% and piped systems on 1% of DSI-operated irrigation schemes; in the transferred irrigation schemes classical systems are used on 42% of irrigated land, canalet systems on 50% and piped systems on 8%. Despite the greater uptake by irrigators of more efficient water technologies (partly induced by low interest credits for the purchase of drip irrigation technology), average irrigation water application rates per hectare increased (i.e. there was a declining trend in irrigation water efficiency). This might be explained by high water losses (through evaporation) from irrigation infrastructure, lack of capital and insufficient technical capacity.

Farmers bear a higher share of the *costs of maintaining irrigation systems*, partially covering operation and maintenance (O&M) costs through annual crop and area-based charges. Irrigation associations prepare an estimated budget before the irrigation season and determine water prices based on regional conditions. Water fees are USD 1.6 to 9.6 per day. While collection rates for water charges in publicly operated schemes are low and never exceed 54%, those in farmer operated schemes are almost 90%. In spite of the reform, relatively low water prices are still the leading factor causing excessive water use in agriculture and consequent environmental problems. DSI expenditure on irrigation O&M costs (net of farmer's fees) averaged TRY 103 million in 2004 and 2005. Currently farmers investing in drip irrigation are granted credit with a 0% interest rate for a five-year period, or a 50% lump sum to cover the costs of adopting this technology.

6. Towards Integrated Water Resources Management

Integrated water resource management has been on the agenda in Turkey since the 1980s. In recent years increasing water needs of various sectors, water pollution, and complex legal and institutional structures have stimulated a thorough revision of water resources management. Stimulated by the launch of the process of harmonisation of Turkish legislation with the EU framework, in particular the EU Water Framework Directive, *river basin master plans* aiming to improve the integration of water management have been prepared by MoEF (DGEM and DSI). Once all plans are completed, projects will be developed for the provision of drinking water, water for irrigation and industry, and the establishment of dams and small lakes to produce energy. In 2006 a project supported by the EU was launched to strengthen appropriate institutions for integrated river basis management, and to design water management instruments to meet the schedule for Turkey to meet the requirements of the EU Water Framework Directive (Table 3.3).

Special *pilot projects* have been carried out, such as in the Buyuk Menderes basin, where the state of surface water and groundwater was established. This included classification by categories of water bodies and by types of surface water; identification of the boundaries and characteristics of groundwater bodies; and identification of locations, boundaries and the status of protected areas. However, many of the plans do not yet include an analysis of the pressures, impacts and cost-effectiveness of the proposed management measures (Akar and Koç, 2007).

In the review period water basin management has been promoted by DSI. This means that DSI's traditional *focus on the water supply side* (e.g. hydraulic works, dams and water transfers) has to be integrated with pollution control and demand side management. The 2007 institutional integration of DSI into MoEF goes in that direction. Further development of the institutional framework would include the creation of river management bodies in support of effective integrated river basin management.

Notes

1. The plan was developed as part of Turkey's participation in the Conventions for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) and for the Protection of the Black Sea Against Pollution (Bucharest Convention).
2. Group A includes the most important inorganic parameters with relevance to the environment such as nitrate, nitrite, ammonium, phosphate, boron, alkali metal and alkaline earth metal (e.g. potassium, calcium, magnesium); Group B includes organic parameters such as biochemical oxygen demand and total organic carbon; Group C includes the heavy metal group (e.g. arsenic, mercury, cadmium); Group D includes bacteriological parameters such as total coliforms.
3. In the EU Blue Flag scheme, coastal water quality is one of the four checklist groups.
4. The granting authority is required to consult with MoEF prior to issuing a permit; the Ministry may refuse to grant the permit or specify conditions under which the permit can be granted. In the latter case, the application for the permit is reviewed by the Provincial Directorate for Environment and Forestry and submitted to the Provincial Environment Council for approval.
5. Water Supply and Sewerage Administrations (SKIs) manage water supply and waste water collection and treatment in metropolitan municipalities. In other municipalities, the municipal administration is in charge. All municipalities are responsible for the construction, operation and maintenance of water and waste water treatment plants and for the inspection of discharges of industrial waste water in their sewerage systems. SKIs are managed by their General Managers and their board, which is chaired by the mayor of the metropolitan municipality.
6. The Ministry of Agriculture and Rural Affairs retained the responsibility for monitoring water pollution by nitrates from agriculture sources.
7. DSI also monitors groundwater quality within its groundwater irrigation projects.
8. In 2004 there were 140 water treatment plants using various techniques (chlorination and filtration or coagulation, flocculation, sedimentation, filtration, chlorination), compared to 113 in 2001.
9. The highest percentage of water loss, 80%, was reported in the city of Kars. Illegal water consumption is estimated at nearly 40% of total supply (SOGESID, 2005).
10. Drinking water tariffs are calculated each month taking into account wholesale price indices, as defined by TurkStat and the municipal councils. Domestic water users are classified into three groups according to water consumption levels. These levels depend on i) consumption figures from previous years, ii) estimates of future rainfall, iii) drought conditions and seasonal fluctuations.
11. The main roles in developing water supply infrastructure have been played by DSI, which provides water to municipalities above 100 000 inhabitants, and the Bank of Provinces, which provides infrastructure for municipalities of between 3 000 and 100 000 inhabitants. Until 2005 the General Directorate of Rural Services (GDRS), one of the most important organisations providing services to rural areas, was responsible for water supply to municipalities below 3 000 inhabitants. The reform of 2005 abolished the GDRS and transferred its personnel and duties to metropolitan municipalities (in the provinces of Istanbul and Kocaeli) and provincial administrations (in other provinces).

12. Imports of transgenic seeds are controlled by MARA.
13. Per capita water potential is 1 500 m^3 if calculated for water exploitable under current technical and economic conditions.

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4

NATURE AND BIODIVERSITY MANAGEMENT*

Features

- Conservation of endemic species
- Protection of wetlands and coastal areas
- Tourism and nature protection
- Afforestation

* The present chapter reviews progress in the last ten years, and particularly since the previous OECD Environmental Performance Review of 1999. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Turkey:

- prepare and adopt a *framework law* to cover all areas of nature and biodiversity;
- finalise and approve the National *Biodiversity Strategy* and Action Plan, including time-bound targets, as proposed by the CBD; set objectives with regard to integration of biodiversity considerations into *agriculture* and other sectoral policies;
- create *protected areas*, so as to reach the 10% domestic target by 2010; establish them in an interconnected network; complete, adopt and implement management plans for all protected areas;
- continue afforestation and *sustainable forestry* efforts; continue and expand all *erosion* combating efforts;
- improve *coastal management*; set and implement an objective for strict protection of sensitive parts of the coast; integrate nature conservation in tourism development;
- finalise the inventory of endangered species; publish the corresponding *Red List*; improve *statistics and indicators* on biodiversity;
- continue to promote *education* and *awareness* concerning nature conservation.

Conclusions

The area of forest and other wooded land has increased to 27.2% of the national territory. *Afforestation* efforts, partly to combat soil erosion, have reached 250, 350 and 400 million planted seedlings respectively in 2005, 2006 and 2007, a major contribution to the UNEP goal of at least 1 billion tree planting worldwide each year. *Legislation* concerning biodiversity has improved, as have related institutional co-operation and co-ordination. The total extent of *protected areas* has increased during the review period and now accounts for 5.3% of Turkey's total land area. Turkey has further strengthened the protection of these areas through management plans. *Public participation* has become an important part of nature inventories, conservation projects and management plans. Considerable progress has been achieved in public awareness and education related to nature conservation (e.g. large-scale programmes in schools, summer camps and training for various groups including prayer leaders and the military). Initial economic measures have been adopted to promote *environmentally friendly agriculture*, especially to address problems of salinity of soils and to support organic agriculture. Turkey has ratified all the main *international*

conventions on nature conservation, except the Bonn Convention on the Conservation of Migratory Species of Wild Animals.

However, some parts of Turkey's *rich biodiversity* are threatened and will face increased pressure in the future. This is largely due to the effects of tourism, urbanisation, industrial and agricultural developments, as well as those of major infrastructure projects in rural areas. *Protected areas* should be extended and connected with each other. Turkey should consider strict protection of parts of its natural coastline, including beaches, deltas and wetlands. The Ministry of Environment developed a *National Biodiversity Strategy and Action Plan* in 2001, and is in the process of adoption of an updated 2006 version. There are a number of separate laws to protect and regulate biodiversity, habitats and landscapes, but no *overall framework legislation*. Monitoring and inventories are carried out by MoEF and by NGOs, but few country-wide *inventories* are available. These include incomplete inventories of endangered species and corresponding red lists that still need to be completed and published. *Erosion* is widespread. Further efforts are needed to integrate nature and biodiversity concerns within agriculture, forestry, and land use planning.

♦ ♦ ♦

1. Policy Objectives

The 1998 *National Environment Strategy and Action Plan* (NEAP) (prepared in parallel with the 8th National Development Plan) was an important step in unifying overall development goals with environmental objectives. Concerning nature protection and biodiversity, the NEAP aimed at: i) creating protected areas and developing management plans for endemic species; ii) creating new wildlife areas, rescue centres, reproduction stations and arboretums; iii) providing education on protection concepts and policies; iv) increasing the consciousness and sensitivity of the public in co-operation with institutions, NGOs and media; and v) educating the local public on the rational utilisation of environmental resources.

The *National Biodiversity Strategy and Action Plan* (NBSAP), prepared in 2001 and revised in 2006 in accordance with the requirements of the UN Convention on Biological Diversity (CBD), is yet to be adopted formally. In practice, it is a reference document for Turkish conservation policy. It outlines the status of Turkey's biological wealth and defines strategic goals and priority actions. The Plan calls for national inventories of flora and fauna, charting of ecosystems and natural habitats, and introduction of the Council of Europe's Emerald Network,[1] and thus would extend the

Natura 2000 Network[2] beyond EU countries. The NBSAP also focuses on awareness raising, legislation, protected areas, and management plans for fauna and flora species, especially endemic and endangered ones. *Other documents* setting objectives for nature and biodiversity conservation are the National Forest Programme and the National Plan for In-situ Conservation of Plant Genetic Diversity.

Performance during the review period can also be evaluated against the recommendations of the *1999 OECD Environmental Performance Review of Turkey*:

- strengthen the network of specialists, scientists and NGOs dealing with information on flora and fauna, finalise the inventory of endangered species and publish a Red List;
- increase the total surface of protected areas, linking them to form a network, and ensure that they are effectively protected, particularly through management plans;
- set as an objective, and implement, strict protection of part of the coastline;
- strengthen co-operation and partnership among ministries and agencies responsible for nature conservation at the planning and implementation stages;
- ensure that environmental impact assessments are carried out for activities that put pressure on biodiversity;
- increase public awareness, and reinforce information and education programmes on nature conservation problems;
- put in place a national biodiversity conservation strategy and action plan, and a national action plan to combat desertification and to control soil erosion and drought, in association with scientists and environmental NGOs;
- pursue efforts to classify forest stands for the purpose of conserving genetic resources.

Progress has been made in carrying out *actions and meeting objectives recommended in the 1999 review*. Important progress has been made in increasing the surface of protected areas (including management plans), monitoring biodiversity, raising public awareness, and preparing action plans on biodiversity conservation and on combating desertification. Some other processes have been launched, like the revision of a Red List of endangered species, and strengthening co-operation and co-ordination among ministries, but these are not completed and will require further efforts.

2. State of and Pressure on Nature and Biodiversity

Turkey straddles *three major bio-geographical regions*: the Euro-Siberian, Irano-Turanian and Mediterranean. It has elements of both continental and maritime temperate climates. Rough topography and high altitudes are found in the North Anatolian Mountains to the north, and the Taurus Mountains to the south, which lie parallel to each other. The main ecosystems are forests, steppes and wetlands, as well as coastal and marine ecosystems. Turkey has rich flora and fauna, high endemism and wide genetic diversity.

2.1 Diversity of flora and fauna

Turkey hosts more than 90 000 species of *flora and fauna*. These include approximately 9 500 vascular plants, 4 000 lower plants, 60 to 80 000 invertebrates and 1 400 vertebrates (Table 4.1).

Out of 9 500 vascular *plant species*, approximately one-third are endemic. Three-quarters of all plant species existing in Europe also grow in Turkey. Wild relatives of many important agricultural plant species are of Turkish origin: cherry, apricot, almond, fig, wheat, chickpea, lentil, apple, pear, chestnut, pistachio and others. A total of 245 different grain types have been identified, including 95 wheat, 91 corn, 22 barley, 19 rice, 16 sorghum and 2 rye (MoEF, 2006a). Turkey is also the home of many ornamental species; more than 500 bulb plants live in Turkish waters.

Anatolian *fauna* consist of some 60 to 80 000 species, mostly invertebrates (of which 5 727 are known). The number of vertebrate species is high (Table 4.1). Turkey hosts some of the world's rare species, such as grey bear, wolf and leopard, as well as hyena, jackal and gazelle. It is the home of light brown deer, pheasant, and other large mammals such as boar and lynx. Turkey hosts about 20 species of marine mammals including seals, whales, the common dolphin (Delphinus delphis), the bottlenose dolphin (Tursiops truncates) and the harbour porpoise (Phocoena phocoena). Two of the most important *bird migration routes* in the West Palearctic Region pass through Anatolia, making it the home of a large number of bird species during parts of the year. Half of Turkey's bird species are migratory. Turkey also has a large variety of *fish* species: about 450 marine and 127 freshwater. There are still several endemic species in Turkish lakes, e.g. a wide range of sub-species of trout (Box 4.1) and Chalcalburnus tarichii, an endemic species of mullet found in Lake Van (Dügel, *et al.*, 2008; OECD, 2004).

Both the number of species and the total number of animals living in Turkey are declining due to pressures such as urbanisation, industrialisation, tourism and

Box 4.1 **Lake Abant Nature Park**

The *province of Bolu* is in north-eastern Turkey, at an altitude of 750-1 350 metres. The province offers a range of nature attractions: a national park (Yedigöller) and several lake areas, including the Lake Abant Nature Park and the recreation area of Lake Gölcük. Located mid-way between Istanbul and Ankara, the province has become a popular place for excursions and recreation, and a location for secondary residences.

The *Lake Abant Nature Park* (about 1 200 ha) is a popular recreational spot and an important biodiversity site. It has 1 221 identified plant and animal species, of which at least 60 are endemic (including about 50 plant species; 1 fish species, the Abant trout; 1 rat subspecies; and 3 invertebrates). The park also has protected habitats for the threatened European otter (Lutra lutra).

Pressure from human activities threatens several of these species. Some of the important changes influencing biodiversity in the lake itself were introduced 50 years ago, when the lake's surface area was extended to provide shallow habitats for common rainbow trout juveniles. However, this reduced the number of endemic fish (the *Abant trout*).

Studies have shown a deterioration in the lake's *water quality* due to waste water discharges related to tourism and the surrounding hotel infrastructure. As waste water pollution increases with the growing number of tourists and in the absence of buffer zones around the lake, pollution will threaten overall species diversity. A higher *conservation status* for the park could help provide better protection for rare and threatened species and improve long-term management of tourism activities around the lake.

environmental degradation. More than 20% of *mammals* (22 species) are *threatened* (vulnerable and endangered according to IUCN categories) (Figure 4.1, Table 4.1). A number of terrestrial mammal species (e.g. red and brown deer, wild sheep, gazelle and otter) are also decreasing and are considered to be in danger of extinction. The Anatolian leopard was thought to be extinct, but traces of its existence have been found. The Mediterranean monk seal (Monachus monachus), along with the loggerhead sea turtle (Caretta caretta) and green sea turtle (Chelonia mydas), which have been endangered for many years, are among the world's 12 most threatened species. All three are now threatened with extinction. The number of dolphins and whales is decreasing rapidly. Many *bird species* that are in danger of extinction in Europe breed in Turkey (e.g. flamingo and white-headed duck). Tuz Gölü is Turkey's largest nesting site for pink flamingo, with colonies of 5 000 to 6 000 nests (OECD,

Table 4.1 **Fauna and flora**

	Species (number)	Endemic species (number)
Vertebrate animals	1 440	
Mammals	161	1 (*0.6%*)
Birds	460	1 (*0.2%*)
Marine fish	450	3 (*0.7%*)
Freshwater fish	236	
Reptiles	105	2 (*2.2%*)
Amphibians	28	1 (*3.6%*)
Invertebrate animals	60 000-80 000[a]	
Insects	5 395	
– of which grasshoppers, crickets, locusts	160	109 *(68.1%)*
Crustacea	239	
Mollusca	93	
Vascular plants	9 477	2 762 (*30.5%*)
Ferns	90	1 (*2.2%*)
Gymnosperms	23	3 (*13.0%*)
Monocotyledons	1 771	249 (*16.9%*)
Bicotyledons	7 593	2 509 (*34.1%*)
Non-vascular plants	4 060	
Mosses	910	
Lichens	1 000	
Algea	2 150	

a) Of which 5 727 are known.
Source: MoEF; TurkStat/TUBITAK.

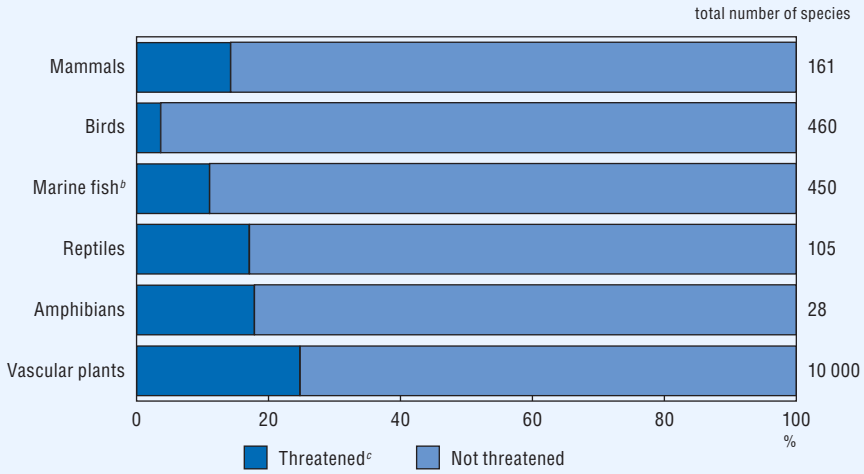
1999). About 100 000 flamingos nest in Turkey. Some 20% of the world's population of white-headed ducks hibernates at Lake Burdur (Kiziroglu, 2006).

2.2 Major ecosystems

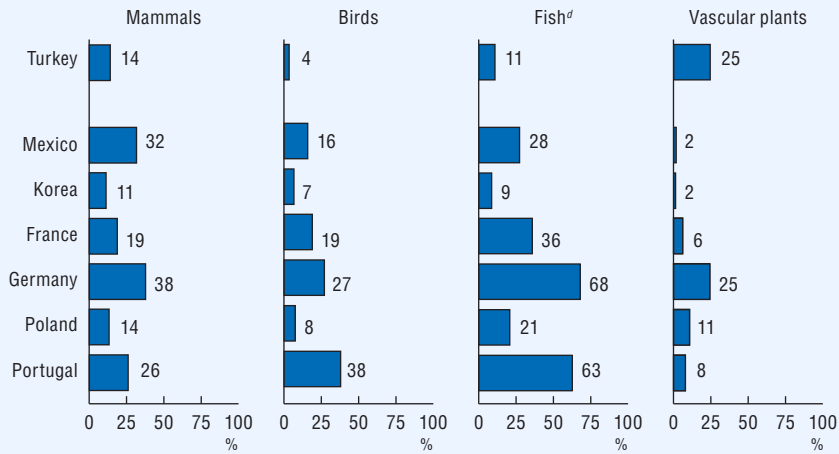
Most large mammals (e.g. bear, wild pig, fox, wolf, lynx, hyena and jackal) live in forest ecosystems, as do many of the mammals that are in danger of extinction (e.g. several species of deer, wild sheep and gazelle). *Forest* and other wooded land covers 27% of the territory, and about half of this land is considered fertile. Forest, in a strict land cover sense, extends over only 13.2% (UN, 2006); the rest consists of degraded forest and rangelands. Since the 1960s, forested areas have grown by 5%,

Figure 4.1 **Fauna and flora**

State in Turkey, 2006[a]

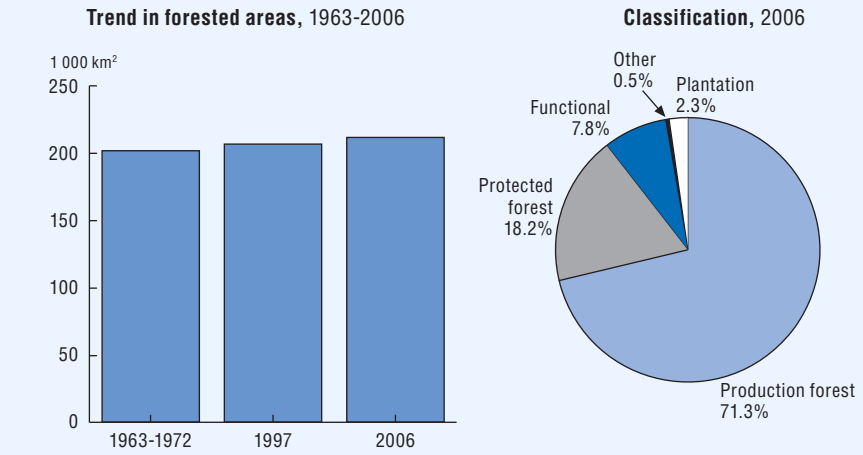


Threatened species,[c] 2006[a]



a) Or latest available year.
b) In addition, 236 freshwater species are known.
c) IUCN categories "critically endangered", "endangered" and "vulnerable" in % of known species.
d) Freshwater species, except for Turkey (marine species) and Poland (marine and freshwater species).
Source: OECD Environment Directorate.

Figure 4.2 **Forested areas,** 2006



Source: MoEF (2007).

mainly due to *reforestation efforts* (Figure 4.2). About half of reforestation has taken place since 1997. In 2005, 2006 and 2007, respectively, 250, 350 and 400 million seedlings were planted, a major contribution to UNEP's worldwide campaign to plant at least 1 billion trees each year.

Following rapid *deforestation* due to human activities, large parts of the *steppes* are now being used for agriculture, urbanisation and infrastructure projects. Much of the remainder is degraded due to excessive grazing. Today these steppe areas amount to about 28% of Turkey's total land area.

Turkey is rich in *wetlands*, possessing 250 separate areas exceeding 1 million ha or 1.6% of the total land area (MoEF, 2001). According to the Ramsar classification, 135 of them are identified as wetlands of international importance. Wetlands are especially important for migrating waterfowl. About 70% of the white-headed duck population winters in Turkey (Council of Europe, 2006). However, since the 1960s about 200 000 ha of wetlands has been lost due to drainage projects: first to combat malaria, which was widespread in the mid-20th century, and later to gain additional farmland (FAO, 2001). A new drainage project is being planned on the protected site of the "wildlife paradise" Sultan Sazligi. Despite rehabilitation projects carried out by MoEF and actions by NGOs, the extent of wetlands has already decreased by some 80-90% in this nature reserve area.

Turkey has a 8 333 km coastline.[3] The *coastal ecosystems*, particularly in the eastern Mediterranean region, exhibit a high diversity of flora and fauna. The Black Sea has the lowest salinity level, and the number of species living in it is only 20% of the number that live in the Mediterranean. Still, the Black Sea provides 70% of Turkey's fish production (Council of Europe, 2006). Coastal areas have experienced the greatest biodiversity loss besides the steppe areas.

Uncontrolled development and large hydraulic construction projects are also significant *threats to Turkish ecosystems and biodiversity*. Uncontrolled development has already led to the loss of 1 300 000 ha of wetlands, 87% of peatlands, 88% of old forest in North-east Anatolia, 79% of sand dunes in the Istanbul area and 75% of sweet gum forest (ECOTEC, 2001). Central, Eastern and South-eastern Anatolia are the driest regions of Turkey and are under serious threat of desertification within ten years. Turkey is not naturally prone to desertification, but due to low rainfall and inappropriate land use, it is now threatened with widespread and severe erosion (MoEF, 2006b).

3. Policy Measures and Achievements in Nature and Biodiversity Protection

3.1 Institutional and legal framework

Institutional organisation

The *Ministry of Environment and Forestry* (MoEF) is the main government body responsible for nature protection, wetland and wildlife management and the management of the areas protected under the 1983 Law on Environment (amended in 2006) and the 1983 Law on National Parks.[4] The key Ministry units are the General Directorate for Nature Conservation and National Parks and the General Directorate for Forestry, after the merger of the Ministry of Environment and the Ministry of Forestry in 2003. Hunting is also controlled by MoEF on the basis of the 2003 Law on Hunting, building on decisions of the National Hunting Commission (made up of stakeholders from local and central government, as well as hunters' associations).

The designation of *Specially Protected Areas* (SPAs) needs approval by a Committee of Ministers and the Presidency for Environment Protection Special Institution, which under MoEF is responsible for the protection, planning and management of these areas.

Other ministries play an important role in nature conservation and management. The Ministry of Agriculture and Rural Affairs (MARA) also has responsibilities for nature and biodiversity, including for gene conservation, cultivation measures,

pesticide and fertiliser use and fisheries. Fishing licenses are issued by the General Directorate of Protection and Control under MARA. The Ministry of Culture and Tourism (MoCT) has responsibilities for cultural heritage and tourism. The General Directorate of State Hydraulic Works (DSI)[5] oversees the construction of irrigation systems and dams.

National legislation

In the review period, progress has been achieved on adopting *legislation* concerning wildlife management and wetlands protection. This includes the 2002 Regulation on the Conservation of Wetlands, the 2003 Law on Hunting, and the 2005 Regulation on Keeping, Breeding and Trade of Game and Wild Animals. However, several laws may have detrimental effects on nature. An example is the Law Concerning Drainage of Swamps and Land Thus Acquired, aimed at eradicating malaria and at regulating land use. Efforts to revise this law have not been successful. The Law on Mining, revised in 2004, and the recent revisions of the 1982 Law on Tourism Encouragement may generate negative pressures on biodiversity.

Harmonisation of national legislation with international laws and conventions may be carried out, but is awaiting implementation regulations (Council of Europe, 2006). In some other cases, harmonisation may be pending: e.g. a draft Law on Biodiversity and Nature Protection has been in preparation since 2004 (MoEF, 2006a), aiming at the development of inventories of habitats and species; monitoring and classification systems; spatial and management plans; a protected area network; and measures to implement CITES in practice. This draft law also aims to contribute to bringing Turkish legislation into conformance with that of the EU.

Performance

Turkey has actively improved its *institutional framework* for nature conservation during the review period, with progress made on its legal and organisational foundations. However, there is still a need for overall co-ordination of nature protection activities and there are overlapping mandates among institutions involved in nature protection. In view of the strong pressures on nature from development, Turkey needs to reinforce its legislative and institutional framework for nature and biodiversity protection, in the context of its international obligations and of its co-operation with the EU.

3.2 Monitoring and assessment

Turkey's biodiversity has been documented and summarised in a number of *publications,* including the biodiversity strategy, the desertification plan, the NEAP, the national report to the Johannesburg World Summit, the EU Environmental

Approximation Strategy and the 2006 TurkStat Environmental Statistics Compendium. These publications have shown the need to further co-ordinate official statistics and indicators concerning nature and biodiversity.

During the review period several *inventories* have been carried out, including a wildlife inventory focusing mainly on large hunted animals and a water birds inventory of the most important wetlands. The Biodiversity Monitoring Unit of MoEF has analysed the Aegean region, and started studies on the Marmara region in 2006 using satellite images. It has also developed a biodiversity database, "Prophet Noah's Ship".[6] In addition, some NGOs, universities and research institutions have carried out annual bird inventories, as well as specific projects in the south-east Mediterranean, South-eastern Anatolia and lower Caucasus regions.

Monitoring of protected areas and biodiversity has improved (e.g. using nationwide geographic information systems) but needs to be strengthened. For example, there are still no regular inventories of protected areas, as set forth in the Law on National Parks and the Ramsar Convention. The limited financial resources available for monitoring seem to hold up progress.

Following the recommendation of the previous OECD review, a *Red List of species under threat* is being revised under the co-ordination of the IUCN National Committee. A strategy and action plan for the revisions of the Red List was set up in 2000, and a group of scientists, NGOs and other experts was identified and invited to participate. Progress has been slow; substantive work started in 2006. In several 2006 workshops, the different sub-groups presented the current status of the national Red Data Lists, as well as proposals for maintaining and updating data.

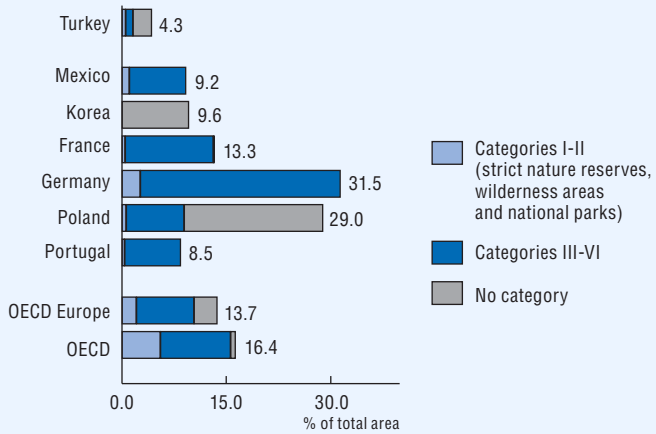
3.3 Protected areas

Turkey has made some progress in protecting nature- and biodiversity-rich areas. Since 1990, the extent of protected areas has almost doubled to reach *5.3% of the territory*. However, this share is low by OECD standards (compared with 16.6% on average in member countries) and far from the 10% domestic target set for 2010. About 1.2% of these areas are strictly protected (IUCN categories I-II) (Figure 4.3). Protected areas are managed under different laws, regulations or international conventions, and by different administrative institutions (Table 4.2).

Areas protected under the Law on National Parks

The 1983 Law on National Parks defines four types of protection areas, according to the types of characteristics to be preserved. *Nature reserve areas* have the strictest protection status, i.e. protection of habitats of rare and endangered

Figure 4.3 **Protected areas,**[a] 2004



a) Terrestrial and marine areas. IUCN management categories I-VI and protected areas without IUCN category assignment. National classifications may differ.
Source: IUCN/UNEP-WCMC (2005), World Database on Protected Areas.

Table 4.2 **Protected areas,** 2007

	IUCN category	Responsible ministry	Number of sites	Area ('000 ha)	Area (%)
Nature reserve areas	I	MoEF	32	64	*0.08*
National parks	II	MoEF	39	879	*1.10*
Nature parks	V	MoEF	22	77	*0.10*
Natural monuments	III	MoEF	104	5	*0.01*
Specially Protected Areas	IV	MoEF	14	775	*1.54*
Ramsar sites		MoEF	12	195	*0.25*
Protected forest areas		MoEF	57	395[a]	*0.51*
Genetic conservation forests		MoEF	214	32	*0.04*
Seed stands		MoEF	339	46	*0.06*
Wildlife conservation areas		MoEF	81	1 227	*1.58*
World Heritage sites		MoCT	9	–	
Natural site areas		MoCT	1 005		

a) Of which 41% are open areas.
Source: MoEF; Zal.

species; they are reserved for scientific and educational purposes only. *National parks* are natural areas of great scientific, scenic and cultural significance, both nationally and internationally.[7] *Nature parks* have characteristic vegetation and fauna; recreational activities are allowed. *Natural monuments* are sites of scientific interest or with outstanding natural features (e.g. ancient trees, waterfalls). Some marine and coastal areas and most terrestrial areas are protected under the Law on National Parks. Most marine and coastal areas are protected under the Regulation on Specially Protected Areas. In addition, there are areas within the costal line protected under the 2003 Law on Hunting and the Watershed Regulation.

The *number of national parks, nature parks and natural monuments* has risen during the review period, while the number of nature reserve areas has decreased. Some nature parks have been given increased protection, and their status has changed from nature parks to national parks. In the review period five new national parks have been established; around 880 000 ha of land is now protected in national parks. However, some protected areas, designated some time ago, are shrinking due to illegal construction activities. For instance, a large tourist complex was built in Beydağlar National Park near Antalya.

Coastal management has been governed by the 1990 Law on Coasts. This law affirms unrestricted public access to the shore and forbids construction within 100 metres of it. However, protection measures are often not carried out, though certain SPAs protecting the monk seal have imposed access restrictions. Also, large stretches of coastline are wooded or are the site of national parks of archaeological (Beydağlari), ornithological (Kus Cenneti) and ecological (Dilek Peninsula) importance.

Specially Protected Areas

Turkey has designated 14 Specially Protected Areas (SPAs). SPAs are *areas of international ecological importance* which are particularly sensitive to pollution and natural resource degradation. These areas are protected under a regulation relating to the Mediterranean Action Plan (adopted in 1988) and focus on the coastal regions. Hence, 9 of the 14 SPAs are coastal areas (e.g. breeding areas for sea turtles and areas where Mediterranean seals live). Other SPAs are important tourist sites (like Pamukkale) and certain lakes. Since the previous OECD review, two new areas have been designated as SPAs: Tuz Gölü (in 2000) and Uzun Göl (in 2004).

Other protected areas

Turkey became a party to the Ramsar Convention in 1994. Out of 135 important *wetland areas,* 12 have been included on the Ramsar List, covering almost 20% of the Turkish wetlands area. Some 19 wetlands have been classified as category A, and

76 as important migratory bird areas (MoEF, 2006a; MoEF, 2006c; FAO, 2001). The Regulation on the Conservation of Wetlands came into force in 2002; a list of nationally protected wetlands is not available.

To combat erosion and protect water and soil, protection status has been given to 57 *forests* in Turkey (395 000 ha or 18.2% of the forested area).[8] Ten of these forests received protection status during the review period. Development is prohibited within these areas according to the Law on Forestry. Much (41%) of the protected forest area is not heavily wooded, with only small trees, bushes or brush, and is found where there is a risk of landslide or erosion. Forests which have been destroyed or burned may have a temporary protection status until they become productive again. A special protection status is given to some 33 000 ha of forests to conserve genetic diversity in-situ. During the review period, the forested area with this protection status has doubled.

The Ministry of Culture and Tourism manages over 1 000 protected natural sites and other *UNESCO conservation areas*. Turkey registered its first UNESCO Biosphere Reserve (Camili) in 2006.

3.4 Species protection

Species protection is governed by the 1983 Law on Environment (amended in 2006), the 1983 Law on National Parks and the 2003 Law on Hunting. Species endangered by habitat destruction or illegal hunting are protected in *wildlife conservation areas and wildlife breeding stations*. The wildlife breeding stations are both research stations and production centres for deer, wild sheep, chamois, gazelles, partridges, pheasants and bald ibis. Turkey has managed to re-establish the population of certain wild game. In the review period 37 stations have been closed down, having completed their functions. Between 2001 and 2006, about 120 000 winged game were released free to nature.

Ex-situ protection of plant species is being pursued within the *National Plant Genetic Resources Project*. Genetic resources are protected in two national gene banks; seven more are under construction. Also, four new gene centres have recently opened. Genetic materials are for the most part limited to cultivated plants and their wild relatives.

Threats to species protection

Invasive species represent one of the major global pressures on biodiversity. In Turkey, a major source of invasive species is ballast water released from ships (Chapter 7). The Mediterranean Sea is especially affected, with the number of invasive species estimated to reach almost 800 (Streftaris and Zenetos, 2007). This is much higher than in any other European sea.

Turkey is part of the *CITES permitting system*, including for re-exportation. Trade in species is managed by the General Directorate of Nature Conservation and National Parks of MoEF, as well as the General Directorate of Protection and Control and the General Directorate of Agricultural Production and Development of MARA. Overall, the number of CITES permits issued has risen steadily since 1998, with a large increase in the number of re-export permits (Chapter 7). Although training of customs officers has expanded, recent EU analyses point to a continuing lack of qualitative and quantitative data on illegal international trade of plants and animals subject to CITES protection.

Other instruments for species protection

Regular surveys of important wetlands, as well as management plans required by the Ramsar Convention, have already been set up or are being prepared for all Turkish Ramsar sites. Four plans have been completed since 2000, but none is yet fully implemented and assessed. In the late 1990s, the government started outsourcing the preparation of management plans for national parks and for endangered and endemic species to NGOs and universities.

Other instruments used to protect species are fines for illegal hunting and illegal logging. Fines for illegal hunting can be as high as TRY 20 000-30 000. Illegal hunting is still considered an important problem. Illegal tree cutting and harvesting have decreased considerably, largely due to successful awareness raising carried out by NGOs such as TEMA (Box 6.3). There is still considerable bird poaching, despite reporting of illegal activities by the public to the authorities. Fishing inspections are strict, with severe sanctions. Even though provisions for penalties related to trade in endangered species (CITES) exist in several legal acts, including the Turkish Penal Code, their application is limited.

3.5 Integration of nature and biodiversity concerns into land management and sectoral policies

While nature conservation in Turkey focuses primarily on designated areas, serious threats to biodiversity occur for ecosystems *outside protected areas* (e.g. coastal areas, seas, steppes). Pressure on natural areas from agriculture, forestry, fisheries and tourism (Box 4.2) is a particular concern, together with transport infrastructure, which often conflicts with nature conservation. Rapid urban development and overexploitation of natural resources lead to fragmentation and destruction of habitats. Even though some progress has been made, nature and biodiversity concerns should be better integrated into sectoral policies and land management. National sectoral strategies, plans, programmes and legislation often

Box 4.2 **Tourism and nature protection**

Tourism in Turkey is based on the country's unusually rich assets. In addition to its extensive coastline (e.g. the Aegean and Mediterranean coasts), with a high number of sunny days, Turkey has extraordinary *natural assets* (a varied countryside and ecosystems, hot springs, mountains) and *cultural assets* (architectural and historical). These assets benefit from tourism (access, information, restoration and maintenance), but are also affected by it (direct and indirect pressures).

The *tourism sector* represents 5% of GDP (10% if its indirect economic contribution is included) and close to 3% of employment (7% including its indirect economic contribution). International tourism is growing fast; international tourist arrivals doubled between 2000 and 2005. However, 46% of the Aegean and Mediterranean coasts is now used directly or indirectly for tourism (e.g. buildings and other facilities generating income from tourism, holiday homes). The popularity of Turkish coastal resorts and the development of water sports along these coasts (water skiing, water scooters) exert increasing pressures on the biological balance of coastal ecosystems, flora and fauna. The development of golfing (land acquisition, and use of water, fertilisers and pesticides) also increases environmental pressures.

The booming tourist industry leads to large-scale *internal migration*. The provinces of Antalya, Mugla and Izmir have experienced a population increase which is above average in Turkey. As a result, there is an *increased demand* for land and changes in the landscape, mainly in coastal areas. Urban development adversely affects the natural and cultural heritage of agricultural areas. *Land and property price increases* are occurring at the expense of the poor, and can lead to major changes in these areas' social structures.

The growth of tourism centres on the coast has not been accompanied by adequate measures to deal with the consequent *environmental pressures* (air pollution, waste water, encroachment on fertile land, noise, and degradation of natural habitats and biodiversity). Biodiversity loss is high in coastal areas. The principal aim of the 1990 Law on Coasts was the protection and conservation of coastal areas, particularly from indiscriminate construction and from pollution (notably waste dumping). However, it provides exemptions for tourism where construction is in the public interest and not for accommodation purposes.

During the review period, Turkey adopted the Tourism Strategy 2023. Environmental protection is one of its major objectives. *Integration of environmental concerns into tourism policies and programmes* has also been improved through a number of regional projects developed since the late 1990s. The application of EIA procedures to tourism development (notably in coastal areas) contributes to more sustainable tourism. However, the current management of coastal zones and tourism-related coastal construction and settlements has adverse impacts on coastal ecosystems.

Box 4.2 **Tourism and nature protection** *(cont.)*

Turkey has introduced a policy aimed at *diversifying tourism products* and locations, so as to reduce pressures on the coastal environment and redistribute the socio-economic benefits of tourism *to less developed regions.* The government is encouraging ecological and cultural tourism. The purpose of the High Plateau Project, for example, is to develop natural and cultural resources in the hinterland of the Mediterranean coast and in the Black Sea regions.

The *Ecotourism Committee* was established in the Nature Protection and National Park General Directorate of MoEF in 2003 to identify and support eco-tourism activities that can provide alternative income for the local population dependent on natural resources. Activities include rafting, trekking, mountain cycling and climbing in Köprülü Canyon National Park and Kaçkar Mountains National Park; paragliding in Ölüdeniz Nature Park; diving and camping in Beyda lar National Park; walking in Göreme National Park. Training of local guides has been organised, for example in the Gelibolu Peninsula Historical National Park, where 186 persons received national certificates in 2007.

need to be reconciled with nature and biodiversity goals, including some international commitments. The 9th NDP (2007-13) comprises specific sectoral integration measures of nature and biodiversity conservation in agriculture and fisheries. However, strengthening implementation capacity is needed (Chapter 5).

Environmental impact assessments and land use planning

The *environmental impact assessment* requirements (1993, amended 2004) determine administrative and technical principles and procedures to be followed in addressing the negative effects of investment activities on the environment. EIAs are required for most investment activities in Turkey, and are processed by MoEF in co-ordination with relevant ministries (Chapter 5).

While EIA procedures have improved, the integration of nature and biodiversity concerns into *land use planning* is lagging. This applies to both regional and local land use planning (MoEF, 2006a). There is also a lack of economic analyses in the area of nature conservation. Staffing constraints of MoEF have until recently made it very difficult to enforce and implement regulations, including those on land use. Draft laws on land tenure and use, rangelands and the regulation of grazing have not been adopted, severely undermining conservation efforts for many areas with important biodiversity outside protected areas (Council of Europe, 2006).

Forestry

Broad-leaved forest accounts for about 40% of forest cover, and the rest is needle-leaf forest. About 99% of the forest area is State-owned, 18.2% is protected in various ways and 71.3% is productive forest. About half of the forest area consists of degraded forest. *Forest degradation* is due to unsustainable practices in the past and the dependence of rural communities on wood for heating and cooking.[9] There are about 2 000 forest fires annually.

The Forestry Law (1956, amended 1982 and 1986) and the Law on Reforestation and Soil Erosion Control (1995) govern the production, harvesting and utilisation of forests, including use and care by rural populations. A *National Forestry Programme* was prepared in 2003, based on the principles of sustainable forest management in multi-purpose forests and ecosystem management (MoEF, 2003). *Effective and large-scale afforestation* programmes have been implemented, mostly to prevent soil erosion but also to recover degraded forest and increase the forest cover to 30% of the total land of the country. While in 2003 the afforested coverage increased by 117 000 hectares, annual forest rehabilitation and afforestation reached 400 000 hectares in 2006. Under the protocol signed with the Ministry of National Education in 2003 the "15 million seedlings for 15 million students" campaign has been organized with seedlings planted in all provinces. In addition, between 2003 and 2006, 14 afforestation protocols were signed with several institutions including the Turkish Grand National Assembly, government agencies, the Turkish Army, the Presidency of Religious Affairs, governors and NGOs. Private afforestation activities increased from 2 000 hectares to 11 500 hectares in 2007. Turkey has supported UNEP's Billion Tree Campaign by planting seedlings across the country, reaching 250, 350 and 400 million in 2005, 2006 and in 2007, respectively.

Agriculture

Although 24% of the country is suitable for agricultural development, three-quarters of this land is prone to erosion given Turkey's mountainous and steeply sloped topography (MoEF, 2006c). *Agricultural activities* are for the most part concentrated in the southern steppe regions. Cereals cover about 70% of cultivated land and fruit production 5%, while about 18% is left uncultivated every year.

MARA has implemented measures aiming at *sustainable agriculture*. The 1994 Regulation on *Organic Agriculture* and the 2004 Law on Organic Agriculture led to the certification of over 16 000 organic producers and the cultivation of around 175 000 ha in 2007. Organic farmers are eligible for loans with preferential interest rates.

MARA and NGOs are active in combating *land degradation and soil erosion*, which are increasing. For instance, MARA provides support for drip irrigation, which reduces the salinity of the soil. As a way to combat rural poverty, which generates pressures on land, many projects have been carried out by NGOs to provide income to local villagers (e.g. beekeeping, apricot tree planting). As a result, around 150 000 ha of land has been rehabilitated, both for pasture and forestry. However, more comprehensive agri-environmental measures are needed, such as direct payment for environmentally friendly farming and measures to reduce the use of chemical fertilisers and pesticides.

Protection of *steppe ecosystems* has improved since the 1998 Pasture Law was enacted. The law generated benefits for biodiversity protection, for the sustainable use of pasture resources, and for limiting land degradation and soil erosion. However, pressure to convert steppe ecosystems into agricultural land is high, especially on the western and southern coasts.

The 2006 *National Rural Development Strategy* includes objectives to improve the management and development of protected areas. There are long-term development and management plans to promote sustainable management of protected areas, and further support is to be given to local communities to use land assets for income-generating activities in a sustainable way.

3.6 Expenditure and financing

Expenditure on nature protection and biodiversity conservation has been increasing, reaching TRY 5 million in 2005 and TRY 11 million in 2006. A large part is devoted to investment and expenditure for *national park management*, with 30% financed through *extra-budgetary sources* (e.g. entrance fees, rentals and sales) and two-thirds from government funds. According to the Law on Hunting, 30% of the income from hunting licences should be returned to finance wildlife management. Local governments do not provide financing for nature protection and biodiversity conservation. During the review period, several major projects have been supported by *foreign financing* (e.g. World Bank, Global Environment Facility, the EU). These included Ecological Risk Analysis and Management Planning of Lake Manyas (LIFE-EU), Biological Diversity and Natural Resources Management (GEF-II Project), GEF-II supported income-generating programmes (Camili Biosphere Reserve, Iğneada Longoz Ormanlari, Köprülü Kanyon and Sultansazliği National Parks) and draft management plans for protected areas (Camili, Iğneada, Köprülü Kanyon, Sultansazliği, Manyas and the Küre Mountains). *NGOs* have also contributed to financing biodiversity measures. Overall, expenditure for nature

protection and biodiversity conservation as part of total environmental protection expenditure is low, at about 0.6% in 2005, though its share grew to 1.4% in 2006.[10]

3.7 International co-operation

Biodiversity

Turkey's *rich diversity of flora, fauna and associated habitat* is of international significance. Three Global Biodiversity Hotspots (parts of the Mediterranean Basin, the Caucasus Mountains and the Irano-Anatolian Range) are found within its borders. Coastal wetlands are rich breeding grounds for fish and shellfish; internal waters and wilderness areas are critical nesting grounds for many species of migratory birds; and medicinal plants from Turkey's forests are of considerable social and economic value (Turkey ranks third, behind China and India, as an exporter of such plants).

Turkey is currently a party to many of the major international accords on nature and species conservation: the *Bern* Convention on the Conservation of European Wildlife and Natural Habitats; the Protocol of the *Barcelona* Convention on the Protection of the Mediterranean Against Pollution concerning Specially Protected Areas and Biological Diversity; the Black Sea Biodiversity and Landscape Conservation Protocol to the Bucharest Convention, the *Ramsar* Convention on Wetlands of International Importance; and the *Washington* Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The Bern Convention has played an especially important role in protecting wildlife and natural habitat in the Aegean region. Turkey ratified the Rio *Convention on Biological Diversity* in 1997, submitting a comprehensive national report to the Convention Secretariat shortly thereafter, and then ratified the associated Cartegena Protocol on Biosafety. However, Turkey is not a party to the *Bonn* Convention on the Conservation of Migratory Species of Wild Animals or the 1996 African-Eurasian Migratory Waterbirds Agreement (*AEWA*), despite having large populations of migratory birds that move between the Western Palearctic region and Africa.

To bolster its efforts to meet its international commitments and national aspirations in this area, Turkey has *turned to the international community for assistance*. For instance, under a six-year Biodiversity and Natural Resources Management Project, begun in 2000 with USD 11.5 million in World Bank and GEF funding, wide-ranging studies were undertaken to help strengthen Turkey's institutional capacity. The project also contributed to the development of a *National Biodiversity Strategy and Action Plan* (NBSAP), which, however, the government has so far not endorsed.

Other internationally supported projects address the conservation of *birds and their habitats*. In 2003, UNEP and GEF co-financed a USD 14 million project to Enhance Conservation of a Critical Network of Wetland Sites Required by Migratory Waterbirds on the African-Eurasian Flyways. Under a *2004 EU Twinning Project*,[11] efforts were launched to transpose EU Directives on birds and their habitats, CITES compliance requirements, and other European nature conservation regulations into Turkey's legal and administrative frameworks.

Biosafety

Turkey's national policy is to support the *development and application of biotechnology*, with the provision that the safety of human health and the environment is ensured. The 8th NDP foresees the establishment of legislative, institutional and practical arrangements to minimise potential risks associated with the use of modern biotechnology. Turkey has not imported or produced transgenic seed for environmental releases or field trials, and does not intend to do so pending clarification of legal, administrative and technical aspects. It is presently moving to conform to the regulations of the European Parliament and Council on transboundary movement of genetically modified organisms (GMOs).

Transboundary movements of living plants and animals are subject to authorisation by MARA, with transits requiring the approval and control of the Under-Secretariat of Customs. Current Turkish legislation and regulations do not refer directly to GMOs. The licensing and authorisation of human pharmaceuticals is the responsibility of the Ministry of Health; existing legislation in this area does not cover GMOs.

In 2003, Turkey ratified the *Cartegena Protocol on Biosafety* and designated MARA's General Directorate for Agricultural Research as the National Focal Point. In support of the Protocol, a Biosafety Exchange Mechanism is being established within MARA, to be converted to an expanded Biosafety Clearinghouse Mechanism.

A UNEP/GEF project to develop a *National Biosafety Framework* has been launched, inter alia, to provide training for MARA staff working in laboratories and research institutes on risk assessment and analysis of genetically modified organisms. It will also provide a framework for a legal and regulatory system, support institutional strengthening, design a decision-making system for risk assessment and management, along with an inspection system that includes monitoring and identification, and define mechanisms for public disclosure and access to information. Another objective is to design a stand-alone biosafety law.

The *main principles* underlying these efforts, as enunciated by Turkish officials, are the precautionary principle, case-by-case evaluation, and strategic long-term risk assessment of GMOs, including their potential impact on socio-economic structures. Further, GMO development, testing and application are not to threaten or impair the safety and health of humans, plants and animals; restrict freedom of choice for consumers; or disrupt the material balance in the functioning of the environment or ecosystem (in particular, reduction of soil fertility or the sustainability of biodiversity).

Notes

1. The Emerald Network, initiated in1998 by the Council of Europe to conserve wild flora and fauna, is essentially a *de facto* extension of the Natura 2000 network to countries outside the EU.
2. The Natura 2000 Network is an ecological network of "areas of special conservation interest to Europe" launched under the Bern Convention by the EU.
3. Excluding islands.
4. The Constitution stipulates that "the State shall take the necessary precautions towards the protection and utilisation of natural resources".
5. Part of the MoEF since 2007.
6. The database (www.nuhungemisi.web.tr) includes "species", "areas", "habitats" and "threats" sections.
7. National parks comprise three zones: a central zone which is strictly protected, a buffer zone where certain activities compatible with the purpose of the park are authorised, and a development zone where tourism and recreational activities are allowed. The first national forest park in Turkey (Yozgat National Forest Park) was established in 1958 in Anatolia, to protect 164 ha of virgin black pine forest.
8. Protected forest areas include some State forests which are protected for national defence purposes.
9. In 2005, 61% of wood removed from forests served as fuel for heating and cooking (EEA, 2007).
10. This figure does not include agri-environmental or afforestation expenditure.
11. EU Twinning Projects provide a means to assist countries which are candidates for admission to the EU. Activities and associated funding are meant to help administrations adopt the EU acquis and the best practices of EU Member States.

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5

ENVIRONMENTAL – ECONOMIC INTERFACE*

Features

- Pollution, energy and resource intensities
- National development planning and programming
- Environmental assessment of projects
- Environmental expenditure and financing
- Institutional environmental framework
- Regulatory and economic instruments
- Monitoring and compliance assurance
- Natural disasters and technological accidents

* The present chapter reviews progress in the last ten years, and particularly since the previous OECD Environmental Performance Review of 1999. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Turkey:

- establish a "*green tax commission*" to review and revise the full range of economic instrument of relevance for the environment (i.e. taxes, charges, trading, others); consider a comprehensive green tax reform, possibly in a revenue neutral perspective; review *motor vehicle related taxes*; introduce taxes on polluting products and inputs (e.g. detergents, batteries, pesticides, fertilisers, CFCs);
- reduce *environmentally harmful subsidies*, in particular in the agriculture and energy sectors, with appropriate measures to deal with competitiveness and distributive implications;
- expand *economic information* on the environment (e.g. environmental expenditure, environmentally-related taxes, resource prices, employment); develop *economic analysis* (e.g. cost-benefit analysis of environmental projects);
- undertake strategic *environmental assessment* concerning transport and agriculture policies;
- maintain a focus on *sustainable development* within the government, and the country more broadly, through an interministerial committee and associated advisory council that provide for broad participation by private sector institutions and the public.

- continue to *harmonise the national environmental legislation with the EU environmental acquis*, following the EU Integrated Environmental Approximation Strategy, with particular attention to framework Directives and EU emissions and quality standards;
- strengthen the *permitting system*: moving from media based permitting to integrated pollution prevention and control, distinguishing large and small/medium size installations; using periodic permit renewals to gradually introduce stricter emission standards; and promoting best available technology;
- strengthen the *enforcement system*, through: an autonomous environmental agency in charge of inspection at national and territorial levels, increased resources for inspections and compliance monitoring, and increased training for inspectors; integrate environmental concerns (i.e. pollution, natural resources, nature concerns) at all levels of *land-use planning*, and strengthen land-use plans enforcement;
- develop the use of economic instruments, seeking *an effective and efficient mix of instruments*, with due regard to social issues; promote the implementation of the *polluter pays and user pays principles*, with a progressive shift from public to private funding, and a time limit for environmental subsidy schemes;
- develop *public-private partnerships* and industry-driven environmental initiatives with appropriate involvement of the Turkish Business Associations;

- strengthen the *emergency preparedness and response* system (e.g. establishing a commission to support the implementation of legislation concerning natural and industrial disasters, extending institutional co-ordination, acquiring appropriate equipment, performing regular drills and simulations);
- increase the *capacity* of provincial and municipality authorities to prepare and implement environmental infrastructure projects, including those with EU funding; continue the reform of the Bank of Provinces to increase the efficiency in transfers of public funds to municipalities and in municipal investments.

Conclusions

Integrating environmental concerns into economic decisions

Within a strong national *economic and development planning* founded on National Development Plans (NDP), increasing integration of environmental concerns has been achieved in several sectors, thus providing some progress in the practice of sustainable development. High road fuel prices and taxes (among the highest among OECD countries) provided incentives to reduce the use of petrol and diesel fuel and to renew the motor vehicle fleet. Turkey's *energy intensity* improved as did its *resource intensity*. *Lignite*, which generates significant pollution when used for energy production, does not receive direct subsidies any more. The structure of *agriculture subsidies* has changed promoting more environmentally friendly practices. *Absolute decoupling* took place for municipal waste generation and the use of fertilisers. The regulatory framework for *environmental impact assessment* of projects has been strengthened and steps launched for the introduction of strategic environmental assessment of policies.

However, Turkey is facing a number of environmental challenges due to unsustainable production and consumption patterns. The overall *material intensity* of its economy is still among the highest in the OECD area, as are the *pollution intensities* (e.g. SO_x and NO_x emissions per unit of GDP). This partly reflects the structure of its economy (e.g. with the highest imports of scrap metal in the world and their conversion into exports of metal products to the middle-east, with high imports and production of cotton and high exports of cotton products to Europe). Efforts to speed up economic and social development do not always take environmental concerns into account, especially at *sub-national level*, where environmental priorities are not high. Environmentally harmful subsidies, especially in the energy

sector, continue to promote polluting activities. With rapid economic growth, a continued increase in motor vehicles ownership and traffic, as well as in municipal and industrial waste generation can be expected. Waste management will require significantly larger collection and treatment infrastructure. While Turkey's preparations for and immediate follow-up to the 2002 World Summit on Sustainable Development, were widely complimented, the efforts to integrate sustainability into sectoral policies has been implemented via a EU project and should be developed through further steps.

Strengthening the implementation of environmental policies

In the review period, the *EU harmonisation process* has become the main driving force in a major national environmental reform. It translates in a large number of *new environmental legislation and regulations*. The 2006 "comprehensive amendment" of the 1983 Environmental Law, and the new Law on Municipalities contributed to the clarification of environmental responsibilities amongst the various levels of administration. *Enforcement capacities* have been strengthened by new regulations and the creation of a separate division in the Ministry responsible for co-ordination of enforcement efforts. Integration of environmental concerns in *land-use planning* is progressing, though challenges related to unregistered operations remain. Industry is being engaged in voluntary approaches, notably in cement and chemical sectors. Turkey is the OECD country which has the largest revenues from environmentally related taxes (i.e. energy and transport taxes): 4.8% of GDP and 25% of total tax revenue, although these taxes were not designed for environmental purposes. *Public-private partnerships* have been strengthened, including the establishment of Organised Industrial Zones that provide comprehensive environmental services to industry. Estimates of pollution abatement and control expenditure (PAC expenditure) have increased from 1.1% to *1.2% of GDP*.

Despite progress in aligning with the EU environmental legislation, transposition is still waiting for several pieces of legislation concerning air, water and nature protection, and several standards are not consistent with EU limit values. *Allocation of environmental responsibilities* among government institutions could benefit from review and revision. Environmental concerns have been too often superseded by development interests in local decision-making. *Implementation and enforcement* remain challenging; a special autonomous environmental agency should be established to drive and conduct environmental inspections at national and territorial levels with appropriate resources, as well as training and monitoring support systems. The *permitting system* needs particular attention, as the current media based procedure is not sufficient, burdensome and needs regular renewal provisions. Despite the introduction of environmental charges, as well as

fuel and motor vehicles tax differentiation, the use of a variety of *economic instruments* for environmental purposes (including specific taxes, charges, emission trading systems) in Turkey should be considered to meet objectives of efficiency and financing, with due regard to social issues. Low landfill charges hamper the recycling industry. A number of unregistered installations, mostly small and medium size, operate without environmental management systems. Adoption of environmental management systems *in industry and public organisations* as well as development of public-private partnerships should be promoted. Turkey faces the challenge of mobilising substantial *financial resources* for environmental investment, especially to work towards its new environmental objectives. This will require engaging *private and public fundings* for environmental improvement, to match external resources provided by the new EU instruments for accession, and strengthening the *capacity of provincial and local authorities* to prepare detailed projects and implement them. This will also require moving progressively to the *full implementation of polluter pays and user pays principles*.

♦ ♦ ♦

1. Progress Towards Sustainable Development

1.1 Sustainable development: decoupling results

Economic development

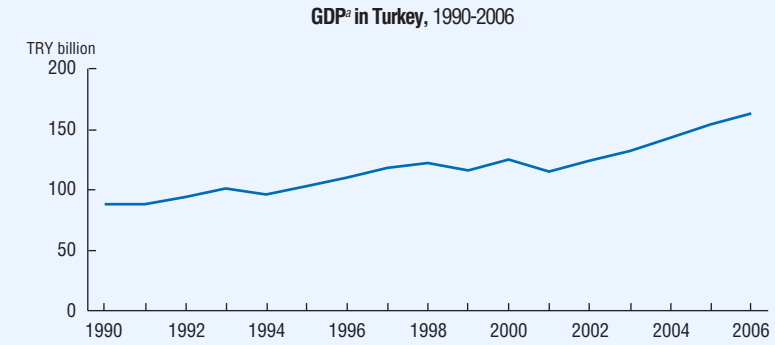
Following continuous growth of GDP in the 1990s (+40%), in 2000 the Turkish economy experienced the *most severe economic crisis* in the country's recent history.[1] In March 2001 a major stabilisation and structural reform programme was put in place, which stimulated economic activities and led to strong growth and large productivity gains (Figure 5.1).

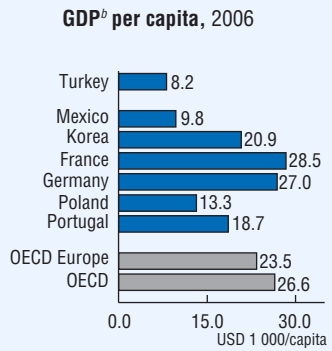
Turkey's *economic recovery* has been impressive, with an average annual growth of 7.5% over 2002-05. Inflation has fallen sharply.[2] Reform has been supported by the convergence of economic policies towards EU benchmarks, following EU candidate status since 1999. Turkey has been among the OECD countries with the strongest economic growth in recent years (Box 5.1).

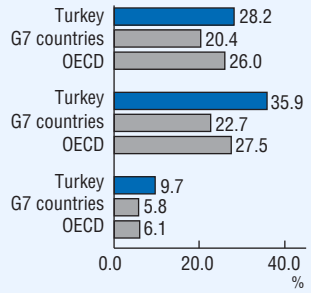
Pollution intensities

While *SO_x and NO_x* emissions increased overall by 28% and 66%, respectively, over the period 1990-2005, an absolute decoupling from GDP growth occurred for SO_x emissions and a relative decoupling for NO_x emissions between 2000 and 2005 (Table 5.1). However, corresponding emission intensities are among the highest in OECD country (Figure 2.1).

Figure 5.1 **Economic structure and trends**







Exports as % of GDP, 2006

Imports as % of GDP, 2006

Standardised unemployment rates,[c] 2006

a) GDP at 2000 prices.
b) GDP at 2000 prices and purchasing power parities.
c) % of civilian labour force; Turkey: commonly used definition.
Source: OECD (2007), OECD Economic Outlook No. 82.

Box 5.1 **Economic context**

Turkey's GDP amounted to USD 603 billion in 2006 (at 2000 prices and PPP). The per capita GDP of USD 8 242 is the lowest in the OECD area. GDP per capita in the richer western regions (e.g. Marmara) is about three times higher than that in the eastern regions (e.g. East Anatolia).

The industrial and service sectors account for, respectively, 29% and 60% of the economy. Turkey has a *rapidly growing private sector*, yet the state still plays a major role in basic industry, banking, transport and communication. Small and medium-sized enterprises (SMEs) provide 61% of total employment, but contribute only 26.5% to GDP. The *informal sector* accounts for 31% of GDP and 51% of the labour force. After years of relatively low *foreign direct investment* (FDI) (less than USD 1 billion), Turkey attracted USD 8.5 billion in 2005.

Whereas *agriculture* accounts for about 11% of GDP, it continues to employ one-third of the Turkish workforce; in 2000-01 an important agricultural reform emphasised privatisation of State-owned organisations and direct income support for farmers, instead of more distorting (and fiscally costly) input and output subsidies.

Between 2000 and 2006 *industrial production* increased by 33%. The largest industrial sector is textiles and clothing (16.3% of industrial production, one-third of industrial employment), followed by oil refining (14.5%), food processing (10.6%) and chemicals (10.3%). Iron and steel (8.9%), automotive manufacturing (6.3%) and machinery (5.8%) together represent 21% of industrial production.

Tourism has continued to expand rapidly: between 2001 and 2005 the number of foreign visitors increased by 82%. Receipts from foreign visitors increased by 88.5% and those from domestic visitors by 57.5%. The tourism industry accounts directly for about 5% of GDP and 600 000 jobs, on average, and both directly and indirectly for 10.2% of GDP and 1.5 million jobs.

Turkey's main *trading partners* are the European Union (about 56% of exports and 40% of imports), the United States, Russia and Japan. It has taken advantage of a Customs Union with the European Union (signed in 1995) to increase its industrial production for exports and to benefit from EU foreign investment. In 2007 exports amounted to USD 107 billion, an increase of 25% over 2006. The largest share of goods exports were: automotive (20%), textiles and clothing (15%), iron and steel (10.8%), chemicals and pharmaceuticals (10%) and white goods (8.5%). Exports of textiles and clothing include large amounts of *cotton products*; cotton is imported (Turkey is the world's second largest importer) or produced in Turkey (the Aegean region, Cukurova, and increasingly South-eastern Anatolia). Turkey is the largest importer of *steel scrap* in the world, producing most of its steel using the electric arc furnace; it supplies steel products to the growing markets of the Middle East and the Persian gulf.

Table 5.1 **Economic trends and environmental pressure**

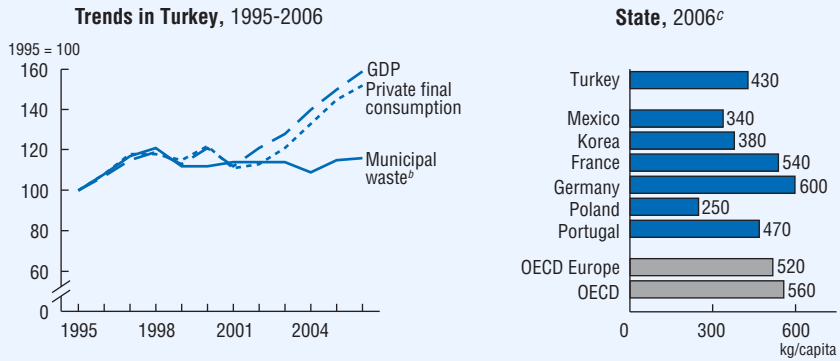
(% changes)

	1990-2006	1998-2006	2000-06
Selected economic trends			
GDP[a]	86	34	31
Population	30	12	8
GDP[a]/capita	43	20	21
Agricultural production	25	7	6
Industrial production[b]	89	36	33
Road freight traffic[c]	170	31	10
Passenger car traffic volume[d]	203	36	15
Selected environmental pressures			
Pollution			
CO_2 emissions from energy use[e]	70[g]	20[g]	8[g]
SO_x emissions	28[g]	6[g]	–9[g]
NO_x emissions	66[g]	17[g]	4[g]
Energy			
Total primary energy supply	61[g]	18[g]	11[g]
Total final consumption of energy	65[g]	23[g]	14[g]
Resources			
Water abstractions	60[g]	20[g]	3[g]
Municipal waste	41	–4	3
Nitrogenous fertiliser use	14[h]	–2[h]	7[h]
Pesticide use[f]	30[g]	32[g]	32[g]

a) At 2000 prices and PPPs.
b) Mining and quarrying, manufacturing, and production of electricity, gas and water.
c) Based on values expressed in tonne-kilometres.
d) Based on values expressed in vehicle-kilometres.
e) Sectoral approach; excluding marine and aviation bunkers.
f) Formulation weight.
g) To 2005.
h) To 2004.
Source: OECD Environment Directorate; IEA-OECD.

CO_2 emissions from energy use have continued to grow (8% in 2000-05), albeit at a slower rate than GDP (24% over the same period). This slowdown was linked to the 2000 economic downturn, as an initial 15% decrease in CO_2 emissions was followed by an increase of 23%. Per unit of GDP, Turkish CO_2 emissions (0.39 tonnes/USD 1 000) are slightly above the OECD Europe average (0.33 tonnes/USD 1 000). Overall Turkey's CO_2 emissions per capita increased between 1990 and 2005 (by around 33%) while they decreased in OECD Europe (Figure 2.2).

Figure 5.2 **Municipal waste generation**[a]



a) In interpreting national figures, it should be borne in mind that survey methods and definitions of municipal waste may vary from one country to another. According to the definition used by the OECD, municipal waste is waste collected by or for municipalities and includes household, bulky and commercial waste and similar waste handled at the same facilities.
b) 2004: break in time series.
c) Or latest available year.
Source: OECD Environment Directorate.

Between 1990 and 2006 energy intensity (total energy supply per unit of GDP) fell continuously, with a decrease of 10% in the 2000-06 period (Table 5.1). In 2005 energy intensity was at 0.15 toe/USD 1 000, similar to the level in OECD Europe (Figure 2.4).

Passenger car traffic increased by 170% between 1990 and 2005 (Table 5.1). However, private car ownership (8 cars per 100 persons) is the lowest among OECD countries and a large increase in the number of motor vehicles in use and in road traffic is expected in the years to come (Figure 2.5).

Resource intensities

Turkey's overall *material intensity*, expressed as domestic material consumption per unit of GDP, is the highest in the OECD area. It remained at about the same level during the 1990s, but declined significantly by 22% thereafter (TurkStat, 2005). While the basis of the fast-growing Turkish economy has progressively shifted from traditional agriculture towards industry and services, there have been recent decreases in intensity in regard to most mining products (including construction minerals, fossil fuels and metals), combined with a decline in intensity in regard to agricultural and forest products. Turkey's demand for *mineral materials* has greatly increased.

Municipal waste generation increased by 41% in 1990-2006, with a marked deceleration in 2000-06 (3% increase). In 2006 waste generation amounted to 430 kg per capita, below the OECD average (560 kg per capita) (Figure 5.2). The intensity of use of *nitrogenous fertilisers and pesticides* is among the lowest in any OECD country. *Water abstraction is high*: 17% of available resources, compared to the OECD average of 11.4% (TurkStat, 2005).

Assessment

In the field of the environment, progress has been achieved since the 1999 review. Over the period 1998-2006, *absolute decoupling* took place for SO_x emissions, municipal waste and fertiliser use. *Relative decoupling* was achieved for CO_2 and NO_x emissions. However, these decoupling achievements should be further pursued, as Turkey's SO_x and NO_x emissions per unit of GDP are among the highest in the OECD area; also, CO_2 emissions have been increasing since 2002. Even if Turkey has considerably lowered the resource intensity of its economy in recent years, there is still room for improvement in resource productivity and in the efficiency of the extraction and processing sectors, especially in the mineral industry. With the rapid economic growth, a continued increase in motor vehicle ownership and traffic can be expected. Similarly, growing volumes of municipal and industrial waste are envisaged, requiring significantly larger waste collection and treatment infrastructures.

1.2 Sustainable development in practice: institutional integration

National development planning and programming

National Development Plans (NDPs) continue to be a strong feature of Turkey's governance, guiding the country's economic, social and sectoral development and public investment programmes. The State Planning Organisation (*SPO)* has an important integration role, as it prepares NDPs and determines investment priorities based on investment requirements. Plan targets are binding for the public sector and indicative for private enterprises. SPO also approves all public investment projects, as well as those proposed by municipalities for financing with domestic or foreign resources. SPO is subordinated to the Prime Minister's office and receives policy direction from the High Planning Council,[3] which is chaired by the Prime Minister and includes cabinet ministers. SPO has the power to require environmental considerations to be incorporated into investment proposals which are totally or partially financed from public funds. Plans are approved by the Turkish Grand National Assembly. They establish the framework for public investment programming.

The character of the 8th (2001-05) and 9th (2007-13) NDPs has shifted from a planning-based concept that formulated a development path for each sector towards a more *strategic approach* to development. For instance, they emphasise institutional and structural reform that allows more efficient functioning of the market, redefinition of the State's role in the economy towards regulatory functions, and increased predictability of government policies. Plans are based on an evaluation of progress in implementing previous plans' commitments.

While the 3rd NDP (1973-1977) included an environmental chapter for the first time, the sustainable development concept was adopted in the 6th NDP (1991-95) and embodied in the following plans. Turkey made progress in implementing the overall objective of the *8th NDP (2001-05)*, which was to create a framework conducive to improving the quality of life of society, continuous and stable growth, and economic transformation towards EU membership and greater global integration (SPO, 2001). Environmental considerations were explicitly mentioned as elements of sectoral policies, including industrial, transport, energy, agriculture, tourism, urban and rural infrastructure, research and development, and education. The 8th NDP included a separate environmental chapter with broad goals but no explicit quantitative targets. The plan referred to Turkey's National Environmental Action Plan, prepared in 1999, as a basis for co-ordinating sectoral policies in achieving sustainable development objectives.

Guided by NDPs, *annual economic development programmes and public investment programmes* are prepared under the supervision of SPO. Attainment of EU candidate status in 1999 and the opening of EU accession negotiations in 2005 gave further impetus to the process of reforming the regulatory framework, including the environmental one. Pre-Accession Economic Programmes (PEPs), prepared every year, set out the structural reform necessary to meet the criteria for EU membership.

Overall, strong and *integrated planning capacity* at the central level provides a powerful mechanism for sustainable development and intersectoral integration. The planning system includes strong commitments to internalise environmental considerations in sectoral policies and serves as a direct guide for the preparation of annual sectoral and public investment programmes. However, many decisions concerning development and the environment are taken at provincial and municipal levels. In the *9th NDP (2007-13)* protecting the environment and improving urban infrastructure are associated with the objective of increasing the competitiveness of the Turkish economy (SPO, 2006a),[4] recognising that better environmental performance is directly linked to greater access to export markets.

Sectoral institutional integration

While SPO has the major national integration role, under the supervision of the Prime Minister's office and the High Planning Council, a number of *ministries* (Agriculture and Rural Affairs, Health, Culture and Tourism, Energy and Natural Resources, Industry and Trade) are involved in environmental policies and many have dedicated offices in charge of the environmental aspects of their policies and their implementation.

Environmental concerns are explicitly included *in sectoral policies and programmes* concerning, inter alia, agriculture, energy, transport, industry (e.g. iron and steel), tourism, and urban and rural development. There are many examples. The reform of *agricultural policy*, in particular the reform of subsidies, integrates environmental requirements. Special provisions and subsidies are provided for the development of agri-environmental measures. *Energy policy*, as set out in the 8th NDP, included provisions for minimising negative impacts on the environment, promoting energy efficiency and increasing the share of renewable energy (e.g. hydro) in energy consumption.[5] The comprehensive 2005 Transportation Master Plan Strategy emphasises reducing air pollution through the promotion of public transportation, transferring part of inter-city freight traffic to railways or sea routes, and improving road and railway infrastructure. Turkey's *Tourism* Strategy to 2023 and the 9th NDP promote "Ecotourism Regions" to develop nature-based tourism. The 9th NDP also provides for sustainable management of *fisheries*. The 2006 *National Rural Development Strategy* calls for sustainable utilisation of resources, reducing disparities by raising income level and quality of life in the rural sector, and also protection and improvement of environmental and cultural assets (SPO, 2006b).

In this context, the *sustainable development* concept and related efforts have been largely driven by international events such as the World Summit on Sustainable Development (Box 5.2).

Integration at sub-national level

Environmental policies are implemented at the *territorial level* with the efforts of provincial and municipal authorities. The governor of each province, appointed by the Ministry of Interior, is responsible for co-ordinating various efforts and ensuring that policies are implemented according to government policy guidelines.

The *Local Agenda 21* programme, launched in 1999, provided an opportunity for the enhancement of local democracy and for practical implementation of the concept of "good governance" (Chapter 6). The emerging model of city councils and other

participatory platforms helped to strengthen local and municipal policies and decisions. This programme also played an enabling and facilitating role in the recovery and reconstruction process following the eastern Marmara earthquake of 1999 (UNDP, 2004).

Environmental assessment of projects

The *regulation on the environmental impact assessment* (EIA) of investment projects, adopted in 1993, was amended in 1997, 2002, 2003 and 2004. The revisions introduced new selection criteria to determine whether EIA is required.[6] The time it takes to obtain an EIA report was reduced to 33 days from the earlier six to seven months. The transparency of EIA procedures was increased. EIA regulations are being harmonised with the EU EIA Directives, except for issues related to EIA in a transboundary context (Innanen, 2004).[7] Mining projects are still not included for EIA consideration. The 1997 amendment required that consultants who carry out the EIA should be certified, but this provision was later removed.

Box 5.2 **Sustainable development**

The writings and declarations of Turkish public figures, private sector representatives and the media over the review period reflect *a widespread appreciation of, and commitment to, sustainable development*. The concept first appeared as a national objective in Turkey's 6th National Development Plan (1991-95), was explicitly addressed in a comprehensive manner in the 7th NDP (1996-2000) and was cited again in the 8th NDP (2001-05).

In 2000 the Ministry of Environment, with support from UNDP, initiated a new flagship programme, the National Programme on Environment and Development (NPED), which contained a component on the preparation for and follow-up to the *World Summit on Sustainable Development in Johannesburg in 2002*.

Following guidelines set out in the 8th NPD, Turkish authorities mounted a broad effort to prepare a comprehensive review of Turkey's sustainable development challenges and options. The process involved broad participation by and dialogue among public, private and NGO stakeholders, who came together in roundtables, workshops and consultative events as well as via internet in an "e-group". This process is *still being widely praised for its success in raising awareness* about sustainable development, and as a model for engaging broad public participation in discussions of major environmental issues and events. It produced two highly regarded reports that Turkey submitted to the Johannesburg Summit: a "National Report on Sustainable Development" and a compilation of "Best Practices in Turkey". The latter included an examination of the application of information and technologies for sustainable development under a project funded by the EU-LIFE programme.[a]

Box 5.2 **Sustainable development** *(cont.)*

A *National Commission on Sustainable Development* established under the State Planning Organisation with expert groups on energy, forestry, agriculture, and science and technology supported the Johannesburg Summit preparation and follow-up. With UNDP support, an assessment and "next steps" report was issued in 2003 (the "World Summit on Sustainable Development Plan of Implementation"), comparing approaches and intentions set out in a number of important Turkish documents (e.g. the "National Report to Johannesburg"; "National Agenda 21" and "National Programme for the Adoption of the EC Acquis"). The report did not, however, set priorities for follow-up activities.

In its 2004 *Country Evaluation of Turkey, UNDP* observed that the absence of future programme priorities in the 2003 "next steps" report, coupled with lack of funding and a restructuring of Turkey's environmental administration, had resulted in a diminution in public enthusiasm and activity regarding the pursuit of sustainable development after the Johannesburg Summit. At the moment, the country does not have a National Strategy on Sustainable Development, as called for in Johannesburg. On the other hand, the *concept has remained important* in Turkey, focusing attention, within and outside the central government, on the interaction of economic, social and environmental policies and the need to pursue sector integration throughout the planning and implementation process.

What is missing is a dedicated and focused effort on sustainable development by the central government which establishes responsibilities and priorities for ministries, recommends roles and actions for private sector institutions, and engages public participation and support. It would be useful, in this regard, to *establish a ministerial committee on sustainability, supported by a public advisory council,* to re-energize and focus the national effort, and to *ensure strong participation by business, academia and environmental NGOs*. Turkey's Business Council for Sustainable Development also has an important role to play. Among the building blocks for a renewed effort are Turkey's ongoing activities at the provincial level in forestry, energy, water and fisheries in support of the *Millennium Development Goals*, and the *Local Agenda 21* programme with its emphasis on municipal-level participatory mechanisms for decision-making.

a) EU-LIFE (Financial Instrument for the Environment) is an EU financial mechanism supporting environmental and nature conservation projects in the EU and candidate and neighbouring countries. Turkey participated in the Life-Third Country component, which focused on pollution, waste and biodiversity.

MoEF, through its General Directorate of EIA and Planning, is the *competent authority* responsible for assessments, ensuring that administrative and technical procedures are followed and that there are monitoring and inspecting projects before, during and after operation. MoEF also co-ordinates EIA matters with other

government agencies, particularly the Ministry of Health, Ministry of Agriculture and Rural Affairs and Ministry of Culture and Tourism, as well as provincial governors.[8]

Between 1997 and 2004 over 800 EIAs were completed, or an average of *100 EIAs* per year. The vast majority of EIAs are undertaken in the more affluent western provinces (Coskun, 2005). Even though MoEF is responsible for implementation and centralises much of the decision-making, the *quality of EIA* procedures and reports varies. In practice, EIA authorisations are often used as an additional permit, added to the number required to develop investment projects. EIAs frequently lack follow-up. Public hearings are limited, and the capacities and expertise of stakeholders vary. Occasionally, EIAs are prepared after the completion of a project. There is considerable willingness to improve the EIA system's performance through: better streamlining with respect to environmental and non-environmental permits; better division of responsibilities between MoEF and provincial environment directorates; and enhanced training through the *EIA Training and Information Centre*[9] at MoEF, created in 2006.

Legislation on *strategic impact assessment* (SEA) of government programmes and plans is in preparation. The draft text gives responsibility to MoEF for supervising the SEA process. The competent authority that commissions the SEA is required to submit the SEA report to MoEF and provide information concerning how SEA conclusions are used (Innanen, 2004).

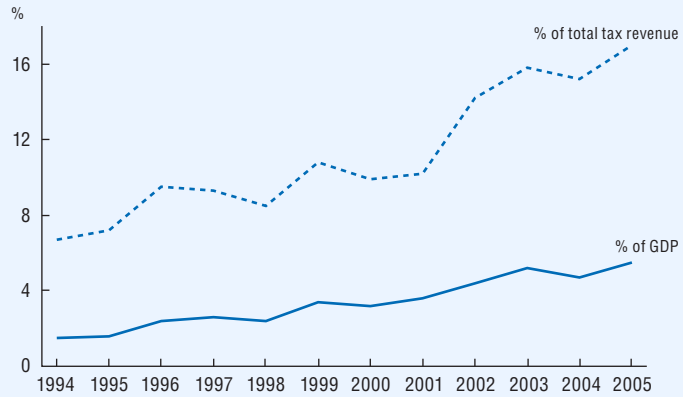
1.3 Sustainable development in practice: market-based integration

A number of steps have been taken by the government in the post-2000 period to *reduce tax distortions, broaden the tax base and improve the efficiency of tax administration*. In June 2002 a special consumption tax was enacted that consolidated many different taxes on some consumption and luxury goods. In April 2003 another tax package on direct taxation was approved by Parliament. With this new law, the system of tax exemption on investments was restructured and simplified, special expenditure reductions were transformed into tax credit, and the system for deducting some expenditure from income tax was simplified and made easier to implement (ENVEST, 2004b).

Environmentally related taxes

Environmentally related taxes represented 15.2% of total tax revenue in 2004, the highest share in any OECD country (the OECD average is 7%) and 4.8% of GDP (the OECD average is 2.6%) (Figure 5.3). These shares had increased significantly from 7.2% of total tax revenue and 1.6% of GDP in 1995. The weight of fuel and motor vehicle taxes in environmentally related tax revenue is very high: 96.5%. The fuel tax itself represents 65% (OECD, 2007).

Figure 5.3 **Environmentally related taxes[a] in total tax revenue and GDP**



a) Includes transport and energy related taxes.
Source: OECD/EEA database on instruments used for environmental policy and natural resources management.

Motor fuel taxes (called "special consumption tax on fuels") are excise taxes levied on motor vehicle fuels, fuel oil and natural gas. They are among the highest in OECD countries and are differentiated between unleaded gasoline and diesel, with a lower rate for diesel.[10] The consumption tax on gasoline and diesel was introduced in 2002 and its increase over the last five years is associated with a decrease in the use of motor fuels per unit of GDP (Figure 2.3). Given that many low-income households in Turkey do not own a car, this reform has touched middle-income and higher-income households. However, since the tax rate for diesel fuel with sulphur content below 0.05% (EUR 0.52/l) is higher than for fuel with a higher sulphur content (between 0.05 and 0.20%), the wrong incentive is given from an environmental perspective (OECD, 2007). A small tax reduction (2%) is applied to fuels (diesel and gasoline) containing a proportion of biofuel. A lower tax is applied to LPG compared with gasoline and other fuels. For example, in 2007 the LPG tax rate was EUR 0.37/l compared to EUR 0.85/l for low-octane unleaded gasoline. On average, in 2004 taxes represented 69.5 and 61.4% of unleaded gasoline and diesel prices respectively (IEA, 2005).

The special *consumption tax on motor vehicles* is a sub-category of the excise taxes paid on consumption goods such as alcohol, cigarettes and luxury goods. This tax on the purchase of new vehicles ranges between 0.5 and 84% of the vehicle's net tax price. For automobiles, the tax rate varies according to engine capacity (in 2007, 37% for engines up to 1 600 cm^3; 60% for those between 1 600 and 2 000 cm^3; 84%

for those above 2 000 cm^3). To accelerate the phase-out of old and polluting vehicles (more than 20 years old and not exceeding 1 600 cm^3), a tax discount was introduced in 2003 and 2004 for the acquisition of a new vehicle (in the same category and with engine capacity not exceeding 1 600 cm^3) while discarding a vehicle that was at least 20 years old.

The *motor vehicle tax* is paid annually and covers 152 categories of vehicles. While the rate increases with engine power, thus providing a positive signal with respect to the environment, there is a strong negative correlation with vehicle age which can be environmentally counterproductive, as emissions are usually greater in the case of older vehicles. However, changes to this provision are envisaged. To reduce illegal abandonment or scrapping of older vehicles, owners who dispose of vehicles through the appropriate provincial administration are exempted from past unpaid fines and motor vehicle tax.

Environmentally harmful subsidies

Various types of *financial assistance* are provided by the State to economic entities with an impact on the environment. Some support measures can be environmentally harmful, as they distort prices and resource allocation decisions as well as affecting the amount of goods and services produced and consumed in an economy.

The 1999 *reform of agricultural subsidies* resulted in an initial decrease in the Producer Support Estimate (PSE) by 2001, followed by an increase to 26% of gross farm receipts in 2003-05 (OECD, 2006c). At *3.5% of GDP,* the PSE level in Turkey is the highest in any OECD country.

The *structure of agricultural subsidies* has changed towards more environmentally friendly agriculture. The share of input payments (e.g. subsidised prices of those pesticides and fertilisers most likely to have negative environmental effects) decreased from 30% in 1986-88 to less than 2% in 2003-05. There has also been a general shift from market price support to direct income support (DIS) payments since 2001,[11] in line with the "decoupling" objective of the EU Common Agricultural Policy. Nevertheless, low water and electricity prices as well as irrigation subsidies (e.g. electricity for irrigation pumps is 50-60% cheaper than for other uses) are granted to farmers.

Concerning *energy subsidies*, hard coal remains subsidised.[12] As current hard coal prices do not allow Turkish State-owned coal producers to recover costs, they receive the balance as a government subsidy, mainly to cover the cost of labour. The government considers that this subsidy is necessary to promote domestic hard coal production and to diversify energy supply, bearing in mind the objectives of security of supply and social

considerations in the mining regions. Total subsidies paid to coal producers amounted to USD 266 million in 2003 (about 0.05% of GDP). While there is not a large volume of hard coal production in Turkey, aid per tonne of coal equivalent has been relatively high compared with other OECD countries that subsidise coal production.

While Turkish *lignite* producers have not received direct subsidies since 1994, they have been able to cover their costs and make a profit.[13] Until now lignite power plants have had a guaranteed market, but this will disappear when the Turkish Electricity Generation Company (EUAS) is privatised as anticipated in the 2001 Electricity Market Law (IEA, 2005).

1.4 Environmental expenditure and financing

Environmental expenditure

Pollution abatement and control (PAC) expenditure[14] was estimated at 1.2% of GDP (0.9% public expenditure, 0.3% business expenditure) in 2006, an increase from 1.1% in 1997 (OECD, 2007); private (business) expenditure includes energy saving measures. Since 1997, detailed PAC data are available only for the public sector and thermal power plants; they show a slight increase in public expenditure, mainly due to increased expenditure at municipal level.

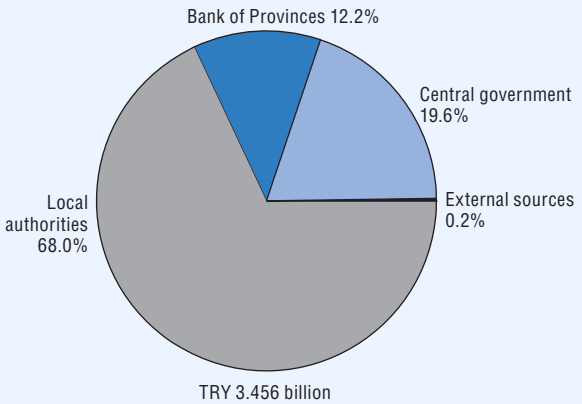
For a number of years *total public investment expenditure* has been around 5% of GDP, with the share allocated to environmental investment declining from 16% in 1999 to 7.5% in 2005.

Financing environmental expenditure

Financing of public environmental investment in 2005 came from four main sources: local authorities (68%), the central government (19.5%), the State-owned Bank of Provinces (Iller Bank) (12%) and external sources (e.g. World Bank, EU, GEF and individual donor countries) (Figure 5.4). Municipal revenues (including environmental charges) play an important role in financing investment and environmentally related operating expenditure (Box 5.3).

During the review period, public financing of environmental projects was modified. Until 2002 a large part of public environmental investment was financed from 20 special funds. In 2002 all budgetary and extra-budgetary funds were closed down;[15] central government resources for the environment are now channelled though a single special revolving account in the Central Directorate of Accounting of MoEF (ENVEST, 2004b), besides direct transfers to municipalities (and provinces) and general transfers through the Bank of Provinces. The termination of these funds has significantly reduced allocations earmarked for environmental infrastructure. “Grants

Figure 5.4 **Financing public environmental investment,** 2005



Source: MoEF.

to municipalities" provided by the central government budget via the Bank of Provinces contribute to the transition (Box 5.4). As part of the post-crisis reform, the number of projects in the overall *public investment programme* was reduced from 5 458 (in 1999) to 3 555 (in 2004). Of the 3 555 projects, 238 provided environmental infrastructure (e.g. waste water treatment plants, sewerage, water supply and solid waste management).

Looking ahead

It is estimated that complying with *EU environmental regulations* will require a total expenditure of EUR 58 billion between 2007 and 2023 (MoEF, 2006). Complying with EU water Directives will require investments accounting for 60% of the total. The central administration is expected to provide 13% of total funding, local administrations 37% (of which 12% by the Bank of Provinces), the private sector 26% and public enterprises 2%. External funding (mostly from the EU) is expected to contribute 22% of total expenditure.

Overall, Turkey faces the challenge of *mobilising financial resources* for environmental improvement, including EU environmental requirements. Some progress has already been made with investment plans for each of the most costly Directives. Further steps need to include i) strengthening the *capacity of provincial and local authorities* to prepare and implement detailed projects; ii) compiling and

Box 5.3 **Sources of municipal revenues**

Central government transfers

Transfers from the central government to municipalities amount to about 2% of GDP. Close to *50% of total municipal revenues* are transfers from the central government. These transfers take place through three mechanisms: the first two provide untied general budget support for the municipal administrations, while the third is earmarked for particular purposes. More specifically:

- 6% of national tax revenues is transferred to municipalities according to their population. This represents *about 55%* of central government transfers to municipalities;
- 4.1% of taxes collected within a province are allocated to a metropolitan municipality if there is one in the province. This represents *about 30%*. Upon receipt by the metropolitan municipal administration, the transfer is divided into three parts. The largest, 55% (of 30%), goes to the various district municipalities according to population, 35% (of 30%) is allocated to the metropolitan municipality, and the final 10% (of 30%) goes to the Water and Sewerage Administrations (SKIs).
- the remainder, about *15%* of transfers, is allocated from the central government budget to a number of ministries and other agencies that in turn allocate funds for (specific) activities in the municipalities. This allocation was previously made through a number of extra-budgetary funds, most of which were eliminated in early 2002 to strengthen the central government budget.

Transfers from the central government to the *provincial governments* amount to about 0.3% of GDP or 1.12% of national tax revenues.

Local taxes

About *10% of total municipal revenues* come from local taxes: property taxes, the "environment cleaning tax" and taxes on advertising, entertainment, telecommunications, electricity and gas consumption, and fire insurance. Non-metropolitan municipalities and metropolitan district municipalities collect all local taxes. However, metropolitan district municipalities are required to transfer 10% of the solid waste tax and 20% of the property tax to their metropolitan municipalities.

Other revenues

In addition, municipalities have other revenues representing *25% of total municipal revenues*. These include fees for services provided by municipalities such as connection of residential units to municipal networks (e.g. roads, sewerage systems and water pipes). A further *15% of total municipal revenue* comes from donations and aid, fines, income from municipal enterprises, borrowing and other sources. There are no legal restrictions on municipalities' external borrowing. They may borrow on external markets, but only after meeting tight financial criteria and with a Treasury Guarantee.

Box 5.4 **The Bank of Provinces**

The *Bank of Provinces (Iller Bank)* is an institution affiliated to the Ministry of Public Works and Settlement. It was established as a municipalities bank (Belediyeler Bankas) in 1933, and municipalities have been its shareholders ever since. The Bank's main sources of revenue are: i) annual capital contributions from the local administrations; ii) central government transfer payments; and iii) operating income from commissions, transactions, and banking service revenues and dividends. Currently, the Bank of Provinces carries out three types of activities:

- it serves as a *transfer mechanism* for central government financial payments to municipalities and special provincial administrations. These transfers are generally for the purpose of unconditional budget support for territorial administrations. However, in some exceptional cases transfers may be earmarked for particular (current or investment expenditure) purposes. While transferring central government payments, the Bank has the right to offset transfers against debt service payables to the Bank and/or other agencies of the central government;
- the Bank provides both short-term and long-term *loans* for investments to the municipalities, usually smaller and medium–sized ones, and their utilities;
- on the demand of the municipalities, the Bank provides *technical assistance* to prepare investment projects. These projects include solid waste plants, drinking water treatment plants, water supply, sewerage networks and urban waste water treatment plants. The Bank can also help them develop urban development plans. This technical assistance is financed from the central government grants allocated to the municipalities;
- the Bank also *executes infrastructure projects* through contractors on behalf of the municipalities.

A *reform* of the Bank is underway to increase the efficiency of transferring public funds to municipalities, and to improve the quality and efficiency of municipal investments.

reviewing *public and private financing data* to adjust financing strategies, in light of external resources to be provided by the new EU instruments for accession; iii) the current reform of the *Bank of Provinces* to increase the efficiency of transferring public funds to municipalities and of municipal investments; iv) greater use of *private funding*, including public-private partnership arrangements and foreign direct investment. Finally, during the transition phase of the EU environmental approximation strategy, it will be essential to move progressively towards full application of the polluter- and user-pays principles.

2. Implementing Environmental Policy

2.1 Institutional framework

Planning and environmental legislation

In the early part of the review period, the *8th NDP and annual government programmes* (developed by SPO and sectoral ministries) led to priority environmental actions: strengthening the institutional framework for environmental management, upgrading and extending the environmental monitoring and information infrastructure, and establishing an environmental enforcement system (SPO, 2001). The economic crisis of 2000-01 delayed the implementation of some recommendations; progress was slower with the use of economic instruments, removal of environmentally harmful subsidies and actual environmental management (e.g. urban and rural environmental infrastructure, marine and coastal resources, environmental hazards), as well as with the integration of environmental concerns in sectoral policies. The 1999 *National Environmental Action Plan* (NEAP), which contained a number of short- to long-term objectives, was not formally approved, implemented and monitored.

After 2005 and the opening of membership negotiations between Turkey and the EU, efforts to strengthen environmental priorities were undertaken (Box 5.5). The *EU Integrated Environmental Approximation Strategy (2007-23)* (UÇES), prepared by MoEF and adopted by the High Planning Council (February 2007), identified measures to ensure harmonisation and compliance with a large part of the *EU environmental acquis communautaire*. The Strategy included some (but not all) targets for completion of transposition into Turkish legislation, as well as some estimated means (but not those for chemicals, GMOs or noise) of implementing and enforcing the acquis. The Strategy estimated that around EUR 60 billion[16] was needed to meet the investment and operational costs of complying with them before 2023 (MoEF, 2006).

This spurred the *updating of large parts of environmental legislation*: overall, 44 new pieces of legislation or major amendments were adopted on horizontal issues (e.g. access to information, environmental impact assessment, environmental inspection) and sectoral issues such as air pollution (e.g. VOC emissions, motor fuel quality, control of air pollution from industrial plants), waste (e.g. hazardous, medical and packaging waste, excavation and construction waste, waste oils, and used batteries and accumulators), water (e.g. drinking and bathing water, urban waste water treatment, nitrates) and chemicals (e.g. dangerous chemicals, phasing out of ODS) (Table 5.2).

Box 5.5 **EU-Turkish relations**

Membership negotiations

Turkey signed the Association (Ankara) Agreement with the then European Economic Community in 1963. This agreement established an association relationship and envisaged the progressive establishment of a Customs Union which would bring the two sides closer together in economic and trade matters. Turkey was recognised as a *candidate state for EU membership* in 1999.

Turkey's accession negotiations started on 3 October 2005. The *screening of Turkish legislation vis-à-vis* the EU acquis communautaire was conducted between October 2005 and October 2006. Examination of the Environment Chapter was completed in June 2006.

Between 2005 and 2007, negotiations on six chapters were opened and provisionally completed in one chapter. The negotiations are conducted in accordance with the *Negotiating Framework* adopted by the EU member States, which expresses that these negotiations are based on Article 49 of the Treaty on European Union and that the shared objective of the negotiations is accession. These negotiations are an open-ended process.

EU financial assistance

Following the 1999 Helsinki European Council, a *pre-accession orientation* was introduced to the EU financial assistance programmes for Turkey. Initially, assistance focused on structural adjustment: EUR 209 million in 2000 and EUR 214 million in 2001 were allocated for Turkey.

In December 2001, the EU Council adopted the "*Framework Regulation for Financial Assistance to Turkey*" with allocations of EUR 126 million in 2002, EUR 144 million in 2003, EUR 236 million in 2004, EUR 277 million in 2005 and EUR 450 million in 2006. Expected average annual allocation for Turkey for the period 2007-10 increases from EUR497 million in 2007 to EUR 653.7 million in 2010.

Present priorities are to support the reform process, cross-border co-operation and partnerships with the EU Member States. As from 2007, financial assistance is provided through the *Instrument for Pre-Accession (IPA)*, which channels pre-accession assistance to all candidate and potential candidate countries. IPA is divided into five components: institution building, cross-border co-operation, regional development, human resources development and rural development. The novelty of the IPA is that it introduces financial support in new areas (e.g. environment, transport, regional competitiveness, human resource development) managed on the same principles as structural funds.

Table 5.2 **Selected environmental laws and regulations**

	First enacted	Last ordinance
GENERAL		
Law on Environment No. 2872	1983	2006
Law on Energy Efficiency	2007	
Law on Geothermal Energy	2007	
Law on Nuclear Energy	2007	
Law on the Use of Renewable Energy Resources for Electricity Production Purposes No. 5346	2005	
Law of Organic Agriculture	2004	
Law on Municipalities No. 5393	2004	
Penal Code	2004	2006
Law on Local Government Associations		
Law on Metropolitan Municipalities No. 5216	2004	2005
Regulation on the Basis and Procedures of the Implementation of the Law on the Right Access to Information No. 18132	2004	2005
Regulation on Environmental Inspection No. 24631/bis	2002	
Regulation on Soil Pollution Control	2001	2005
Regulation on Organic Agriculture	1994	
Regulation on Environmental Impact Assessment No. 25318	1993	2004
Law on the Organisation and Responsibilities of the Ministry of Environment and Forestry No. 4856	1991	2003
Law on Mining	1985	2004
Law on the Procedure of Administrative Justice No. 2577	1982	
Law on the Organisation and Responsibilities of the State Hydraulic Works	1953	
Law on Sea Ports	1925	
AIR		
Regulation on the Control of Air Pollution from Heating No. 25699	2005	
Regulation on Petrol and Diesel Fuel Quality No. 25489	2004	
Regulation on Informing Consumers on Fuel Economy and CO_2 Emissions of New Passenger Cars No. 25530	2003	
Regulation on the Control of Exhaust Gas Emissions caused by Motor Vehicles	1993	
Regulation on Protection of Air Quality No. 19269	1986	
WASTE		
Regulation on End-of-Life Tyres	2006	
Regulation on Hazardous Waste Control No. 25755	2005	
Regulation on Medical Waste No. 25883	2005	
Regulation on Waste Vegetable Oil Control No. 25791	2005	
Regulation on Packaging and Packaging Waste Control No. 25538	2004	2007
Regulation on Waste Oil Control No. 25353	2004	
Regulation on Waste Batteries and Accumulators Control No. 25538	2004	2005
Regulation on the Recovery and Control of Ship Waste No. 25682	2004	
Regulation on the Control of Excavation Soil, Construction Waste and Wreckage No. 25406	2004	
Regulation on Solid Waste Control No. 20814	1991	2005

Table 5.2 **Selected environmental laws and regulations** *(cont.)*

	First enacted	Last ordinance
WATER		
Regulation on Bathing Water Quality No. 26048	2006	
Regulation on Urban Waste Water Treatment No. 26047	2006	
Regulation on the Control and Reduction of Water Pollution Caused by Discharge of Certain Dangerous Substances No. 26005	2005	
Regulation on the Quality Required of Surface Water Intended for the Abstraction of Drinking Water No. 25999	2005	
Regulation on Water Intended for Human Consumption No. 25730	2005	
Regulation on the Protection of Waters against Pollution Caused by Nitrates from Agricultural Sources No. 25377	2004	
Law on Fisheries No. 1830	1995	2006
Regulation on Fisheries No. 22223	1995	2006
Regulation on Water Pollution Control No. 25687	1988	2004
Law on Underground Waters No. 167	1960	
Law on Geothermal and Natural Mineral Waters	1926	2007
NATURE		
Regulation on Keeping, Breeding and Trade of Game and Wild Animals and the Products Obtained from Them No. 258472005	2005	
Regulation on Hunting and Wild Animals and Production Facilities and Stations and Rescuing Centres No. 25656	2004	
Law on Hunting No. 4915	2003	
Regulation on the Conservation of Wetlands No. 25818	2002	
Law on Reforestation and Soil Erosion Control	1995	
Law on National Parks No. 2873	1983	
Law on Preservation of Cultural and Natural Entities No. 2863	1983	
Law on Forestry No. 6831	1956	1986
INDUSTRIAL POLLUTION AND RISK MANAGEMENT		
Regulation on Control of Air Pollution from Industrial Plants No. 26236	2006	
Law on Organised Industrial Regions	2002	
CHEMICALS		
Regulation on the Working Principle and Procedures of Ethical Councils Concerning Animal Experiments No. 26220	2006	
Regulation on the Protection of Experimental Animals and on the Basic Principles of the Establishment, Operation and Inspection of Experimental Laboratories	2004	
Regulation on the Phase-Out of Ozone Depleting Substances No. 23766	1999	2006
Regulation on Dangerous Chemicals No. 21634	1993	2001
NOISE		
Regulation on Environmental Noise and Management No. 25862	2005	2008

Source: OECD, Environment Directorate.

The legislative changes culminated in a *comprehensive 2006 amendment to the 1983 Law on Environment*. This amendment included the polluter- and user-pays principles, as well as the participatory and precautionary approaches, opening up possibilities for greater use of economic instruments, environmental liability and enhanced public access to environmental information. The amendment specified stricter requirements for municipalities to prepare detailed land use plans and plans for the construction of domestic solid waste treatment facilities. It also introduced higher sanctions for non-compliance with environmental legislation.

Overall, the Turkish environmental legal framework is now *stronger and closer to the EU environmental acquis communautaire*. For example, the regulations concerning packaging waste are fully in compliance with the EU acquis. However, *in some areas transposition is still lacking*, for instance concerning surface and ground water quality, air quality and integrated industrial pollution control, risk management, chemicals management, waste (e.g. landfill), nature and biodiversity protection (e.g. the Birds and Habitats Directives). Particular attention needs to be paid to the transposition of EU standards (European Commission, 2007). There is also a need for a full assessment of the administrative capacity and financial resources required, as well as a detailed plan for further regulatory adjustments.

National environmental administration

In line with the recommendations of the 1999 OECD review, *environmental institutional capacity* has been strengthened. The Ministry of Environment and the Ministry of Forestry were merged in 2003 to become the Ministry of Environment and Forestry (MoEF).[17] This restructuring was accompanied by the recruitment of additional environmental staff (around 500 between 2003 and 2007) and by additional environmental financial resources. MoEF has 1 200 full-time employees (e.g. 193 dealing with EIA, 475 with inspections) at national level and some additional 4 000 (including some 20% of forest guards) work for the 81 Provincial Directorates. Following government restructuring after the September 2007 elections, MoEF includes the *General Directorate of State Hydraulic Works* (DSI), previously under the Ministry of Energy and Natural Resources, with 27 000 staff[18] in Ankara and in 25 Regional Directorates (DSI, 2007).

Other sectoral ministries have authority over certain elements of environmental policy. For example, the Ministry of Agriculture and Rural Affairs is responsible for plant and animal protection in rural areas and for aquatic products; the Ministry of Energy and Natural Resources makes policies related to energy efficiency; the Ministry of Industry and Trade has authority for improving the environmental performance of enterprises and innovation technologies; the Ministry of Public Works and Settlement prepares land use plans for coastal zones; the Ministry of Health has

functions and responsibilities regarding the protection of environmental health; and the Ministry of Culture and Tourism has the authority to protect cultural values and use of coastal zones.

The 2006 amendment to the Law on Environment called for re-establishing the *Supreme Council of Environment* (SCE), which in the past had aimed to ensure the integration of environmental concerns into sectoral policies. Environmental disputes among administrative bodies could also be settled in the Council. The SCE is expected to consist of high-level officials of relevant ministries. Depending on the agenda, representatives of chambers of professions, NGOs, local authorities, universities and scientific institutions would also participate.

Environmental research is supported by non-executive scientific institutions. For instance, the Chemistry and Environment Institute at the Marmara Research Center, which is part of the Scientific and Technological Research Council of Turkey (TUBITAK), works on a range of issues including water and waste water, marine waters, solid waste and soils, and air quality. The Institute has received ISO 9 001 and 14 000 accreditation and acquired certified equipment for testing some 200 parameters.

Territorial environmental administrations

At *provincial level*, the central government is represented by nominated governors (Vali). Branch offices of government bodies have extensive executive and oversight roles. MoEF is present with 81 Provincial Directorates of Environment and Forestry (PDEFs), which prepare regional land use and nature protection plans, issue permits (land use, construction, environmental, hunting), lead inspection activities and manage the provision of environmental services. The Bank of Provinces (Box 5.4) plays an important role at territorial level as the principal lender to local government for infrastructure development.

Within the framework of policies set by national and provincial authorities, *municipalities* carry out responsibilities for planning, provision and control of services to the population (including those related to solid waste, water, sewerage and transport) as well as the preparation and adoption of land use plans (i.e. provincial and municipal).[19] Municipalities come together in associations to provide waste collection, water and sewerage services. These are provided directly through semi-autonomous companies or through concessions (Chapter 3). The municipalities are also responsible for managing sites of historical or natural importance.

Although municipal and village councils are run by elected representatives, they operate within the limits established by central authorities,[20] mainly to ensure *co-ordination*, uniformity of public services and compliance with the law. These limits,

however, may prevent the application of flexible and less costly solutions. For example, authorisation procedures may become complicated and extensive if various agencies (and often even each department within an agency) establish their own supervisory requirements. The provincial Local Environmental Committees, which bring together representatives of the provincial offices of various ministries, mayors and business representatives, are expected to contribute to the identification of environmental problems and negotiate solutions, but their role has not been significant so far.

Recent policies aim to disengage the State from carrying out many functions and to devolve management authority to the local level. The 9th NDP states that the government would withdraw from the production of goods and services and strengthen its policy-making, regulatory and supervisory functions (SPO, 2006). Further *devolution* of management responsibilities according to the subsidiarity principle should allow better use of the potential of elected authorities and more flexible and cost-effective solutions. Devolution should be accompanied by the provision of adequate means, including funding, to fulfil policy objectives and support procedures for reporting to the public and to higher authorities on policy implementation.

2.2 Regulatory instruments

Reforming environmental permitting for industrial operations

Steps are being taken to simplify and rationalise *permitting processes*. The 2003 amendment to the regulation on "unhealthy establishments" clarified responsibilities between MoEF and the Ministry of Health related to the environmental and health dimension of permits. A further aim is to regroup permitting procedures for all media,[21] with a limited time frame for authorities to issue a package of permits. For large enterprises, this would be in line with the EU IPPC Directive. For small enterprises, it would be managed by binding rules for specific sectors. New procedures would be introduced parallel with new limit values and standards required by EU legislation. The *permitting reform* envisages the establishment of a Turkish IPPC Centre. This Centre is expected, inter alia, to gather and disseminate information about integrated permitting and to provide training to permit writers and permitting authorities.

In practice, the present permitting procedures are often perceived as burdensome by the regulated community. Some estimates suggest that 60% of installations may operate *without appropriate environmental permits*; a significant number of enterprises operate with temporary permits only (IMPEL, 2005).

Progress in enforcement and compliance assurance

In the past, enforcement of environmental legislation did not attract sufficient attention and there was only a basic framework for environmental inspections, lacking capacities, impacts and transparency. The *2002 Regulation on Environmental Inspection* was an important step towards enhancing environmental compliance assurance in order to respond to non-compliance and create a deterrent effect. Today MoEF is responsible for emissions control, and the Ministry of Health (which historically undertook many environmental management functions) for sanitary and epidemiological inspections. The Ministry of Labour and Social Security oversees indoor workers' health and safety.

The establishment of a *Directorate for Inspections in MoEF* in 2002 introduced the separation of inspections for compliance from permit writing. It also introduced a more comprehensive approach to compliance assurance: the Directorate is now responsible for co-ordination of enforcement efforts (e.g. preparation of guidelines on inspections, approval of the annual programme of inspections prepared by the Provincial Directorates, training); its *inspectors* conduct "combined inspections" (inspection of a single installation for compliance with all relevant environmental legislation) while those of the Provincial Inspection Departments of PDEFs carry out media-based inspections of all facilities in their province. Since the Provincial Inspection Departments are formally subordinate to the governor's office (and not the central inspectorate of MoEF), enforcement officers may face pressure to balance economic and environmental protection goals.

Local police forces (jandarma) may be involved in environmental inspection in rural areas. They have the right to inspect permits and to notify the Provincial Directorates in cases of non-compliance. They also take part in responding to emergency situations involving industrial accidents. They play a role in the prosecution of cases identified by DSI where illegal abstractions or exceedance of limits are recorded.

Concerning *nature conservation*, inspections are carried out by the nature protection staff of the Provincial Directorates, as there is no dedicated unit at the national or provincial levels. The national and provincial staff of the Special Protected Areas Institution also has inspection responsibilities within their area of expertise. Forest areas are controlled by MoEF's General Directorate for Forestry, which has a guard service attached to the Provincial Directorates.

Additional *human resources* have been provided for enforcement purposes. In 2006 there were 280 inspectors in the various departments of MoEF, including 17 in the Department for Inspections. There were also 850 inspectors in the

Provincial Directorates. The forestry services staff makes up about 20% of total PDEF staff. However, given the size of the country and the number of installations subject to inspection, it is estimated that 200 to 300 additional inspectors should be employed to meet requirements (IMPEL, 2005). Enlargement of the enforcement staff should be accompanied by the establishment of an integrity system for inspectors, regular training and evaluation of their performance.

While there were general provisions for environmental *non-compliance sanctions* in the 1983 Law on Environment, the 2002 Regulation on Environmental Inspection introduced more detailed definitions of environmental non-compliance cases, increased the level of fines, and differentiated them according to the nature and seriousness of the environmental crime. The 2006 comprehensive amendment to the Law on Environment introduced a more specific provision in the Turkish Penal Code related to breaching environmental regulations.[22] The amendment also introduced *compliance promotion* provisions (e.g. the possibility of applying a discount of up to 50% to the tariff for electricity used in treatment plants).

In 2005 MoEF and the provincial authorities carried out 25 combined inspections, while the provincial authorities carried out over 30 000 media-specific inspections. The inspectors can impose administrative sanctions: in 2005 total *fines* for non-compliance reached EUR 15 million and the *closure* of 280 installations was ordered. However, the general trend is to provide a written *enforcement warning* to the facility. To date, no complete data on inspections have been collected and published. From 2007, Provincial Directorates have an obligation to prepare *reports on inspection activities* and submit them to MoEF with the aim of receiving guidance on enforcement measures.

Other permits and licences

MoEF issues other types of permits and licences, including *approvals of fuels* for use in energy production (coal, oil and gas). Approvals are based on tests for standard parameters carried out by laboratories authorised by the National Reference Laboratory. In the case of coal, for example, calorific value, humidity, ash, sulphur and volatile content are evaluated before the permit is issued. MoEF issues permits for the disposal of appropriately treated and certified *sewage sludge* on agricultural or forest land. Such permits, renewed every year, are subject to approval by the relevant local authority.

MoEF also gives licenses to firms that collect, separate and recycle *waste* on behalf of other firms subject to the deposit-refund quota system. Several types of *water management* permits are issued. For example, abstraction rights are issued by

DSI after allocations are made for use of surface water, including for hydropower, irrigation and municipal use in urban areas.

Provincial and municipal authorities prepare *urban development plans* within their jurisdictions. Detailed land use plans, and subsequently *building permits*, are under the responsibility of municipal authorities.[23] Start-up and operating permits are issued upon inspection by the respective administrations (municipalities, special provincial administrations, or the management body of an Organised Industrial Zone). These have replaced the previous Ministry of Health "unhealthy establishments" permits. There is also a requirement for operation permits upon completion of construction. These are issued by the respective administrations under urban planning legislation (IMPEL, 2005).

Environmental monitoring

Several steps have been taken over the review period to increase the coverage and policy relevance of the *environmental monitoring and reporting system*. For example, in 2006 MoEF assigned the principal role in *air quality monitoring* to the General Directorate of the State Meteorological Service[24] for collecting and collating information on air emissions and quality. The air monitoring network has expanded, benefiting from the efforts of Provincial Directorates and universities. All the provinces now have at least one automatic measurement station for SO_2 and PM_{10}, part of the national Air Quality Monitoring Network. In addition, mobile air quality monitoring vehicles have been introduced and a national reference laboratory (under MoEF) is being accredited with support of the Marmara Research Centre.

During most of the review period, responsibility for *water monitoring* was shared among several institutions: DSI and its 1 200 measurement stations across Turkey; MoEF and its Provincial Directorates; and the Ministry of Agriculture and Rural Affairs, responsible for monitoring nitrate pollution in freshwater and groundwater. The inclusion of DSI in the MoEF structure (in 2007) provides opportunities for efficiency gains in monitoring water quantity and quality. *Ad hoc* environmental information is also gathered by universities and research institutions as part of their research projects.

However, the overall system is fragmented and needs further improvement, including to support standard establishments and accreditation and to support some policy decisions concerning industrial zones or coastal tourism areas (with the notable exception of Organised Industrial Zones, where emissions and discharges are monitored by their management bodies). The establishment of a *Department for Environmental Inventory at MoEF*, responsible for co-ordinating monitoring efforts, goes in the right direction.

The *laboratory network* includes public and private laboratories. A national reference laboratory (associated with MoEF and supported by TUBITAK's Chemistry and Environment Institute) is in the process of accreditation and development. The Institute, which appears to have well developed capacities in the air, water (seawater and freshwater), soils and waste sectors, also leads intercalibration activities in the field. Universities and private laboratories exist in many parts of the country. All Organised Industrial Zones have their own laboratories.

At the sub-national level, Provincial Directorates of Environment and Forestry produce periodic *state of the environment reports* according to standard formats provided by MoEF. All data related to water quality, waste water and waste generation, air quality, greenhouse gas emissions and environmental expenditure are collected by the Turkish Statistical Institute (TurkStat), which published nation-wide environmental statistics compendium in 2004 and 2006. In 2007 MoEF published a comprehensive state of the environment report covering all environmental media and presenting sectoral pressures on the environment (Chapter 6).

2.3 Economic instruments

Turkey is the OECD country with the largest revenues from environmentally related taxes, both when measures as a per cent of GDP or as a per cent of total tax revenue (Section 1.3). Petrol taxes are the highest in the world. However, the Turkish environmental policies overall are based on regulations, with limited use of other economic instruments, such as *user charges and pollution fees*. All charges principally serve revenue raising purposes. The 2006 amendment to the 1983 Law on Environment (Article 3) states, however, that "… to encourage the protection of the environment and the prevention and elimination of environmental pollution (…), economic instruments and incentives, such as emissions and pollution charges, and market-based mechanisms such as carbon trading shall be used".

Concerning *waste management*, charges on solid waste generation are collected by municipalities mainly to contribute to covering the costs of municipal waste collection and disposal.[25] Commercial and industrial sources pay a fixed annual charge based on the type and size of the facility, while households pay a fixed lump sum together with the water bill.[26] The environmental effectiveness of the charge is questionable, as it is not linked to the actual amount of waste generated and covers only a portion (about 15%) of the collection and disposal costs (ENVEST, 2004). The tariff structure is distorted, as industrial plants pay a lower rate than facilities such as schools. The charge rates should be revised, aiming at covering the full cost of disposal and providing an incentive effect to reduce waste generation.

The *deposit-refund system* is also used in waste management. The Regulation on the Management of Solid Waste requires packaging waste (paper, metal, plastic and glass) to be collected after disposal and recycled according to annual quotas. MoEF licenses firms that collect, separate and recycle waste on behalf of other firms that are subject to the quota system. These firms are responsible for keeping records of all the packaging material processed in their plants and have to submit this information to the Ministry periodically. The deposits are returned to those who bring empty containers back to the retailers or wholesalers of the product.

A *charge for hazardous waste treatment* (including treatment of clinical and industrial waste) has been designed to finance the operations of the only dedicated hazardous waste disposal facility (the Izaydas plant located in Izmit).[27] The charge is based on the volume and type of waste delivered to the facility. The rates cover the full operating costs. The capital costs of the plant have been covered by public funding. The effectiveness of the charge is limited, as it is imposed on the small proportion of hazardous waste that is actually delivered for treatment.

Concerning *water management*, a charge on water use and connection to sewers is designed to contribute to cover water supply and waste water disposal costs. Rates are fixed by municipalities; until the revision of the Law on Environment in 2006, a requirement that the level of the waste water charge should not be higher than 50% of the payment for drinking water supply severely undermined the financial and economic rationale of the system. This limitation has been eliminated, and the amended law calls for establishing rates that reflect the marginal social costs. Fees are also applied in the case of waste water discharges by industries unable to operate their own waste water treatment plants for certain periods.[28] The fee provides an incentive for industries to build and operate treatment plants and to reduce pollution.

Concerning *air management*, 20% of the regular inspection cost for motor vehicles feeds MoEF's revolving fund (budget line). There are also tolls (according to vehicle size and the distance travelled) for the country's main highways and a fee (according to vehicle size) paid for crossing either of the two bridges connecting Asia and Europe in Istanbul. Other economic instruments are applied in regard to *noise*[29] and *hunting*. The implementation of tradable emission quotas is currently not foreseen.

Environmentally related financial assistance is available in the form of exemptions from import duties and from the value added tax for purchases of environmental equipment and for environmental R&D and investment. Financial assistance is also available in the form of interest support (with a maximum of TRY 300 000) for investment credits and discounts on energy tariffs (up to 50%) for

pollution treatment and abatement facilities. Although the amount of these subsidies seems limited, they are not consistent with the polluter-pays principle, especially as no time limits are assigned to the subsidy schemes.

2.4 Private sector initiatives

Private sector initiatives to improve *environmental management* and reduce environmental impacts have been increasing. The number of enterprises certified for ISO 14 000 grew rapidly, from 91 in 2000 to over 1 400 in 2006; this was especially relevant in the case of those exporting to EU markets.[30] The Turkish Accreditation Agency and the Turkish Institute for Standards (TIS) have been working on the development of industry standards to address waste generation and management problems, as well as air and water pollution. In total 512 standards on the environment (out of which 131 are national and 381 internationally adopted) are in force.[31] TIS provides training to industry and experts and carries out environmental audits. Up to 2007, TIS provided 465 experts with "EMS Auditor/Lead Auditor" training. Technical studies to establish EMAS[32] are being initiated. Eco-labelling is not yet developed, though pioneering work has been done in the textile and leather industries.

Voluntary approaches, initiated and co-ordinated by the Turkish Business Association, have continued in the cement, chemical and automobile industries. Initiatives focus on meeting high environmental standards. Cleaner production initiatives have been applied through the joint efforts of universities and enterprises in the textile, olive oil production, dairy, leather and electroplating sectors. Most initiatives have focused on small and medium-sized enterprises (SMEs) with the greatest potential for water and energy savings. Some assessments concerning olive oil production have led to 95% reductions in waste water generation. Firms in the chemical industry have been implementing the Responsible Care programme and cleaner production training programmes, particularly in SMEs.

Organised Industrial Zones (OIZs) play an important role in industrial development. They provide many services (e.g. infrastructure, security services, legal advice) to enterprises located within a limited geographical area.[33] At the end of 2007, 107 OIZs had been established, covering a total of over 22 000 ha. Many OIZs (such as the one in Gebze, near Kocaeli) were established with the aim of reducing pollution caused by dispersed industrialisation around urban areas. The management of OIZs assists enterprises in their contacts with the environmental administration, arranging environmental permits and meeting other requirements. OIZs also provide environmental infrastructure, including water supply, waste water collection and treatment, waste disposal and emergency response. In addition, they

play an important role in strengthening environmental management in enterprises. Even though their operations focus on firms with foreign capital, sharing the OIZs' experience should be of value across Turkey, particularly for SMEs.

2.5 Natural disasters and technological accidents

Turkey is prone to *natural disasters* such as earthquakes, floods, landslides, avalanches and forest fires. *Earthquakes* are the most serious threat, as most of the country is located along active geological fault lines: the North Anatolia fault, corresponding to the southern shore of the Black Sea, and a variety of faults in the western Aegean region and in south-eastern and eastern Anatolia. 92% of the country's territory is prone to earthquakes and 95% of the population lives in these areas. Over the last 25 years, more than 25 000 people have died and nearly 100 000 buildings have been damaged beyond repair as a result of earthquakes (Table 5.3). One of the most disastrous earthquakes in recent history struck north-western Turkey on 17 August 1999, with estimated damages of USD 13 billion (Bibbee, *et al*., 2000) (Box 5.6). Measured in terms of direct economic costs, natural disasters have, on average, accounted for 1% of GDP per year, with earthquakes representing 0.8% of GDP. Landslides account for over 25% of Turkey's natural disasters; events and floods for over 10%. Other disasters include rock slides (8.2%) and avalanches (1.2%).

Turkey also has a recent history of *technological accidents*. In 1999, the Eastern Marmara earthquake caused the release to the atmosphere of 200 metric tonnes of hazardous anhydrous ammonia,[34] an explosion of tanks containing 6 400 tonnes of toxic acrylonytril, a spill of 50 tonnes of diesel fuel into Izmit Bay due to damaged fuel-loading equipment, and a fire involving 700 000 tonnes of oil stored at the TUPRAS oil refinery. It took several days to bring the fire under control, and large quantities of toxic gases were released, while the Marmara Sea was affected by a sizeable oil spill (Steinberg, 2001; Perkins, 2002). In 2004, a fire broke out in the naphthalene tanks at the ATAS refinery in Mersin. There were no casualties, but the fire lasted for several days and caused significant air pollution. Sea operations have also resulted in accidents. For example, in July 2002 a large LPG tanker caught fire and exploded during pumping operations at Izmit. This triggered the explosion of nine other tanks at the facility, and 300 tonnes of LPG burned. Traffic through the Turkish Straits remains very high, entailing substantial risks despite remarkable preventive efforts (Chapter 7).

Co-ordination of *responses to emergencies* is vested in the General Directorate of Emergency Management (TEMAD) within the Prime Minister's office, which is supported by the General Directorate of Disaster Affairs (GDDA) of the Ministry of

Table 5.3 **Major earthquakes,** 1982-2005

Date	Place	Magnitude	Deaths	Buildings damaged
27.03.1982	Bulanik	5.2	..	1 000
30.10.1983	Horasan	6.8	1 155	3 241
18.09.1984	Balkaya	5.9	3	187
05.05.1986	Sürgü	5.8	8	824
06.06.1986	Sürgü	5.6	1	1 174
07.12.1992	Akyaka	6.9	4	546
13.03.1992	Erzincan	6.8	653	6 702
01.10.1995	Dinar	5.9	94	4 909
05.12.1995	Pülümür	5.6	..	..
14.08.1996	Mecitözü	5.4	145	707
22.01.1997	Hatay	5.5	1	1 841
27.06.1998	Ceyhan	5.9	145	10 675
17.08.1999	Izmit/Marmara	7.4	17 127	50 000
12.11.1999	Duzce	7.3	798	20 503
06.06.2000	Orta-Çerkeş	5.8	12	2 456
15.12.2000	Bolvadin-Afyon	5.6	6	250
03.02.2002	Afyon/Sultandagi	6.0	2 500	4 401
27.01.2003	Tunceli Pülümür	5.8	250	100
01.05.2003	Bingöl	6.4	1 000	7 800
25.03.2004	Askale-Erzurum	5.1	10	1 212
02.07.2004	Eastern Turkey	5.1	18	531
25.01.2005	Mere-Hakkâri	5.4	3	83
20.10.2005	Seferihisar	5.9	..	100

Source: UNEP (2007), MoEF (2007).

Public Works and Settlement. GDDA develops natural disaster response policies and provides training for personnel involved in disaster management through the European Disaster Training Center in Istanbul. The General Directorate of Civil Defense (GDCD), which is part of the Ministry of Interior, the Turkish Red Crescent Society (TRCS)[35] and the armed forces play major roles in rescue and relief operations. The first line of response to technological accidents is provided by the security and firefighting services at the affected installations. The Undersecretary of Maritime Affairs is responsible for marine environmental protection operations and MoEF is responsible for coastal environmental protection (Peynircioglu, 2002).

Following the adoption of laws on natural disaster management in 2003, MoEF was charged with the preparation of emergency plans and management of chemical and major industrial accidents. Information on establishments where there is a risk of

Box 5.6 The 1999 eastern Marmara earthquakes

The earthquakes and their impacts

On 17 August and 12 November 1999, two earthquakes struck the Marmara and Bolu regions of Turkey, causing material damage and human casualties. The *August event* (7.4 magnitude with an epicentre near the town of Gölcük in Kocaeli province) lasted for 48 seconds, killing over 17 000 people, injuring 24 000 and leaving approximately half a million homeless. Between 50 000 and 120 000 houses were damaged beyond repair and another 50 000 were heavily damaged (57% of the overall housing infrastructure). The death toll increased in winter because of the poor conditions of shelters for survivors. The earthquake was heavily felt in the industrialised areas around the Marmara Sea, which account for one-third of Turkey's overall output: 58 industrial facilities in the Kocaeli region alone suffered moderate to heavy damage, and many facilities reported releases of hazardous substances. The *November event* (7.3 magnitude, epicenter Düzce) resulted in 798 deaths, 4 948 injuries and 20 000 collapsed or heavily damaged housing units.

Post-earthquake reconstruction efforts

Immediately after the earthquakes, the government provided *emergency assistance* to those whose homes had been damaged in the form of tents, temporary residences and rubble clean-up. During recovery and rehabilitation, the government also provided funds to help homeowners to purchase *new residences*. Temporary residences were constructed by the Ministry of Public Works and Settlement and the General Directorate of Disaster Affairs, or using donations by foreign agencies and others. Over time, new permanent residences have been built for the owners of severely and moderately damaged residences with the support of long-term low-interest loans.

The *post-earthquake rehabilitation programme* introduced measures to reduce potential losses from natural disasters by: improving the emergency response system; increasing the earthquake resistance of new buildings; adopting and enforcing land use plans and building codes; and setting up a compulsory disaster insurance scheme. The programme also increases public awareness of earthquakes, preparedness measures by businesses, and support programmes for small businesses. In addition, the Turkish Emergency Management Directorate (TAY) has been created and the Istanbul Seismic Risk Mitigation and Emergency Preparedness Project (ISMEP) initiated with the assistance of the World Bank.

Land use planning

The 1985 regional land use plan for the eastern Marmara area underlined the potential negative impacts of seismic risks on industrial and residential development. Prior to this plan in 1982, the Bank of Provinces had prepared a geological report on

Box 5.6 **The 1999 eastern Marmara earthquakes** *(cont.)*

these risks in the area, highlighting the lessons learned from the 1967 earthquake. It suggested areas most suitable for settlement and industrial development. In practice, however, the *planning principles were often ignored*: multi-storey buildings covered much of the city, except in a few traditional neighbourhoods. Industrial plants were located in areas vulnerable to earthquakes. After the earthquake, the majority of collapsed buildings were multi-storey, whereas low structures (of one or two storeys) were undamaged.

Following the reconstruction efforts, the *new land use planning* process was initiated for the cities of the eastern Marmara region, taking into account geological conditions. The plan for the new earthquake-safe housing areas of Adapazar was prepared, with its implementation to be monitored to prevent non-compliance with the safety principles. The plan selected suitable sites for new residential development to the north of the city, and building codes have been revised. Detached houses of only up to three storeys have been constructed, and housing plots are separated from each other by wide streets and include vast green areas.

major accident hazards is collected by the Emergency Preparedness Commission. The 2006 comprehensive amendment of the Law on Environment makes the preparation of *emergency plans* to control and decrease the negative effects of industrial accidents compulsory. These plans are co-ordinated with the Local Emergency Plan for Major Industrial Accidents, prepared by provincial governments. Information on establishments where there is a risk of major accident hazards is collected by the Local Emergency Case Preparation Committees. A form in Turkish has been developed in compliance with the "OECD Industrial Accidents Notification/ Reporting Form" and has been available on the website of MoEF. After a major industrial accident, this form is filled in and sent to MoEF by Provincial Directorates. The 2006 amendment also requires facilities with potential environmental risks that may affect third parties to be insured to cover *financial liabilities*. In cases where industrial operations are evaluated as posing a threat to public health in case of an accident, MoEF can deny an operational permit or close the facilities temporarily or permanently.

Turkey is in the process of harmonising its legislation with the *EU Seveso II Directive.*[36] A regulation on control of major industrial accident hazards has been drafted and is currently under discussion with stakeholders. In addition, a communiqué (on public information, safety reports/emergency plans and notification)

has been prepared and an information system for industry developed. MoEF has been designated a competent authority, sharing responsibility for implementation of the Directive with the Ministry of Labour and Social Security. The full implementation of the Seveso II Directive will require approximately EUR 131 million in public funding and EUR 167 million in private funding (EC, 2007).

Even though industrial operators are required to compile and regularly update a wealth of technical information concerning hazardous materials (consistent with the Seveso guidelines), *emergency preparedness and response* could still be improved. Information about accidents may not be readily available to all first-line response forces.[37] There are no established procedures to identify the principal command at on-site emergency response operations. While the overall authority and responsibility lie with the governor of the affected region, it is not clear to whom this authority is delegated during response to specific accidents that involve different actors. There may be an over-reliance on the capacity of the personnel of industrial installations to manage large-scale accidents, and on the role the army can play in such situations (UNEP, 2007). The establishment of an expert commission to support the implementation of natural and industrial accident legislation could help to address the major problems, including institutional co-ordination, preparation of guidelines and availability of appropriate equipment. The entire emergency system would also benefit from regular drills and simulations.

Notes

1. In the 1990s Turkey's economy suffered from "boom-and-bust" cycles, with banking and economic crises in 1994, 1999 and 2000. The consequences of the 2000 crisis were severe: devaluation of the currency by some 50% on a single day, a jump in nominal interest rates to 100%, the virtual collapse of the banking system and the bankruptcy of a number of enterprises. At the end of 2001 GDP had declined by nearly 8%, inflation was about 70% and the net public debt to GDP ratio exceeded 90%.
2. While inflation fell steadily, from 85% in 1998 to 29.7% in 2002, the economic reform brought it down to single digit level in 2004 for the first time in three decades. It dropped to 7.7% in 2005, but climbed back to 9.8% in 2006.
3. SPO serves as the secretariat of the High Planning Council.
4. The other key objectives include i) increasing employment, ii) strengthening human development and social solidarity, iii) ensuring regional development and iv) increasing quality and effectiveness in public services.
5. The Ministry of Energy and Natural Resources includes renewable energy resources among the priorities of energy policies, particularly in energy production. It is estimated that the hydrologic energy potential economically available is 130 000 GWh annually, but that only 35% of this potential can be utilised.
6. EIA procedures are guided by lists of activities included in annexes to the latest EIA regulation. Projects listed in Annex I require a full EIA regardless of circumstances. For projects listed in Annex II MoEF decides on a case-by-case basis whether an EIA is required, based on several "selection and elimination" criteria stipulated in Annex IV, which includes requirements for descriptions of the site itself, the nature of the project, the potential impacts on the environment and the potential alternatives. Annex V, a listing of areas classified as "sensitive" in Turkey, must also be taken into account in the screening process. Preparing such descriptions is referred to as a preliminary EIA report ("pre-EIA").
7. Annexes I and II of the recently introduced EIA regulation reflect Annexes I and II of Directive 97/11/EC, but the regulation does not envisage consulting neighbouring countries if the proposed project may have transboundary impacts. In addition, Turkey has not signed the UNECE Espoo Convention.
8. MoEF is responsible for procedures concerning all Annex I projects, and may delegate responsibility for the Annex II process to the provincial environment directorate where the Ministry deems it has the professional competence to deal with applications. Until 2007, such delegation had been granted to 30 of the 81 provinces.
9. The Centre provides relevant information to stakeholders, facilitates communication and co-ordinates research activities on EIA methodologies. Supporting documents, such as the EIA manual and guidelines, have been developed to standardise EIA procedures and to provide guidance on EIA procedures and reporting. For example, three sectoral guidelines for carrying out EIAs related to highways, hazardous waste and harbours have been prepared.
10. Leaded gasoline was banned on 1 January 2004.
11. The DIS programme has made annual payments of around USD 90/ha to all farmers on the basis of their cultivated area.

12. While the selling price of hard coal to iron and steel producers was USD 100 per tonne and was USD 39-40 per tonne for power generation, the production cost of hard coal was USD 187 per tonne. Prices are renegotiated every year with major users.
13. The production cost of lignite is currently about USD 20 per tonne. The average selling price is about USD 28; the price of lignite sold for power generation is lower, at USD 23 per tonne.
14. According to OECD/Eurostat definitions (OECD, 2007c), pollution abatement and control (PAC) expenditure includes activities aimed directly at the prevention, reduction and elimination of pollution (e.g. waste, water, air, noise, R&D, administration). Environmental protection expenditure (EPE) includes PAC and the protection of biodiversity and landscape. Both PAC and EPE include public and private expenditure.
15. The only exceptions were: the Price Support and Stabilisation Fund, Savings Deposit Insurance Fund, Defence Fund, Privatisation Fund, Social Solidarity Fund, and Promotion and Publicity Fund.
16. This did not cover costs in the areas of chemicals, GMOs or noise. Investment and operational costs in these areas are being developed.
17. The Ministry's three General Directorates, covering media-specific issues (DG for Environmental Management), horizontal policies (DG for EIA and Planning) and natural environment issues (DG for Nature Protection and National Parks) play a role in the practical implementation of environmental legislation. In addition, autonomous institutions are supervised by the Minister of Environment and Forestry: i) the Special Environmental Protection Institution, responsible for planning and development control in 14 special protection zones under the Mediterranean Action Plan of the Barcelona Convention; ii) the State Meteorological Service; and iii) the General Directorate for Forest Management, responsible for the protection, development and sustainable utilisation of forests. The General Directorate of State Hydraulic Works (DSI) was incorporated in the MoEF structure in 2007.
18. Out of 27 659 DSI personnel in 2006, 1 505 were administrative, 4 512 technical, 21 378 manual workers and 264 other.
19. There are 3 225 municipalities in Turkey, of which 16 are (larger) metropolitan municipalities. The municipalities' elected councils manage a range of services (some compulsory and some at the discretion of the council). The 16 metropolitan municipalities have two-tier authorities, including a council with elected representatives and nominated representatives of the lower-tier (ordinary) municipalities and villages they cover. Some 35 000 elected village councils have responsibility for the provision of services to settlements with a population of up to 2 000.
20. This relation is stated in the present Constitution, Article 127, paragraph 5: "The central administration has the power of administrative trusteeship over the local governments."
21. Currently, separate permits are required for releases of pollutants to air, surface water or sewerage, waste disposal and noise. Separate permits are also required for construction of industrial facilities starting their operations and after an operational trial period. For example, installations emitting air pollutants are subject to preliminary and full permits. Preliminary permits have limited time validity and are issued prior to operation, based on design characteristics and expected emissions. Full permits are granted after a trial period of operation.
22. For example, a new provision allowed criminal sanctions of up to two years of imprisonment for deliberately discharging wastes or garbage to soil, water or air with damage to the environment.

23. However, the land use/site development permit in the Organised Industrial Zone or special tourism zone is obtained from the respective management bodies.
24. An autonomous structure subordinated to MoEF.
25. 10% of the revenue from these charges is earmarked for MoEF.
26. The so-called "environment cleaning tax" rates are fixed independently by each municipality.
27. There are plans, however, to build up to six new hazardous waste treatment facilities.
28. The so-called "pollution prevention charge" applies to all industries, whether or not they discharge to the sewerage network.
29. An aircraft noise charge is calculated as 0.5% of the passenger ticket price, and at a predetermined rate per tonne of freight.
30. For example, the Izmir KOSGEB Eco-textile Laboratory was certified to ensure that Turkish textile industry products were compatible with international environmental standards.
31. The TIS established national committees that follow international and regional standardisation activities (namely ISO/TC and CEN/TC).
32. Regulation 2001/761/EC.
33. There is at least one OIZ in each Turkish province. The OIZs operate according to legislation from the year 2000, under the Ministry of Industry and Trade. The Council of Ministers appoints the legal entity that manages the OIZs.
34. The release was deliberate, in order to avoid the explosion of an over-pressurized tank after the loss of refrigeration capabilities.
35. TRCS has the capacity to address 250 000 people's needs in emergencies by providing temporary shelter and food.
36. 1996/82/EC.
37. For example, firefighters may not have consistent access to information on a hazardous installation affected by an emergency due to unclear procedures for activation of crisis centres.

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6
ENVIRONMENTAL – SOCIAL INTERFACE*

Features

- Social disparities, employment and the environment
- Access to environmental information
- Public participation and the role of NGOs
- The South-eastern Anatolia Project
- The TEMA Foundation
- Environmental education

* The present chapter reviews progress in the last ten years, and particularly since the previous OECD Environmental Performance Review of 1999. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Turkey:

- develop a white paper on the *health-environment* interface; develop and implement a national action plan on health and environment; further implement the national children's environmental health action plan;
- reduce the share of people without *access to environmental services*, (e.g. water supply, water sanitation and waste services) to improve health and the quality of life, in particular for low income households;
- integrate environmental and sustainable development concerns in *regional development* programmes, with particular attention to rural and disadvantaged regions;
- promote environmental policies which contribute to *increased income and job creation*, especially in rural areas and poorer districts of large cities;
- continue to monitor the implementation of the right of *access to environmental information* and of *access to courts* concerning environmental issues, and correct implementation as needed;
- continue to strengthen *environmental education*; develop further efforts by public authorities and environmental NGOs to increase *environmental awareness*.

Conclusions

Important efforts have been made to increase *access of the public to information in general and to environmental information in particular*. Annual *state of the environment* reporting at provincial level has been supplemented by nation-wide reports. Environmental *information units* formed in government agencies, together with the state of the environment reports and national environmental statistics produced by the Turkish Statistical Institute inform the public about environmental issues. *Public participation* in the management of protected areas, in rural development and in EIAs procedures have become common and the number of environmental NGOs has increased. Initiatives to raise *public environmental awareness*, including training courses on environmental issues and environmental information dissemination have been developed for rural communities, the armed forces and prayer leaders. Several court cases for non-compliance and for environmental or health damages have proceeded. During the review period,

significant progress in extending *environmental education* to all levels of the formal system was made, particularly for pre-school, primary and secondary schools.

Turkey continues to experience important *regional disparities*, with poverty affecting more rural areas of Eastern and South-eastern Anatolia, and suburbs of metropolitan areas. Even though a number of *regional programmes* support economic development of disadvantaged regions, their environmental and sustainable development content is often not sufficient. Studies of the relations between *public health* and environmental services are few and links between health and environmental policies should be developed. Large health related benefits could be derived from improved environmental conditions, including increased labour productivity, reduced health expenditure, and increased well being of the population. Environmental concerns should be integrated in technology development and innovation and could stimulate *employment*, especially in industry. *Environmental NGOs* face challenges, including establishing themselves, co-operating with other NGOs and raising funds. Turkey has not yet become a party to the Aarhus Convention.

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1. Environmental Health

Turkey faces a double *burden of disease* typical of developing middle-income countries: an unfinished agenda concerning infectious diseases, child and maternal health; and the growing impact of non-communicable diseases. Data from the Turkish Ministry of Health show that cardiovascular, prenatal and cerebrovascular diseases, non-infectious respiratory diseases, cancer and pneumonia constitute the main disease burden on the population (Arnaudova, 2006). The share of total communicable diseases is higher than in the EU15, while the share of non-communicable diseases is lower but on the rise. However, the health information systems are still under development and do not provide a full picture of the causes of mortality and morbidity (European Parliament, 2006). Similarly, there is limited knowledge of the *health impacts of pollution* or of the potential benefits of improved environmental management.

1.1 Valuation studies

Available information on the health impacts of *pollution* is limited and primarily comes from research studies undertaken in universities. One study shows that the

potential health benefits of air pollution mitigation in terms of the annual potential reduction of health care expenditure have been estimated at USD 212-350 million (Özdilek, 2006).[1] Health risk assessment studies are also conducted in response to concerns expressed by populations living near *newly built installations* (e.g. the hazardous waste incineration plant in Izaydas[2]) or large *mining centres* (e.g. high lead and cadmium concentrations in the blood of children living around a coal mining area in Yatagan).

The process of approximation to EU environmental legislation has prompted an analysis of the *costs and benefits* of some environmental actions. Between 27 000 and 135 000 cases of chronic bronchitis in Turkey would be avoided in 2010 through full implementation of the EU air Directives, which would result, notably, in reduced use of low-quality lignite in power stations. Other benefits from air pollutant emission reductions through full compliance with EU air Directives (decreases in health expenditure, increased labour productivity, increased well-being) have been estimated at EUR 3-9 billion (ECOTEC, 2001). More such studies could help inform environmental and sectoral policy-making and generate public awareness.

1.2 Policy responses

The ambitious *Health Transformation Programme* (PTH) launched in 2003 sought to tackle a number of structural deficiencies in the health protection system, such as one-third of the population having no health insurance coverage.[3] Underfunded and understaffed primary health care centres in urban (and some rural) areas do not have environmental health officers responsible for basic sanitation issues (e.g. water safety, safe solid waste disposal, sewerage systems, food hygiene), in particular in Eastern and South-eastern Anatolia. The PTH aims at: introducing universal health insurance, improving access to and the quality of health care services, establishing a primary care network, changing environmental legislation, building the capacity of health professionals, and developing accurate and up-to-date health information systems.

In the context of this reform of the health sector, attempts have been made by environmental and health authorities to develop action plans to address environmental health problems. Following the 3rd Ministerial Conference on Environment and Health in 1999, the 2001 Turkish *National Environmental Health Action Plan* was adopted, but its findings were not included in the PTH. The 4th Ministerial Conference on Environment and Health in 2004 prompted the elaboration of a 2005 *national children's environmental health action plan*, after a wide consultative process. It identified information needs and actions specific to children's environmental health.

2. Disparities, Employment and the Environment

2.1 Regional and urban-rural disparities

Although Turkey has made great strides in regional development, *disparities among regions* are still a problem (Table 6.1). Nearly 35% of the rural population is below the relative *poverty* level, compared with 22% of the urban population (Box 6.1). The rural poor have difficulties accessing education and health services, and are also deprived of environmental infrastructure; part of the rural population does not have access to safe drinking water; and only 5% is connected to waste water treatment plants. In many cases this leads to pressures on forests, nature and wildlife.

Table 6.1 **Regional distribution of population and GDP**[a]

Region	Share of population (%)	Share of land area (%)	Share of GDP (%)	Population density (inhabitants/km^2)	GDP per capita (%)
Black Sea	*11.0*	*14.1*	*8.7*	72.7	*74.4*
Marmara	*28.4*	*12.6*	*38.9*	211.3	*140.7*
Aegean	*13.1*	*11.6*	*15.6*	105.5	*118.6*
Mediterranean	*13.0*	*11.5*	*12.2*	106.0	*95.1*
Central Anatolia	*15.5*	*21.2*	*14.8*	68.7	*94.6*
Eastern Anatolia	*9.0*	*19.3*	*4.3*	43.8	*47.1*
South-eastern Anatolia	*10.0*	*9.8*	*5.4*	96.1	*55.3*
Turkey	100.0	100.0	100.0	93.6	100.0

a) Population and area in 2005. GDP in 2001.
Source: OECD.

Large *regional development projects* have been launched to support the economic development of eastern and southern parts of the country. The *South-eastern Anatolia Project (GAP)* is the largest regional development project in Turkey and is considered one of the largest of its kind in the world, covering 10% of the total territory and representing an investment of TRY 50 billion (USD 32 billion) over some 25 years (DSI, 2007). The GAP includes 13 major projects, primarily for irrigation and hydropower generation (Box 6.2). The programme will provide new

Box 6.1 **Social context**

Turkey has a *population* of 73.1 million (2006 present population). Although annual population growth slowed from 1.8% in 1998 to about 1.5% in 2006, this is the fourth fastest growth rate among OECD countries. *Population density* is 93.8 inhabitants per km^2, with higher densities in northern and western Turkey and lower densities in central and eastern Anatolia (Figure 6.1). An estimated 67% of Turkey's *population lives in urban centres*, a proportion that has been growing by 2.8% annually mostly due to rural-urban migration. The largest city, Istanbul, has 8.6 million inhabitants, followed by Ankara (3.1 million) and Izmir (2.1 million). There are 12 cities with a population exceeding 500 000, and 48 cities with more than 100 000 inhabitants.

The labour market is characterised by low levels of labour force participation. The employment rate (the percentage of working age people who have jobs) decreased from 55% in 1998 to 51% in 2006, the lowest among OECD countries. Since 2000 there has been a nearly 30% drop in agricultural employment, with some increases in the service and industry sectors. In the context of continuing economic reform, the *unemployment* rate increased from 6.9% in 1998 to about 10% between 2002 and 2006. The Turkish economy uses less than half of the country's workforce. There are very sharp differences in labour market participation rates between men and women. The *informal sector* represents 31% of GDP. Partly because of regulations, taxes and administrative barriers, a large number of firms and individuals are in the informal sector.

In 2006 *life expectancy* was 69.1 years for men, 74.0 for women and 71.6 years for the population as a whole. *Health* expenditure accounted for 7.7% of GDP in 2005, representing 13% of total government expenditure. Basic health indicators (infant and child mortality, maternal mortality, life expectancy, immunisation rates) point to challenges in health care and, in particular, to nutrition, housing, smoking, water supply and pollution. For example, infant mortality, at 22.6 deaths per 1 000 live births in 2006, remained significantly higher than in other OECD countries except Mexico, despite major progress (there were 36.6 deaths per 1 000 live births in 1998).

The literacy rate is 95.3% for men and 79.6% for women, for an overall average of 87.4%. There are disparities among regions, with literacy high in the western and north-western parts of the country (98%) and low in the eastern parts (40% for women). *Education expenditure* was estimated at 4.1% of GDP in 2004, the second lowest in the OECD area. In 2005, 27% of the population had at least upper secondary education.

Turkey has a *high inequality* index (Gini coefficient of 0.34 for income). There is a sharp east-west divide, with the South-eastern and Eastern Anatolia regions much poorer than the western part of the country. Both consumption and income indexes indicate that inequality is higher in urban areas than rural ones (World Bank, 2005). *Poverty* essentially affects rural households, and welfare disparities between rural and

Box 6.1 **Social context** *(cont.)*

urban areas are growing. Nevertheless, one-quarter of the urban population lives in squatter housing. Overall, the relative poverty rate had declined to the 21-25% range by 2005. Extreme poverty has remained low, at about 1.2%.

Turkey has traditional social ties with turcophone countries, which represent a population of 60 million in central Asian and Caucasian countries. In the second half of the 20th century many Turkish citizens *emigrated* to Western Europe (particularly Germany), contributing to the creation of a significant diaspora. More recently, Turkey has become the destination of numerous *immigrants*, generally from the former Soviet republics or from other neighbouring states, either to settle and work in Turkey or to continue their journey towards the European Union.

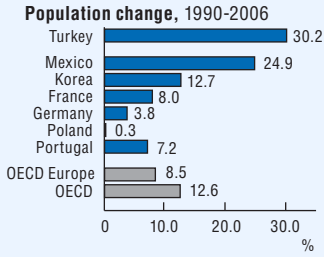
opportunities for development and job creation in the region. There are concerns about rising soil salinity, as well as pesticide and nutrient pollution associated with irrigation systems and representing a need for investment. Other *regional programmes* include the Zonguldak-Bartin-Karabük Regional Development Project (ZBK), the Eastern Black Sea Regional Development Plan (DOKAP), the Eastern Anatolia Project Master Plan (DAP) and the Yeşilirmak Basin Development Project (YHGP). All of them focus on encouraging entrepreneurship, tourism and trade, and on bringing domestic and foreign public and private investment into the regions (DSI, 2007). Associated environmental issues (e.g. adequate monitoring and management of natural resources, appropriate land use planning and urbanisation, and management of pollution from industry) need to be addressed.

The recent National Rural Development Strategy and the Agricultural Strategy Paper (for 2006-10) are further instruments to *stimulate the development and productivity of rural areas*. Actions envisaged (e.g. training on best agricultural and forestry techniques, development of agro-industries, commercialisation of products, consolidation of farms) are expected to reduce the environmental impacts of poverty. Providing rural areas with environmental services will not only bring the direct benefits of water supply and sanitation, but also the indirect benefits associated with improved health and education.

With the continuous *migration to urban areas* (about 1.4 million people per year), the number of low-income families is rising in big cities. The adverse effects of migration are felt heavily in Ankara, Bursa, Istanbul, Izmir, Adyaman, Antalya, Diyarbakir, Batman and Içel, which already face urban infrastructure (housing, water and sanitation, public

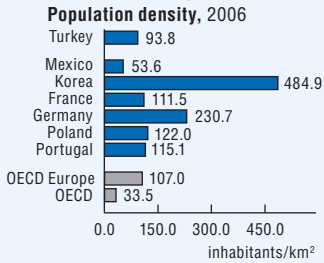
Figure 6.1 **Social indicators**

Population and ageing



Population change		1998	2005
natural increase	‰	16.1	12.7
net migration	‰	1.5	0.0
		2000	2004
Foreign-born population	%	1.9	. .
Ageing		1998	2006
over 64/under 15	ratios	0.17	0.21

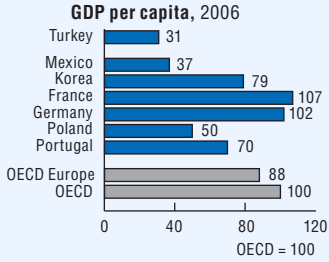
Settlement and mobility



Population by type of region		2003	
	% population	% area	density
urban	16.6	1.2	1 202
intermediate	48.3	17.7	239
rural	35.2	81.1	38

Mobility		1998	2006
car ownership	veh./100 inh.	6	8
rail traffic	billion pass.-km	6.2	5.3

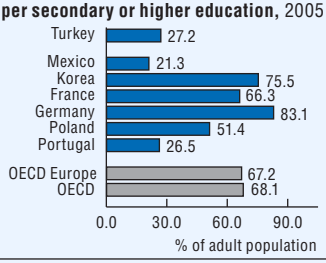
Income and employment



Labour force participation (% pop. 15-64)		1998	2006
total rate	%	55.3	51.1
female rate	%	30.7	26.7

Unemployment rates		1998	2006
total rate	%	6.9	9.9
female rate	%	6.8	10.3

Health and education



Education attainment			2005
upper secondary		%	27.2
Life expectancy			1998 2006
at birth:	total	years	69.0 71.6
	female	years	71.3 74.0
at age 65:	male	years	12.7 13.1
	female	years	14.4 15.1

Source: OECD, Environment Directorate.

transport), education and health challenges. While some aspects of the urban environment have improved, especially in large cities such as Istanbul, in most cities providing environmental infrastructure and services (water supply, waste water collection and treatment, solid waste collection and treatment) presents the double challenge of i) dealing with the investment backlog and ii) addressing the large influx of migrants.

Box 6.2 **South-eastern Anatolia Project (GAP)**

The South-eastern Anatolia Project extends over wide areas of the basins of the lower *Dicle (Tigris) and Firat (Euphrates)* Rivers (areas also known as "upper Mesopotamia" and as part of the "*fertile crescent*" *or* "*cradle of civilisations*"). The region covers over 75 000 km^2 (nearly 10% of the country). It includes the Turkish administrative provinces of Adiyaman, Batman, Diyarbakir, Gaziantep, Kilis, Mardin, Siirt, Sanliurfa and Sirnak. The region is home to 7.1 million people and is bordered by Syria to the south and Iraq to the south-east.

Compared to other geographical regions of the country, South-eastern Anatolia receives little precipitation; hence plans have been made to harness the waters of the *Dicle (Tigris) and Firat (Euphrates)* for irrigation and hydraulic energy production. Although the original idea for the rational utilisation of these water resources was formulated in the 1930s, the South-eastern Anatolia Project (GAP) was formally launched in 1989. Its main objective was to expand *irrigation of agricultural land and energy production* through the construction of 22 dams and 19 hydropower plants on the *Dicle (Tigris) and Firat (Euphrates)* and their tributaries. It was planned that, once the project was fully developed, over 1.8 million ha of land would be irrigated and 27 billion kWh of electricity generated annually. The area to be irrigated accounts for 20% of the economically irrigable area in Turkey, and the annual electricity generation for 22% of the country's economically viable hydropower potential. The project had been expected to provide 3.8 million people with employment opportunities.

Later, the project was transformed into an *integrated regional development project* with the aim of promoting sustainable development principles and with coverage extended to rural and urban infrastructure development, including housing, water and sanitation, transport, communication, agricultural and industrial development, tourism, education and health. These dimensions have been included in the *GAP Social Action Plan*. An EIA report was prepared in 2005 and is available on internet.

Major parts of hydropower generation plans are completed. At the end of 2007, eight hydraulic power plants were in operation with an installed capacity of 5 500 MW (out of 7 450 MW planned). Progress with irrigation infrastructure has been slower, with nine dams built (out of 22 planned) and 273 000 ha irrigated (out of 1.8 million ha planned).

Box 6.2 **South-eastern Anatolia Project (GAP)** *(cont.)*

A series of *development and social projects* have been developed and implemented within the framework of the GAP Social Action Plan. These have included promoting social sustainability and improving social services, encouraging local entrepreneurship and industrial development, promoting sustainable human settlements and ensuring sustainable use of natural resources. Examples include the operations of multi-purpose social centres (ÇATOM) to raise the status of women and integrate them into the development process in Adiyaman, Diyarbakir, Gaziantep, Mardin and Şanliurfa, and the establishment of several centres for supporting and directing entrepreneurs that provide counselling services for both domestic and foreign investors investing in the region. As of the end of 2007 there were 1 834 enterprises employing more than ten workers.

There are *concerns about the environmental consequences* of several components of the GAP project (e.g. water retention and withdrawal, expanded irrigation practices, human resettlement). These have been studied, including with support from international organisations. For instance, plans for constructing the Ilsu dam (which would be the second largest in Turkey by volume of water) have been debated as, on one hand the project, planned for more than two decades, will provide much needed hydroelectric energy and jobs in a poor region, but on the other will displace more than 50 000 people and damage the area's environment and cultural heritage (e.g. the ancient town of Hasankeyf, considered an archaeological treasure and home to 4 000 people, would be flooded). To mitigate the consequences, some actions have been taken, including preparing environmental management plans and biodiversity inventories, constructing advanced waste water treatment plants and identifying alternative landfill locations.

2.2 Employment and the environment

The ongoing structural and economic reforms are modernising the labour market. However, employment in agriculture has decreased with no corresponding employment increase in industry and services. *Unemployment* climbed from around 6% in 1998-2000 to over 10% in the period 2002-07.

There are no data on *environmentally related employment*, nor are there studies on the positive, negative and net employment impacts of environmental policies. No active employment policy associated with environmental policies has been established, especially for industry and services. The *environmental goods and services* industry is not considered by Turkey's 2003 SME strategy and action plan[4] or by the Small and Medium Industry Development Organisation (KOSGEB), which

runs many support schemes related to technological development/innovation, export promotion, entrepreneurship development, information technology and quality improvement.

The environmental dimension is also missing in current programmes promoting *innovation,* including the National Science and Research Strategy for the period 2005-10.[5] The University-Industry Joint Research Centres Programme (USAMP), managed by the Turkish Scientific and Technological Research Council (TUBITAK), and the SAN-TEZ (a new university-industry co-operation project promoting the transfer of technology) could include environmental concerns to a greater extent. MoEF participates in the work of the Supreme Council for Science and Technology, as the 9thNDP included environmental protection under its competitiveness cluster of objectives.

2.3 Local Agenda 21

After the programme to promote *Local Agenda 21* (LA 21) was launched in the mid-1990s, a second wave of activities started in 2000.[6] There was an emphasis on the legal and institutional sustainability of LA 21 initiatives, for example through the establishment of city councils or similar platforms such as Local Agenda 21 "Citizen Houses" that provide communities with venues for the exchange of views and co-operation. Attention has been given to ensuring the effective participation of women, youth and senior citizens.

After preparing their local action plans, many cities started implementing their priority projects. Activities are co-ordinated by *Local Agenda 21 Secretariats* established jointly by partner cities. By the end of 2007, the number of partner local authorities in Turkey's LA 21 programme reached 65: 10 metropolitan municipalities, 1 provincial administration, 20 provincial centre municipalities and 34 district municipalities. Some difficulties occurred in establishing partnerships with the private sector as a result of limited capacity to develop dialogue with the private sector, in particular in rural areas.

3. Environmental Democracy

3.1 Access to environmental information

Turkey established its environmental statistics in the early 1990s. *Reports on the state of the environment* in the provinces have been published annually since 1993 and have been available in electronic form since 2004. The national state of the environment report (first produced in 1996) was updated and published by MoEF

in 2004 and 2007, and is also available in electronic form. In addition to data on land and forests, biodiversity, air pollution, water supply, waste water and waste, TurkStat's Environmental Statistics Compendium contains a set of 40 sustainable development indicators (TurkStat, 2006). Turkey is working actively with Eurostat and OECD in further developing its environmental data and indicators, for instance through improved monitoring of air and water quality and through extended economic data and economic analysis concerning the environment.

The *public's right to obtain information from authorities* has been ensured by the Constitution and was strengthened by the 2003 Law on the Right of Access to Information.[7] Concerning environmental information, the 2006 comprehensive amendments to the 1983 Law on Environment partially transposed the provisions of EU Directive 2003/4/EC on public access to environmental information. The new regulations provide definitions of public authority and environmental information (as defined by the Law on Environment) and clarify limitations on the right of access (e.g. data related to state security, judicial investigation and prosecution, privacy or intellectual property). Information provided is free of charge up to the first ten pages. The regulations require public authorities to reorganise their websites and electronic mail systems to better respond to public inquiries. Several agencies have already responded to this requirement, and special information units have been formed in government agencies.[8] In 2005 around 625 000 direct applications for environmental information were submitted to MoEF and over 85% were answered positively.

Turkey has not yet become a party to the *Aarhus Convention* on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, and no timetable has been set for its signature and ratification. Article 3/9 of the Convention is one of the main obstacles to signature.

3.2 Public participation

Important steps have been taken in opening policy-making to public participation. The *comprehensive 2006 amendment to the 1983 Law on Environment* stipulates that public participation is a fundamental principle of environmental policies. The legislation requires MoEF and local authorities to provide a participatory environment to chambers of professions, trade unions, NGOs and citizens.

Participation by the public has been strengthened, especially in the context of *EIA,* with the provisions for EIA public participation meetings. At such meetings the public is informed about the planned project and opinions; questions and concerns are recorded for consideration in project development and implementation. The results of

the meetings are presented on the web pages of MoEF and in national and local newspapers. Several mechanisms for public participation were created by the 2005 *Law on Municipalities.* The creation of city councils allows direct participation in decision-making processes at local level. "Children's Councils", the "National Youth Parliament", and "LA 21 Women's Councils" also provide platforms for public participation in policy-making processes.

The comprehensive 2006 amendment to the 1983 Law on Environment also envisaged the creation of the *Supreme Environmental Council*, which would assist in: defining environmental objectives and strategies; enabling the inclusion of environmental concerns in economic decisions; and building consensus among different parties in case of conflicts related to environmental measures. The Council, not established yet, will comprise members of public authorities under the chairmanship of the Prime Minister. It will meet at least once a year with representatives of industry, NGOs, local authorities, and representatives of universities and scientific institutions.

3.3 Role of non-governmental organisations (NGOs)

Between *110 and 160 environmental NGOs are active in Turkey* (REC, 2002a).[9] Most environmental NGOs are operating in larger cities, with some of them carrying out activities in rural areas of Eastern Turkey.[10] Their operations focus on environmental awareness raising (publications, brochures, newsletters, TV and radio), education, training and environmental research. Activities cover a wide range of environmental issues, such as sustainable living in rural and forest areas, health problems stemming from environmental hazards, nature and biodiversity conservation, and protection of the seas and inland waters. Close relations are also maintained between NGOs and religious leaders and the military in regard to raising environmental awareness.

To improve environmental awareness, especially in rural areas, Turkish authorities have signed several *agreements with different* "*actors of civil society*" to promote educational and information actions and enhance local capacity to apply sustainable development principles on a daily basis. Some of these agreements, for instance with the Turkish Foundation for Combating Soil Erosion, for Reforestation and Protection of Natural Habitats (TEMA), have had an important public impact (Box 6.3).

Membership fees and donations provide a significant share of *NGOs' financial base,* in addition to revenues collected from commercial activities such as publications, lotteries and exhibitions. In recent years a number of NGOs have been

Box 6.3 TEMA: Turkish Foundation for Combating Soil Erosion, for Reforestation and Protection of Natural Habitats

TEMA is an NGO founded in 1992 to promote *sustainable rural development*, with an emphasis on combating erosion, forest and biodiversity management, and the creation of alternative income for rural communities. TEMA has 50 000 members and 288 volunteer representatives throughout the country. Institutions and companies have joined, as special members, with donations ranging from USD 2 000 to 88 000. The organisation's annual budget is over USD 2 million.

TEMA's *education programme* has focused on teacher training, curriculum building, student field trips and adult education. Teacher training on environmental policies has been carried out in co-operation with the Ministry of Education and the Directorate of Religious Affairs. Seminars, panels and conferences have been conducted in co-operation with the Ministry of Justice, Ministry of Interior, General Directorate of Security and universities. Over the years, more than 2 million people have attended TEMA's various environmental education and awareness raising programmes. Each year, during the summer, nature and erosion training camps are organised for teachers, voluntary educators and university students as well as imams.

With the support of MoEF, TEMA has planted more than *2 million saplings* on 2 350 ha, engaging citizens, educational institutions, the private sector and Turkish armed forces.

Currently, TEMA works on 35 *rural development projects* covering 100 000 ha throughout Turkey. For instance, the Macahel Rural Development Project for the Conservation of Natural Heritage promotes the production and marketing of honey by Caucasian bees, which thrive naturally in the area. The project also promotes eco-tourism and organic agriculture.

TEMA is also *active internationally*. It collaborates with several organisations and institutions working for environmental protection and sustainable development: ECOSOC (Economic and Social Council of the United Nations), IUCN, MIO-ECSDE (Mediterranean Information Office for Environment, Culture and Sustainable Development), EEB (European Environmental Bureau), MED-Forum (Forum of Mediterranean NGOs for Ecology and Sustainable Development), IECA (International Erosion Control Association). TEMA is an accredited NGO of the United Nations Convention to Combat Desertification and an NGO partner of the UNEP Mediterranean Action Plan. It aims to become a global organisation; TEMA-D (Germany) was established in 1998 and TEMA-NL (the Netherlands) in 2002.

created as foundations, associations and citizens' initiatives. The Council of Ministers can grant associations a status of "beneficial to the public" which allows tax exemptions and financial assistance from the State.

Turkish NGOs face considerable *limitations* on their activities. These include legal obstacles in regard to start-up procedures such as limitations on membership, which depends on the authorities' permission. NGOs' co-operation with international agencies and other countries, as well as with other organisations such as trade unions, political parties and professional chambers, is restricted. Grants to associations and membership fees are strictly controlled and limited by law (REC, 2002b).

Turkish NGOs also face management and development challenges. As activities tend to focus on short-term issues, the NGOs often lack focus, clear missions and goals, as well as financial sustainability. Networking between NGOs is limited and confined to major events. Greater co-operation with NGOs in other countries could help to maintain international standards and strengthen NGOs' operations and fund raising. The establishment of the *Turkish office of the Regional Environmental Centre for Central and Eastern Europe* (REC) in 2004 provided an important impetus to the development of environmental NGOs.[11] REC's main activities focus on strengthening the capacity of environmental NGOs and local authorities in legal, institutional and technical matters and providing financial support through small grants to environmental NGOs and local administrations. REC also facilitates the flow of environmental information through online, electronic and printed media.

3.4 Access to justice

The *Law on Environment* provides that everyone who suffers from, or is aware of, any activity which pollutes or harms the environment may apply to the relevant authorities for measures to stop that activity. If no action is taken, or if it is considered insufficient, an action can be brought in court. Similar procedures are included in the Law on Environmental Impact Assessment, under which anyone not satisfied with the decisions taken during the EIA process can appeal to the courts after exhausting the administrative appeal steps.

In a number of cases, citizens and NGOs have used the *judicial path* to challenge environmentally harmful activities. Several court cases have attracted attention in Turkey and abroad: cyanide leaching from gold mining in Bergama; the health impacts of a methane explosion at a waste disposal site; the proposed Ilisu dam, which threatens to flood the remains of the architectural and other cultural heritage at Hasankeyf; the Bakü-Tiflis-Ceyhan (Bakü-Tbilisi-Ceyhan) oil pipeline, which will transport Central Asian oil to world markets through several ecologically sensitive areas of Turkey. The Bergama case was heard by the European Court of Human Rights, which awarded each plaintiff EUR 3 000 to be paid by Turkey (Arsel, 2005).

4. Environmental Education

Environmental subjects are introduced at all levels of regular education. In *pre-schools and primary schools*, children are involved in activities that familiarise them with the broad concepts of pollution and its negative impacts, and with nature and wildlife values. In *secondary schools* environmental subjects are present in several curricula including natural sciences and geography, with a more technical perspective on pollution and its impacts and with the social dimensions of environmental issues. 2 500 teachers have been trained to educate other teachers on environment. Special activities are planned for World Forest Day, World Environment Day, World Water Day and World Meteorological Day, with students at different levels of formal education but with an impact on the whole population, such as special exhibitions and special awards. In Turkey there are about 250 000 *scout groups* developing activities on environmental protection, waste collection and forest watching; some 15 000 scout leaders receive specific training every year.

In *high schools and universities* several new environmental disciplines have been introduced in traditional curricula. Twenty-seven different universities have environmental engineering departments; most of them have established multi-disciplinary environmental research and development centres. The leading institutions are located in traditional academic centres, such as those in Ankara and the Marmara region. Some centres have been established in the coastal regions and focus on marine resources management and coastal zone management.

Provision of environmental information is also pursued via different *mass media,* even though they still demonstrate limited interest in environmental issues and coverage is often limited to major accidents. There are ongoing campaigns, with posters and brochures, to inform and advise the public on better practices relating to the use of forests and nature. Educational and promotional audiovisual clips about forests and forest fires have been broadcast on TV. Documentaries about recycling, endemic species and environmental initiatives have been disseminated over national and regional channels. A special newspaper (“Kozalak”), with a circulation of 60 000, covers some 20 000 forest villages and raises awareness among villagers about the protection of forests. MoEF has its own journal (“Environment and People”), which contains both scientific and practical information and is published every three months, with a circulation of 10 000. The Turkish Zero Extinction Fund project, supported by UNDP, Bird Life International Turkey (Doga Dernegi) and MoEF, covers 300 key biodiversity areas. It focuses on the conservation of threatened orchid species, the Anatolian leopard, the Sultan Sazligi wetlands, the country’s last remaining demoiselle cranes and the globally threatened great bustard. CNN Turkey promotes the fund through a series of television broadcasts.

Notes

1. The study included cities with heavy traffic, industry and coal powered plants (Kütahya, Erzurum, Istanbul and Izmir) and those where natural gas was used for heating (Ankara, Eskisehir, Bursa and Kocaeli).
2. The analysis consisted in measuring emissions data during trial operations, modelling deposition, determining accumulation in environmental media using transfer factors, characterisation of receptors, exposure evaluation and risk characterisation.
3. 2.8 million rural inhabitants are not covered by the social security system. Around 1 million have "green cards" that provide the poor with access to free-of-charge health services.
4. In line with the European Charter for Small Enterprises and with the National Development Plan, the medium-term and the annual programmes.
5. Although public resources allocated to science and technology have significantly increased since the end of the 1990s, the share of R&D expenditure in GDP is still lower than 1%.
6. A project entitled "Promotion and Development of Local Agenda 21 in Turkey" was launched in 1997, co-ordinated by IULA-EMME (International Union of Local Authorities, Section for the Eastern Mediterranean and Middle East Region) under the auspices of UNDP-Turkey and the Capacity 21 initiative. The first phase was completed at the end of 1999. During the first phase there were a total of 23 cities involved.
7. Article 74 of Turkey's Constitution states that "Citizens and foreigners resident, considering the principle of reciprocity, have the right to apply in writing to the competent authorities and to the Turkish Grand National Assembly with regard to the requests and complaints concerning themselves or the public. The result of the application shall be made known to the petitioner in writing without delay". Law No. 4778 on Right of Access to Information was introduced in 2003 and amended by Law No. 5432 in 2005. The Implementing Regulation on the Rules and Principles Regarding the Law on Right to Information was introduced in 2004.
8. According to the regulations, requests for information shall be answered within 15 working days. This period can be prolonged up to 30 working days if several departments are involved in providing the information. In case of rejection of the request, an appeal can be filed to the Evaluation Board on Access to Information (with representatives of public administration and judiciary) within the 15 days following the notification replying to the request. The Board shall give its decision in 30 working days. The person requesting information has the right to take legal action if information is not provided.
9. Environmental NGOs constitute 2% of all associations in Turkey. Higher shares correspond to associations focusing on social solidarity (28%), mosque construction (19.8%), sport (13.8%) and school construction (12.8%) (Adem, 2005).
10. There are a few large nation-wide NGOs (with more than 20 permanent staff, extensive membership base, multiple funding) and several smaller ones at provincial level in major cities. There are not many grassroots NGOs. Very few international NGOs are represented with permanent offices and staff. These NGOs tend to focus on issues such as marine protection of the seas surrounding Turkey.
11. The REC Country Office in Turkey opened on 27 May 2004 in Ankara. It is legally based on the REC Charter and on a bilateral agreement between the Republic of Turkey and REC. Its establishment was ratified by the Grand National Assembly of Turkey in 2004 and was financed through a EUR 2.3 million grant from the European Commission, which supported most of its activities for the first two years.

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7 INTERNATIONAL CO-OPERATION*

Features

- Stratospheric ozone depletion
- Climate change
- Trade and environment
- Progress with maritime safety in the Turkish Straits
- Protecting the Black Sea
- Management of marine fisheries
- Transboundary rivers

* The present chapter reviews progress in the last ten years, and particularly since the 1999 OECD Environmental Performance Review. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Turkey:

- continue to strengthen national actions in support of *multilateral and regional environmental accords* and programmes in which Turkey participates, and to utilise fully the technical and financial support available from the international community through these mechanisms;
- maintain progress in contributing to international efforts to address climate change by preparing a comprehensive *National Climate Change Plan*, with clear goals, priorities and milestones, which also sets out responsibilities for all sectors of Turkish society; and consider setting nationally-determined voluntary targets (e.g. for energy use, renewable energy, afforestation and greenhouse gas emissions). This would maintain momentum in pursuing the national strategy and to provide an important signal to other countries of Turkey's commitment and intent;
- continue efforts leading to accession to the *Kyoto Protocol*;
- strengthen national policies, guidance and requirements governing the *environmental performance of industry*, both in Turkey and elsewhere. This would entail a "greening" of foreign direct investment and export credit decisions, as well as rigorous application to Turkish industry of the environmental aspects of the OECD Guidelines for Multinational Enterprises;
- maintain an open, active dialogue with neighbouring countries on issues related to *transboundary rivers*, with a view to ensuring sound management of water quality and quantity and increasing co-operation among riparian countries;
- accelerate efforts to protect Turkey's *coastal waters* from land-based pollution, given the substantial risk to economic growth, tourism and public health if water quality degradation is allowed to persist;
- introduce a dedicated environmental component into Turkey's expanding *development assistance* programme, including the possible establishment of an Environmental Focal Point in the International Co-operation and Development Agency to oversee and co-ordinate environmental assistance efforts, as well as help ensure the environmental soundness of the overall ODA programme.

Conclusions

Turkey significantly expanded its engagement within the international community in the field of environment over the review period. It is currently a party to most *key regional and global environmental accords* and programmes, and has

made effective use of a variety of international mechanisms to acquire technical and financial assistance in support of its national environmental priorities. Its *co-operation with the EU* on pre-accession convergence efforts has helped keep Turkey's international environmental commitments and responsibilities before national policy makers**.** It met its commitments under the Montreal Protocol to phase out *ozone-depleting substances* four years ahead of the target date, which was especially noteworthy given its policy of rejecting international pollution reduction targets based on its "special circumstances" (i.e. Turkey's low per capita income level requires it to emphasise economic growth). It has made impressive improvements in the area of *maritime safety* by establishing a high-tech Vessel Traffic Services system for the Turkish Straits, and developing oil spill contingency plans at the regional and (in some instances) municipal levels, supported by increased manpower, training and equipment. A progression of increasingly stringent regulations for the management of transboundary movement of *hazardous wastes* has brought Turkey into compliance with the Basel Convention and OECD rules. Good progress has been made in pursuing national follow-up to the Conferences of the Parties on the UN Convention on Biological Diversity and the UN Convention to Combat Desertification, and in responding to obligations under the UN Framework Convention on Climate Change, which Turkey ratified in 2004. Turkey has recently initiated a procedure of accession to the Kyoto Protocol.

Despite some advances in regional co-operation to address *marine pollution* in the Black, Mediterranean, Aegean and Marmara seas, water quality is under heavy pressure in Turkey's coastal waters, particularly from the discharge of untreated or lightly treated municipal and industrial waste water. Although *marine fisheries* management has been improved by a series of new regulations (on fishing practices, closed areas and seasons, and controls on equipment), the state of a number of fish stocks is of concern. With respect to *industry*, lack of inspection and enforcement capacity and political commitment is constraining the country's ability to improve environmental conditions in the workplace, and to reduce the potential for environmentally damaging industrial accidents; expanded efforts are needed to promote environmentally sound industrial growth by attaching effective environmental criteria and conditions to foreign direct investment, export credits, and the requirements of Turkish industry operating in other countries. The chemicals area has been cited in recent EU analyses as falling considerably short of EU legislation and requirements for the sound management of potentially toxic chemicals involved in international trade. Recognising efforts already accomplished (e.g. training programmes, brochures) Turkey's response to CITES requirements for controlling *trade in endangered species* has been limited, and needs further strengthening of inspection by customs agents. Turkey has not lived up to its commitments for data

provision and action under the ECE Convention on Long-range Transboundary Air Pollution.

♦ ♦ ♦

1. Policy Objectives, Institutions and Mechanisms

1.1 Policy objectives

Turkey's recent National Development Plans (NDPs) call broadly for international co-operation on environmental issues. *Specific objectives* are set out in major reports prepared for international environmental conferences, in an array of national action plans in support of multilateral and regional conventions, and in implementing environmental legislation. Collectively, they indicate a consistent interest in achieving the following:

- *strengthening regional co-operation and institutions* to address priority national environmental challenges and shared problems (e.g. maritime safety, marine pollution);
- utilising fully and efficiently the *technical and financial resources* available from international organisations and programmes (e.g. GEF, UNDP, EU, Multilateral Fund for the Implementation of the Montreal Protocol);
- fulfilling commitments assumed under *international conventions* and agreements (e.g. on depletion of the ozone layer, trade in endangered species, hazardous wastes, biodiversity[1]);
- supporting the international community in addressing *environmental* "*commons*" *issues* (e.g. climate change, ozone depletion, fisheries management), consistent with the principle of "common but differentiated responsibilities";
- upgrading environmental performance, laws and institutions within the *framework of EU convergence efforts*;
- managing effectively the *water resources* of transboundary rivers;
- protecting the quality of coastal waters and *regional seas*.

Other objectives were set out in the *Recommendations of the 1999 OECD Environmental Performance Review* of Turkey:

- take steps to ratify the international agreements signed by most European OECD members which meet the needs of a rapidly industrialising country in the European context;

– pay special attention to recent developments in international environmental law, as a basis for solving transfrontier issues in a bilateral or regional context;
– improve availability and access to environmental information, facilitate public participation with a view to implementing relevant OECD Recommendations, and prepare for possible accession to the Aarhus Convention;
– promote greater energy conservation and efficiency, with a view to supporting world efforts to reduce emissions of greenhouse gases;
– develop an integrated strategy to prevent maritime and industrial accidents and to cope with their consequences, with a view to becoming a party to relevant international agreements and practices in this regard.

The objectives proposed by the OECD in 1999 *have largely been achieved*. Important progress is evident in: the ratification of international agreements; the evolution of Turkey's environmental law; improvement in public access to information (notwithstanding that Turkey has not yet signed the Aarhus Convention); promotion of energy conservation; and improvement of maritime safety.

1.2 Institutional responsibilities

The *broad policy context* for the conduct of international environmental affairs is set out in the National Development Plans prepared by the *State Planning Organisation*. The *Ministry of Foreign Affairs* provides oversight, and negotiating leadership, to ensure consistency with Turkey's foreign policy objectives and commitments. Operational responsibility at the State level is vested in an array of ministries and institutes, predominantly the *Ministry of Environment and Forestry (MoEF),* which has, inter alia, interagency co-ordinating responsibilities for Turkey's participation in major bilateral, regional and multilateral environmental forums.[2]

1.3 Mechanisms of co-operation

Bilateral relations

Turkey is a party to a *number of formal bilateral environmental agreements*. Most concern Eastern European, Caucasian and Central Asian countries (including turkophone countries) and several EU countries (Table 7.1).[3] The majority of the agreements provide for information exchange, training and meetings of experts, rather than for the conduct of broad-based programmes with periodic ministerial-level overview sessions. In contrast to most OECD members, bilateral agreements appear to have a lower priority in Turkey's engagement in international environmental

affairs. Bilateral consultations of an *ad hoc* nature on the *management of transboundary rivers* have been held on occasion with neighbouring countries, with the frequency increasing in the last two years (Table 7.2).

Turkey's relationship with the *European Union* is a special case. Since 2004, the process of bringing environmental laws and regulations into conformance with EU standards has been very active. It has been accompanied by very significant financing, which has substantially strengthened Turkey's environmental capacity, including its engagement at the regional and multilateral levels (Box 5.5).

Table 7.1 **Selected bilateral environmental agreements**

	Date of signature	Turkish party	Counterpart party
USA	1991	Ministry of Environment	Environmental Protection Agency
Germany	1992	Ministry of Environment	
Hungary	1993	Undersecretary of the Ministry of Environment	Permanent State Secretary for Environment and Regional Policy
Tajikistan	1995	Ministry of State	Ministry of Environment
Kyrgyzstan	1995	Government of the Republic of Turkey	Government of the Republic of Kyrgyzstan
Uzbekistan	1996	Ministry of Environment	Ministry of Foreign Affairs
Turkmenistan	1996	Ministry of Environment	Ministry of Nature Use and Environmental Protection
Kazakhstan	1997	Ministry of State	Ministry of Foreign Affairs
France	1997	Ministry of Environment	Ministry of Environment
Slovakia	1997	Government of the Republic of Turkey	Government of the Slovak Republic
Georgia	1997	Government of the Republic of Turkey	Government of Georgia
Greece[a]	2000	Ministry of Foreign Affairs	Ministry of Foreign Affairs
Romania	2001	Government of the Republic of Turkey	Government of Romania
Netherlands	2001	Ministry of Environment	Ministry of Housing, Spatial Planning and Environment
Ukraine	2003	Government of the Republic of Turkey	Cabinet of Ministers of Ukraine
Bulgaria	2004	Government of the Republic of Turkey	Ministry of Environment and Water of Bulgaria
Azerbaijan	2004	Government of the Republic of Turkey	Government of Republic of Azerbaijan
Germany	2006	Ministry of Environment and Forestry	Federal Ministry of Environment, Nature Protection and Nuclear Safety

a) Protocol on the joint Economic Commission, including an environmental section.
Source: MoEF, 2007.

Table 7.2 **Turkey and its neighbours**

	Population[a] (million)	GNI[a] (USD billion)	GNI[a]/capita (USD)	GNI[b]/capita (USD)	GNP growth rate[c] (%)	Freshwater internal renewable resources[d] (m^3/cap.)	Length of border with Turkey (km)	Length of river boundary (km)	Major transboundary rivers
Turkey	73	660.8	9 060	5 400	*6.1*	3 110			Meriç
Greece	11	272.9	24 560	21 690	*4.3*	5 396	212	188	Meriç
Bulgaria	8	78.1	10 140	3 990	*6.1*	2 705	269	50	Meriç/Tunca
Georgia	4	16.4	3 690	1 560	*9.4*	11 566	{610	{243	Çoruh (Chorokhi)
Armenia	3	17.7	5 890	1 930	*13.4*	2 981			Arpaçay/Aras
Azerbaijan	8	50.6	5 960	1 850	*34.5*	965	9	9	Aras
Iran	69	587.1	8 490	3 000	*5.8*	1 818	454	20	–
Iraq	..	..	..	..	..	1 326	331	38	Dicle (Tigris)
Syria	19	76.6	3 930	1 570	*5.0*	375	877	76	Firat (Euphrates), Asi

a) 2006: GDP is PPP adjusted.
b) 2006; Atlas method (smoothes exchange rate fluctuations by using a three-year moving average, price-adjusted conversion factor).
c) 2005 to 2006.
d) These data exclude water received from other countries.
Source: World Bank; FAO Aquastat; O. Bilen. From 1999 OECD review.

Box 7.1 **Turkey and the Mediterranean Sea**

The *UNEP Regional Seas Programme* was launched in 1974, building on international co-operation concerning the Mediterranean Sea. The programme responds to the accelerating deterioration of the world's oceans and coastal areas, with a vision of engaging neighbouring countries in collaborative action to protect and rehabilitate the marine environment. Presently, 140 countries participate in 13 Regional Seas programmes under UNEP auspices, including programmes for the Mediterranean and the Black Sea. The programmes function through Action Plans, adopted by the member governments, underpinned by strong legal frameworks in the form of regional conventions and associated protocols. The work is overseen and co-ordinated by Regional Activity Centres or Regional Co-ordinating Units, in some cases served by the UNEP Secretariat and in others by independent commissions.

For the *Mediterranean*, the Convention for Protection of the Marine Environment and Coastal Region of the Mediterranean (the Barcelona Convention, 1976, replaced in 2004) includes 24 countries and the EU as parties. Turkey ratified the original Convention in 1981. A Mediterranean Action Plan (MAP Phase II) was adopted by the parties in 1995. Six protocols exist: Pollution from Dumping by Ships and Aircraft; Pollution from Land-based Sources and Activities; Specially Protected Areas and Biological Diversity; Preventing Ship-source Pollution and Emergency Response; Pollution from Offshore Exploration and Exploitation; and Pollution by Transboundary Movement of Hazardous Wastes and their Disposal. The Secretariat, in the form of a Co-ordinating Unit for the Mediterranean Action Plan, is located in Athens. Regional Activity Centres have been established on: development of a "Blue Plan" for socio-economic development of the Basin; Priority Action Programmes; Specially Protected Areas; Emergency Response Centers for Marine Pollution; Environmental Remote Sensing; and Cleaner Production.

The Mediterranean is the *largest inland sea in the world*, with a surface area of 2.5 million km^2. Turkey's Mediterranean shoreline extends 1 577 km, with its coastline on the Aegean Sea (one of five distinct basins of the Mediterranean) adding another 2 805 km. While the Mediterranean is not a major fish production region for Turkey, it is locally significant as a source of food and employment. The coastal and near-shore areas along Turkey's portion of the Mediterranean (e.g. Bay of Iskenderun and Goksu delta) are *important wildlife and waterfowl nesting and breeding sites*, while the waters are home to the Mediterranean monk seal, one of the 12 most endangered mammals in the world. The Aegean is considered an especially rich and vulnerable natural resource and wildlife habitat region.

Water quality and biodiversity along Turkey's Mediterranean and Aegean coastlines *are under heavy pressure from extensive industrial and domestic waste water inflow,* and from intensifying development of uniquely beautiful and fragile areas for tourism and secondary homes. The Aegean Sea is receiving waste water discharges and other pollution from over 60 major points along the coast (including 7 rivers, 50 tourism and vacation home developments and industrial zones, plus

Box 7.1 **Turkey and the Mediterranean Sea** *(cont.)*

inflows from the Black Sea and Sea of Marmara). Heavy localised concentrations of suspended solids, hydrocarbons, mercury and cadmium limit the use of the water for bathing and other recreational purposes, and impact adversely on fish and shellfish populations. In the Aegean, the Bay of Izmir is under increasing threat from organic pollution from municipal sewage and ship wastes from port activities, while Candarli Bay is polluted by wastes from tanker traffic, refineries and tanker-filling installations, as well as organic loads from river inflows.

Pollution control plans and priorities are set out in a *Mediterranean Action Plan* under the Barcelona Convention. The initial work included identification and monitoring of the amount, quality and trends of land-based pollution at river mouths and in other designated sites, and of biotic trace metals in the Aegean and Mediterranean Seas. During the fourth phase of the programme (2006-13), the focus is on data collection and modelling in semi-enclosed gulfs (e.g. Izmir, Mersin and Ayvalik) suffering from eutrophication; and in the Yumurtalk region where oil loading and transport and new industrial development are having negative impacts on water quality and coastal habitats. Overall, 257 stations in the Aegean and Mediterranean are involved in data collection and monitoring. A major priority is to protect the fish farming industry which has grown up along the Aegean coastline.

Regional mechanisms

In contrast to the situation with bilaterals, Turkey *assigns high priority to co-operation at the regional level*, in particular to advance national objectives with respect to the protection of the marine environment. Long-standing and broad-based work programmes involving Turkey and all other riparians to the Mediterranean and Black Seas have been carried out, involving multifaceted Action Plans and regional centres operating within the framework of conventions (Box 7.1). Other regional centres provide emergency responses to marine pollution accidents and undertake maritime search and rescue.

Turkey is also a party to a wide range of *regional conventions* and associated protocols and agreements (Annex II.B), notably the 1976 Barcelona Convention on the Mediterranean and five of its protocols; 1992 Bucharest Convention on the Protection of the Black Sea; 1994 Lisbon Energy Charter and its protocol on energy efficiency and the environment; and 2000 Florence European Landscape Convention.

In 2003, Turkey became a member of the *European Environment Agency (EEA),* which has generated advances in environmental information management. This relationship has assisted Turkey to expand its reporting capacity and access to data in support of its national reporting obligations under international conventions. The *Regional Environment Center for Central and Eastern Europe (REC)* established an office in Ankara in 2004, co-funded by the European Commission and the Government of Turkey. The Center's priorities include assisting Turkey's EU convergence process in the field of environment and conducting public information activities.

Turkey has given high priority to the environmental work programme of the *OECD* and somewhat less to that of the *UN Economic Commission for Europe* (UNECE), as it has not yet ratified the Aarhus Convention on public access to information or the various protocols to the Convention on Long-range Transboundary Air Pollution. Within the framework of the *Council of Europe*, Turkey has been participating in projects on biodiversity and nature conservation linked to implementation of the 1982 Bern Convention on the Conservation of European Wildlife and Natural Habitats. In the early 2000s, it also participated in *two pilot studies under the NATO-CCMS programme* (on integrated water management, and on the environmental security of hazardous substances involved in oil and gas transport in the Black Sea and Caspian Region).

Other multilateral mechanisms

Over the last decade, Turkey has significantly expanded its involvement in, and support for, *key multilateral environmental treaties and programmes*. It is currently a party to over 30 Multilateral Environmental Agreements (Annex II.A), ratifying in recent years major conventions on climate, desertification, nuclear safety, biodiversity, and oil spill preparedness and response. On the other hand, *Turkey has not yet embraced* a number of other key international accords that have been *ratified by most European countries*. These include:

- 1979 Bonn Convention on the Conservation of Migratory Species of Wild Animals, and its 1996 African-Eurasian Waterbird Agreement;
- 1982 Law of the Sea Convention, and 1995 Agreement on the conservation of straddling fish stocks and migratory species;
- 1997 Convention on the Law of the Non-Navigable Uses of International Watercourses;
- 1997 Kyoto Protocol on climate change;
- 1998 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade;

– 2001 Stockholm Convention on Persistent Organic Pollutants.[4]

In following up its multilateral treaty commitments with national actions, Turkey has made *effective use of funding and technical support* from various multilateral institutions and programmes (e.g. EU, Global Environment Fund, Multilateral Fund for the Implementation of the Montreal Protocol, UNDP, UNEP, World Bank). In addition to close co-operation with the World Bank, UNDP and UNEP, it has drawn on the resources of FAO for fisheries and forest management, IMO for marine pollution control and UNIDO (through its Centre for Regional Co-operation, located in Turkey) for sustainable development of small and medium-sized industry.[5]

2. Global Issues

2.1 Stratospheric ozone depletion

Meeting obligations

In 2000, Turkey ratified both the 1985 Vienna Convention for the Protection of the Ozone Layer and its 1987 Montreal Protocol as an Article 5 developing country. This committed it to reduce its consumption[6] of the major ozone-depleting substances (ODS), principally chlorofluorocarbons (CFCs) and halons, by 50% by January 2005 and 100% by 2010 from a 1995-97 baseline average for each of these chemicals. The baselines were 3 805.7 tonnes of ozone depletion potential (ODP) in the case of CFCs, and 141.0 tonnes in that of halons. Since Turkey had never manufactured these substances, the *focus of control efforts was on their importation*.

Turkey *successfully met its Protocol obligations four years ahead of schedule*. By 2005, CFC consumption had been reduced to 132.8 tonnes ODP. By the end of 2006, the total phase-out commitment had been achieved (Table 7.3). In the case of halons, 30 ODP tonnes was consumed in 2006 while the Protocol permitted 70.5 tonnes. Methyl bromide, an agricultural chemical also associated with ozone depletion and subject to Protocol controls, was licensed in 1987 for importation into Turkey. In 2000, a Regulation on Phase-Out of Agricultural Use of Ozone Depleting Methyl Bromide was issued, with complete phase-out accomplished by the end of 2006. Turkey obtained critical use exemption of methyl bromide for quarantine in 2007.

This excellent performance was achieved through a *combination of regulatory policies, economic instruments and support by the international community*, principally the World Bank and the Multilateral (Trust) Fund established to assist parties to meet their responsibilities under the Protocol. In 1998, two years before it ratified the international accords, Turkey announced an import quota system for

CFCs, followed by another for halons, both designed to gradually reduce their importation. In 1999, a Recommendation on Phase-Out of Ozone Depleting Substances was promulgated. This regulated the substances by controlling their use and placement on the market, setting out trade controls, and establishing reporting requirements for importers and industrial users.

The National Ozone Policy

In 1999, a *National Ozone Policy* was announced to raise public awareness of the issue, to inform industry and other ODS users of forthcoming national plans to reduce usage, and to provide a coherent planning and programming framework. An *escalating tax on chemical imports* was then introduced, with its effectiveness quickly observable in rising prices and gradually lowered demand for the controlled chemicals. Under the National Ozone Policy, MoEF was assigned responsibility for the design and implementation of Turkey's control programme, including co-ordination of national and international activities related to the Montreal Protocol. The Under-Secretariat of Foreign Trade was given the lead for import and export controls and price setting; the Under-Secretariat of Customs for surveillance and statistics; and MARA for the methyl bromide phase-out strategy.

A key role was played by the *private sector* Technology Development Foundation of Turkey (TTGV), working in co-operation with MoEF and UNIDO, by managing funds provided under the Multilateral Fund to assist industry with ODS phase-out. The Foundation supported 165 companies under 31 ODS phase-out projects, at a total cost of USD 24.6 million. One of its successes was to convert a portion of Fund grants into loans through an innovative revolving fund approach. Loan repayment by Turkish industry proved to be very high, with some 1 600 tonnes ODP phased out in the process. This helped Turkey earn special recognition from UNEP as one of the most successful countries in fulfilling Montreal Protocol commitments.

Much of the direction and drive for ODS phase-out resulted from a *World Bank project* initiated in 2001 which set quantitative targets for phasing out CFCs 11, 12 and 115 by 2006, supported by a USD 9 million funding commitment from the Bank over the 2004-10 period. The funding provided for conversion, recycling and recapture of the CFCs by small and medium-sized Turkish industrial firms; establishment of a recycling centre; management and technical training; and training of customs inspectors. As a result, the *aerosol and refrigerant industries* rapidly moved to ODS alternatives; while the *foam sector's* transformation proved more difficult, CFC-13 was eventually replaced. The use of substitute chemicals with lesser (although not negligible) ODS potential, especially HCFC blends, has increased markedly. Halons have disappeared from portable fire extinguishers.

Table 7.3 **Consumption[a] of ozone-depleting substances (ODS),** 1992-2006

(ODP[b] tonnes)

Annex/Group Name / Year	A.I CFCs	A.II Halons	B.I Other fully halogenated CFCs	B.II Carbon tetrachloride	B.III Methyl chloroform	C.I HCFCs	C. II BFCs	C.III Bromochloromethane	E.I Methyl bromide
1992	4 118.4	164.0	0.0	162.8	151.1	32.1	0.0		
1993	4 450.9	166.0	0.0	303.6	103.6	26.4	0.0		
1994	2 660.8	172.0	0.8	190.3	116.0	31.1	0.0		
1995	3 788.8	88.0	0.0	134.2	113.6	61.1	0.0		421.2
1996	3 758.8	226.0	0.0	110.0	172.2	58.8	0.0		578.4
1997	3 869.6	109.0	0.0	70.4	8.7	93.7	0.0		504.0
1998	3 985.0	203.0	0.0	168.3	45.8	143.1	0.0		415.2
1999	1 791.1	0.0	0.0	90.1	44.0	171.2	0.0		342.6
2000	820.2	10.0	0.0	56.9	22.5	339.8	0.0		342.6
2001	731.2	147.0	0.0	16.0	11.4	205.5	0.0		43.8
2002	698.9	13.0	0.0	13.2	10.8	275.2	0.0	44.5	280.8
2003	440.9	40.9	0.0	13.2	10.8	357.6	0.0	9.4	185.4
2004	257.6	22.0	0.0	0.0	4.0	493.7	0.0	14.9	90.6
2005	132.8	30.0	0.0	2.2	5.9	574.9	0.0	18.5	28.8
2006	0.2	30.0	–0.3	0.9	0.0	849.6	0.0	0.0	20.4
Baseline[c]	3 805.7	141.0	0.0	105.1	37.4				479.7

a) Represents imports of chemicals. None were produced by Turkey over the time period.
b) Ozone depletion potential.
c) CFCs and halons: average 1995-97; other fully halogenated CFCs, carbon tetrachloride and methyl chloroform: average 1998-2000; methyl bromide: average 1995-98.
Source: UNEP Ozone Secretariat.

Now that importation of controlled ODS has been eliminated, *programme priorities through 2010* have shifted to controlling illegal imports, continuing recovery and recycling efforts with industry for stockpiled chemicals, and assisting with end-user retrofitting activities. Prevention of illegal imports is receiving special attention, with the Technology Development Foundation of Turkey also providing training for customs officials.

2.2 Climate change

Turkey finds itself in a *difficult position* with respect to climate change. As a founding *member* of the OECD, and aspirant for accession to the EU, it is expected to join forces with the industrialised nations which have made commitments to reduce greenhouse gas emissions. At the same time, with the lowest per capita GDP of any OECD member, Turkey requires economic growth and industrialisation to raise the living standards of a large and growing population. Further, Turkey has a per capita emission level of greenhouse gases (GHG) well below the OECD, EU and world averages (Table 7.4, Figure 2.2).

Table 7.4 **GHG emissions,** by gas, 1990-2005

(million tonnes CO_2 eq)

	CO_2	CH_4	N_2O	F gases	Total
1990	139.6	29.2	1.3	0.0	170.1
1991	146.5	33.2	2.2	0.0	182.0
1992	152.9	36.7	4.0	0.0	193.6
1993	160.9	39.0	4.1	0.0	204.0
1994	159.1	39.2	2.2	0.0	200.5
1995	171.9	42.5	6.3	0.0	220.7
1996	190.7	45.0	6.1	0.4	242.1
1997	203.7	46.4	4.7	0.6	255.5
1998	202.7	47.7	5.6	0.7	256.6
1999	201.7	48.8	5.7	0.5	256.8
2000	223.8	49.3	5.8	1.1	280.0
2001	207.4	48.7	4.8	1.2	262.1
2002	216.4	46.9	5.4	1.9	270.6
2003	231.0	47.8	5.3	2.3	286.3
2004	241.9	46.3	5.5	2.9	296.6
2005	256.3	49.4	3.4	3.2	312.4

Source: TurkStat, 2007.

Emissions of GHG

Total GHG emissions in Turkey (CO_2, CH_4, N_2O and fluorine gases) increased 84% between 1990 and 2005, from 170.1 million tonnes to 312.4 million tonnes (teragrams) CO_2 equivalent (Table 7.4).[7]

The major component of Turkey's GHG emissions is CO_2 (82.1% of the total), followed by methane (15.8%), nitrogen oxides (1.1%) and fluorinated gases (1.0%). With respect to economic sectors, the *energy sector's share* of the GHG emissions increase amounted to 77.3% of total national emissions in 2005. This was actually a decrease from the sector's share of 77.7% in 1990, due to a shift from coal to gas in electricity generation and residential heating, the introduction of new energy technologies, and removal of old, polluting cars and trucks from the roadways.

Turkey and the UNFCCC

When the UN Framework Convention on Climate Change (UNFCCC) was adopted in 1992, as an OECD member *Turkey was included among the Annex I and Annex II countries* which bear most of the burden of the commitments made under the agreement. However, it did not engage actively in Convention implementation until 2001, following negotiations which resulted in the *other UNFCCC parties agreeing that Turkey's* "*special circumstances*" should be recognised and that it could invoke the "common but differentiated responsibilities" principle under the Convention. The parties further agreed to the *removal of Turkey from the list of Annex II countries* which were to provide financial and technical assistance to developing countries.

In 2004, *Turkey ratified the UNFCCC*. It has recently initiated a procedure of accession to the *1997 Kyoto Protocol.*

Present efforts

Although Turkey's engagement on climate change issues extends back to the early 1990s (Box 7.2),[8] the *first National Inventory of Greenhouse Gas Emissions* was submitted in 2006 to the UNFCCC Secretariat; the First National Communication to the UNFCCC was submitted in January 2007. Consideration is now being given to the preparation of a National Climate Change Action Plan, covering mitigation and adaptation, as called for in the 9th National Development Plan (2007-13).

Turkey has, to date, cast its GHG emission control efforts in terms of "*no regrets*" *actions* taken in various economic sectors for other purposes, with the energy sector the principal target. Most prominent are steps taken over the past five years to

Box 7.2 **Major Events in Turkey's Response to Climate Change**

1991	Government esta.blishes National Climate Co-ordination Group in preparation for 1992 Earth Summit in Rio (focus on climate change implications and mitigation)
1992	Turkey listed in both Annexes I and II to UN Framework Convention on Climate Change (UFCCC)
1995	Amendment proposed concerning deletion of Turkey from lists in Annexes I and II to the UNFCCC
1997	Position paper presented to 3rd Conference of the Parties (COP-3): "Turkey and Greenhouse Gas Emissions"
1999	Specialised Commission on Climate Change established by State Planning Organisation (SPO) in preparation of 8th National Development Plan, the first major government document to contain proposals for policies and measures to reduce GHG emissions
2000	SPO publishes Special Commission Report on Climate Change
2001	In Decision 26/CP.7 of COP-7, Turkey deleted from Annex II and placed, after becoming a party, in situation different from that of other parties listed in Annex I to the Convention
	Inter-Ministerial Co-ordination Board on Climate Change (CBCC) established under Ministry of Environment
	8th National Development Plan released, laying ground for Turkey's accession to UNFCCC
2002	National Report on Sustainable Development, co-ordinated by SPO and assisted by UNDP for presentation at World Summit on Sustainable Development in Johannesburg, contains chapter on climate change
2004	Turkey ratifies Convention and becomes party to UNFCCC
	Structure of CBCC revised, with NGOs and private sector participation, and with remit to begin preparation of Turkey's First National Communication to UNFCCC Secretariat and a national climate change mitigation strategy. Board supported by eight working groups on: climate change impacts; GHG inventory; GHG mitigation in industry, building, waste and service sectors; GHG mitigation in energy sector; GHG mitigation in transportation sector; land use, land use change and forestry; policy and strategy development; education and public awareness
	Ankara Conference on Climate Change organised (first comprehensive international meeting in Turkey on the topic) within scope of UNDP National Environment and Development Programme Project
2006	First National Inventory of GHGs submitted to UNFCCC Secretariat, in accordance with guidelines of IPCC, with assistance from UNFCCC experts, EEA and UNDP

Box 7.2 **Major Events in Turkey's Response to Climate Change** *(cont.)*

2007	First National Communication to UNFCCC prepared by MoEF (with financial support from GEF and technical support from UNDP project, "Enabling the Activities for the Preparation of Turkey's Initial Communication on the UNFCCC")
	9th National Development Plan (2007-13) calls for preparation of a National Climate Change Plan, covering mitigation and adaptation
	Higher Council of Science and Technology, at its 15th meeting, calls for preparation of research programme on climate change, global warming and adaptation measures
	Grand National Assembly establishes Research Commission on causes and effects of climate change
	Turkey presents its First National Communication and Climate Change Policies during UNFCCC side event at 26th Subsidiary Bodies Meeting in Bonn (Germany)

Source: MoEF, 2007.

improve energy conservation and efficiency, to promote fuel switching and greater reliance on renewables, and to upgrade transport efficiency (Chapter 2).

Responsibility for climate policy development, co-ordination, and preparation of national reports under the UNFCCC is *vested in MoEF, which serves as the National Focal Point* for Turkey under the Convention. Other governmental entities are looked to for contributions with research, programme initiatives and communication, which are to be further expanded and elaborated as Turkey's strategy on climate change is developed and implemented. These include the State Planning Organisation, Ministry of Foreign Affairs, Ministry of Energy and Natural Resources, Ministry of Trade and Industry, Ministry of Agriculture and Rural Affairs, Ministry of Transport and Turkish Statistics Institute. In 2007, the *role of the Parliament was expanded* with the creation of a Research Commission to evaluate the causes of climate change and the implications for Turkey.

Public participation in climate change policy and implementation is provided through an interministerial Co-ordination Board on Climate Change, established in 2004, with representation from domestic NGOs, industry and academia. Turkish

environmental NGOs have expressed satisfaction with the degree of their participation in preparing the National Communication on Climate Change.

Turkey has turned to a variety of *international institutions for technical and financial support* as it has shaped its climate change response. For instance, both UNDP and the GEF contributed to the preparation of the First National Communication. Turkey's efforts on climate change have also been energised and assisted by its EU approximation process.

Perspectives

Looking forward, the *proposed National Climate Change Action Plan is expected to emphasise* an expansion of ongoing no-regrets measures, plus: further upgrading of power plants; research and development on clean coal technologies; fulfilment of the 2004 Energy Efficiency Strategy improving insulation and regulations in the building sector; promotion of less-polluting cars; and restructuring of railway systems. Plans also call for ratifying a domestic Energy Efficiency Law, enacted in May 2007; expanding participation in international co-operative projects; and further harmonisation of Turkish legislation with the EU acquis in areas that will support the National Climate Change Action Plan. Indicative of the latter, the EU Directive on CO_2 labelling of passenger cars has been transposed into Turkish legislation in the form of the Regulation on Informing Consumers on Fuel Economy and CO_2 Emissions of New Passenger Cars, which will enter into force at the beginning of 2009.

The *challenge Turkey faces in reducing GHG emissions is considerable*. Gross domestic product is projected to rise some 6% per year over the next 15 years, with growth in the coal-dominated energy sector projected to increase apace. Modelling studies reported in Turkey's National Communication to the UNFCCC indicated that, on a "*business-as-usual*" basis, over a period of 15 years (2005-20) per capita energy consumption would double (from 1 284 to 2 541 ktoe), with coal accounting for a larger share, rising from 26 to 36%, principally through replacing oil, whose share was expected to drop from 40 to 27%. The result under this scenario would be an increase in CO_2 emissions of 6.3% annually, to more than double by 2020, while methane would show a 240% increase. Applying a "*demand side management*" scenario, which would introduce certain CO_2 reductions in the power and residential sectors, *national CO_2 emissions in 2020 would be reduced by 75 million tonnes per year*, or 12%. The modelling assumptions include two nuclear plants coming on line in 2016 and 2018, with other sectors (steel and concrete) showing major changes.

Even if this ambitious scenario were realised, Turkey's *GHG emissions in 2020 would be quite high and rising as industrialisation and population growth continue*. As it stands, Turkey has numerous GHG reduction projects underway and envisioned. While the forthcoming National Climate Change Action Plan will be an important step in expanding and integrating them, the national effort would improve in efficiency and impact if the Strategy were to define with precision the key steps forward, and their costs and benefits in terms of GHG reduction, as well as how their co-ordination and integration could be realised. Most important would be the *introduction of a national target for GHG emissions over a defined period of years, as a challenging national goal*, even if it were not linked to the specifications of the Kyoto Protocol or the post-Kyoto successor regime after 2012.

It is also important for Turkey to continue to examine various *economic and regulatory measures* that might be employed to reduce GHG emissions. Notably, the 2006 Turkish law amending the earlier Law on Environment encourages the use of economic instruments and incentives such as the collection of emission and pollution charges and mechanisms based on the market, e.g. carbon trading. In this regard, Turkey should consider the environmental and political benefits that could accrue were it to join the carbon trading system established within the EU. Setting differentiated taxes to promote the use of cleaner fuels could also significantly stem the rising tide of carbon emissions and other air pollutants.

Finally, Turkey should explore possibilities for *acquiring additional financial and technical support for climate change activities* elsewhere within the international community. As an Annex 1 country, Turkey is not eligible for Joint Implementation credits nor can it host Clean Development Mechanism projects.

2.3 Trade and environment

Endangered species

In 1996, Turkey became a party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Three years later, the CITES Secretariat informed the Conference of Parties that Turkey, along with Fiji, Vietnam and Yemen, had high volumes of trade in CITES-listed species but lacked adequate legislation to meet the requirements of Convention implementation. Turkey's response was to *enact more stringent regulations* governing endangered species, and to establish a CITES Management Authority responsible for documentation and permitting related to the import and export of mammals (except marine animals), birds and reptiles.

In 2001, a *set of regulations* was issued based on the requirements of EU Directives. It was further revised in 2004. That same year an EU Twinning Project was initiated, on Capacity Building in the Field of Environment, with a component on implementation of the CITES Convention and related EU Regulations. Among the activities was an assessment of how to harmonise and upgrade the databases of various Turkish authorities active in endangered species matters: MoEF for CITES follow-up; the Authority for Protection of Special Areas; and TUBITAK for biodiversity.

Trade permitted under CITES, including re-exportation, is managed by the General Directorate of Nature Conservation and National Parks of MoEF, the General Directorate of Protection and Control, and the General Directorate of Agricultural Production and Development of MARA. *Permits* cover parrots, crocodiles, turtles, the skins and trophies of certain game animals, species imported for zoos and circuses, ivory samples, crocodile and snake skins, and museum materials. Overall, the number of CITES permits issued has risen steadily since 1998, with a large jump in the number of re-export permits awarded in the last two years (Table 7.5).

Although *training of customs officers* has been expanded, recent EU analyses point to a *continuing lack of qualitative and quantitative data* on illegal international trade of plants and animals subject to CITES protection. The EU has also recommended that the number of animal rescue centres for confiscated animals be expanded: two are currently in operation but in need of upgrading; none is available in coastal areas; and some species are not covered (Chapter 4).

Table 7.5 **CITES permits,** 1998-2006

	Importation	Exportation	Re-exportation	Other
1998	5	27	29	_
1999	44	5	11	6
2000	36	9	7	11
2001	32	4	16	_
2002	76	4	24	3
2003	98	17	21	5
2004	130	15	47	14
2005	228	7	375	_
2006	192	16	159	9

Source: CITES.

Hazardous wastes

Turkey has *displayed a strong national commitment to the Basel Convention* since it ratified the treaty in 1994, and has been instrumental at the international level over the past five years in promoting its strengthening. Turkey also subscribes and conforms to the OECD system for transfrontier movement of hazardous wastes by its members.

In 1995, following Basel ratification, a Regulation on Hazardous Waste Control and Management was issued, *prohibiting imports into Turkey of all hazardous wastes*. The following year a Notice on Substances Controlled for Purposes of Protecting the Environment set controls on waste scraps imported for their economic value. That same year, Turkey signed the *Izmir Protocol* to the Barcelona Convention for the Protection of the Mediterranean Sea against Marine Pollution, which sets out controls and prohibitions on transfrontier movement of hazardous wastes, urges in-country disposal for Mediterranean countries, requires written notification for hazardous waste transfers and prohibits the export of such wastes to developing countries. In both 1996 and 1998, revised Foreign Trade Regulations came into force in Turkey which further tightened requirements and procedures for trade in wastes, waste products and banned substances, as well as in scrap metal, chemicals and fuels.

Additional measures to strengthen Turkey's legal and administrative capacities for sound *waste management*, including trade aspects, were taken following a 2003 Twinning Project under which the EU provided technical assistance in the fields of air quality, chemicals and waste management. This was part of a broader effort to help Turkey revise its legislation and administrative arrangements to meet the requirements of EU environmental Directives.

Chapter 8 of the *2005 Turkish Regulation on Hazardous Wastes* concerns transfrontier movement of such wastes, covering import, export and transit. A communiqué on standardisation, which is updated and issued annually by the Under-Secretariat of Foreign Trade, lists the wastes that are subject to import provisions along with those that are banned completely. Under the Regulation, waste producers must use a waste movement/transportation form during waste transport that is in compliance with the EU's waste trading form. The Regulation also establishes a Notification Form that is in compliance with the Basel Convention Notification System for prior informed consent by importing countries. In the case of illegal trafficking, Basel procedures are applied.

In 2002, Turkey expressed concern at the 6th Conference of the Parties to Basel about "gaps in commitments" in hazardous waste exports, having found itself the target for *importation* of controlled wastes from other parts of Europe. Regarding its

own exportation of hazardous wastes, the amount has been increasing in recent years as Turkey's capacity to treat and dispose of such wastes domestically has failed to keep pace with growth in waste production. All exports have been carried out in accordance with Basel requirements, and have gone largely to Germany for treatment and disposal. In 2006, 36 different types of hazardous wastes, amounting to 21.9 tonnes, were exported; the total reached 38.9 tonnes in 2007. Included were batteries; textile, petroleum, photographic, metallurgical, medicinal and contaminated construction wastes; PCBs; and agricultural pesticides.

Shipbreaking

In 2002, a *Turkish court decision with international ramifications* led to the turning back of a French ship, the "Sea Beirut", headed for Turkish shipbreaking yards because it was contaminated by asbestos and other hazardous materials. One year later, Turkey informed the Basel Convention Secretariat that it was prohibiting imports of ships intended for dismantling which contained large amounts of asbestos and other toxic materials used during construction. In 2004, the Court of Izmir declared that *importation of ships for scrap containing significant levels of asbestos or other dangerous materials onboard is illegal.* These actions were a major factor in a subsequent expansion of the scope of the Basel Convention, based on an agreement among the Parties that ships can be considered toxic waste under international law. The specific provisions of Basel were amended to state that end-of-life ships cannot leave a country without permission of the importing state, and that Convention signatories must ensure that shipbreaking is performed in an environmentally sound manner and minimise the transboundary movement of hazardous waste aboard such ships.

In 2006, *Turkish NGOs* became increasing active in this area when public attention was attracted to the Dutch ship "MS Otapan", which reportedly contained high amounts of asbestos and was bound for the Aliaga Ship Dismantling Shipyards on the Aegean coast. A new civic organisation, the Initiative Against Hazardous Shipbreaking in Turkey, and an "NGO Platform on Shipbreaking", a coalition of human rights, environmental and public health groups, played large roles in publicising the actions taken and successfully pressing the government to reject the ship. Under a 2005 Regulation on Hazardous Wastes, ships sent to Turkey for dismantling now must comply with Basel prior informed consent procedures.

Turkey has a *large shipbreaking industry*. Together with Mexico and Spain, it accounts for most of the shipbreaking by OECD member countries. The industry has, in the past, come under criticism from Turkish NGOs and international observers for lack of attention to the environmental risks associated with the removal, handling and disposal of hazardous materials, as well as with industrial accidents. In recent years,

the industry has moved to strengthen its performance in handling and disposing of contaminated wastes in an environmentally sound manner in the face of public concern and closer government regulation and oversight.

Industrial accidents and the workplace environment

Public attention to the *environmental consequences of industrial accidents* was heightened in 1999, when a major earthquake produced a cascade of effects leading to releases of hazardous chemicals at industrial facilities in the Kocaeli region. In response, the government issued new policies and regulations on contingency planning for and emergency response to industrial accidents; a new investment programme included funds for the creation of emergency response centres, materials and training (Chapter 5).

Turkey is *not a party to a number of major international agreements* on industrial accidents acceded to by most other European countries. These include the 1974 ILO Convention on Prevention and Control of Occupational Hazards Caused by Carcinogenic Substances and Agents; the 1977 ILO Convention on Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration; and the 1992 UNECE Convention on the Transboundary Effects of Industrial Accidents.

Turkey has, however, adopted a number of *OECD Decisions and Recommendations* to protect the workplace and workers; it also participates in the UNEP APELL programme, which, inter alia, promotes environmental safety in industry. Strengthening of regulations and administrative structures to prevent industrial accidents and to provide environmentally sound conditions in the workplace are under review within the framework of the EU approximation process.

Industry is paying much greater attention to this area, with industry officials pointing to their firms' commitment to Responsible Care and corporate social responsibility, and the systematic use of ISO 14000 standards, as basic tools for environmentally sensitive production. In the petrochemical sector, a Regional Emergency Response Mechanism for industrial accidents is under development.

Trade in chemicals

Turkey has had a long-standing involvement in UNEP's International Register of Potentially Toxic Chemicals (UNEP-IRPTC), as well as in the OECD's Chemicals Programme, in order to strengthen its capacity to provide *sound environmental management of chemicals which are traded internationally*. In early 2007, it organised a workshop in Istanbul on the implementation of OECD's Mutual

Acceptance of Data (MAD) system and the establishment of an inspectorate for Good Laboratory Practice.

Turkey's overall approach to improved chemical safety has been *principally influenced since 2000 by its work with the EU* to bring national chemicals legislation, policies and administration into conformance with the EU acquis. Under an EU Twinning Project on air quality, chemicals and wastes, it began receiving technical assistance with the short-term objective of evaluating the existing situation regarding chemicals management, and the longer-term objective of harmonising Turkish legislation and systems with EU Directives in support of free trade of goods.

In 2003, an EU *analysis of progress* indicated that major deficiencies remained. A full picture of chemicals on the Turkish market was not yet available, and the registration system for import and export included only some large groups of chemicals and certain individual chemicals, thus failing to provide complete, disaggregated coverage. Further, it was important for Turkey to rationalise the respective roles and relationships among an *array of government institutions* with responsibilities and activities in the chemicals field. These included MoEF (industrial chemicals), the Ministry of Agriculture and Rural Affairs (pesticides and agricultural chemicals) and the Ministry of Health (pharmaceuticals), the Ministry of Labour and Social Security, as well as the Ministry of Trade and Industry, the Under-Secretariat of Foreign Trade and the Under-Secretariat of Customs.

In response to the co-ordination requirement, a *Chemicals Safety Committee was created in 2003*, chaired by MoEF, which includes all of the aforementioned government entities as well as representation from universities and industry. The annual issuance of an Import Communiqué on Standardisation of Foreign Trade, entitled "Chemicals Taken Under Control for the Protection of the Environment", represented another step by the government to tighten controls on hazardous chemicals involved in international commerce.

In 2006, a new phase began with a two-year EU assistance project, "Technical Assistance to Turkey to Strengthen the Institutional and Administrative Capacity in the Field of Chemicals". The objectives include establishing a new registration system, an inventory system and a *National Chemicals Monitoring Database*, all linked to conformance with EU Directives on dangerous substances, dangerous preparations, risk assessment and safety data sheets.

At the multilateral level, Turkey has signed but not ratified i) the 1998 *Rotterdam Convention* on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and ii) the 2001 *Stockholm Convention* on Persistent Organic Pollutants (POPs). In 2004, a project financed by

the GEF was launched on "Enabling Activities to Facilitate Early Action on the Implementation of the Stockholm Convention on Persistent Organic Compounds in Turkey". Managed by a working group established by MoEF, this project led to the finalisation of a National Implementation Plan in January 2008, including a POPs inventory for Turkey and defining of national priorities to meet the requirements of the Stockholm Convention.

2.4 Official development assistance

Over the review period, Turkey has *advanced from an aid recipient to (principally) an aid donor*. Its Official Development Assistance (ODA), including public funds dispensed as bilateral grants as well as contributions and membership fees to multilateral institutions, rose to USD 601 million in 2005. This compares to ODA levels of USD 66 million in 2003 and USD 339 million in 2004 (definition changes and a more complete inventory after 2003 account for some of the growth). Turkey's provision of credits, contributions by the private sector and support for domestic and foreign NGOs raised the overall assistance figure for 2005 to some USD 1 400 million. Responsibility for the design and implementation of the development assistance programme is vested in the *Turkish International Co-operation and Development Agency*, which was restructured and upgraded in 2002.

Since Turkey is a limited recipient of foreign aid as well as a donor, it is designated as *an Upper Middle-Income Country* by the OECD's Development Assistance Committee (DAC). This excludes it from full membership in that body although it does meet other DAC criteria for membership, notably the requirement to provide USD 100 million or more in ODA financing annually. Turkey participates in the DAC with observer status.

Geographically, Turkey's development assistance effort in 2005 involved *88 countries* in the Caucasus and Central Asia (40.5%), the Balkans and Eastern Europe (30%), Africa (6.2%), the Middle East (5.9%) and the Far East (4.7%). Pakistan was the largest recipient (USD 126 million, including a large proportion for earthquake emergency relief), followed by Kyrgyzstan (USD 57 million) and Kazakhstan (USD 46 million). Sectorally, social infrastructure development was the principal focus, with education the largest component. The other major sectors were emergency assistance and peace-building.

The *environmental component* of Turkey's ODA remains very small. In 2005, USD 370 000 was committed under a General Environmental Protection account, mainly in the form of small technical support and training grants in the areas of forest management, drinking water quality and general environmental management.

Another USD 780 000 was allocated in grant support for water supply and sanitation projects. Limited funding was also provided to *multilateral institutions,* notably the GEF and UNEP, to support environmental activities of direct benefit to Turkey.

3. Regional Issues

3.1 Marine pollution

Maritime safety and the Turkish Straits

A large volume of ship traffic moves through Turkey's territorial waters, as well as the Turkish Straits.[9] The Straits have five times the traffic volume of the Panama Canal; the narrow sharp turns and treacherous currents of the Istanbul Strait (Bosphorus), which is 31.7 km long and only 698 metres wide at its narrowest point, create a high risk of collisions. Of particular concern is the large number of *large oil-carrying vessels* moving through the Black Sea into the Straits, despite the opening of the Bakü-Tiflis-Ceyhan (Bakü-Tbilisi-Ceyhan) oil pipeline.

Over the 1990s and during the review period, Turkey has made great strides in improving its capacity to *prevent and respond to marine accidents and associated pollution incidents*. Its multi-stage approach (contingency planning, ship scheduling and monitoring, search and rescue, pollution equipment upgrade and siting, and increased training) has been paying off in terms of *reduction of accidents* by a factor of 10.

In 2003, a further major step forward was the inauguration of a state-of-the-art *Vessel Traffic Services* (VTS) system for the Turkish Straits, dedicated to improving safety at sea and more efficient flow of traffic through the Straits.[10] The average waiting time for travel through the Istanbul Strait (Bosphorus) has been reduced to five hours; the number of ships passing through has increased 20% within the safety framework. The system, which is operating in the Istanbul VTS Area and the Çanakkale VTS Area, provides one of the longest VTS coverage areas in the world, and work is underway to extend it through the Sea of Marmara, which lies between the two straits (Box 7.3).

A broader "*Ships Traffic Services*" *programme*, initiated by the Under-Secretariat of Maritime Affairs in 2003 and covering all Turkish waters, provides day and night monitoring, information and assistance to ships at sea or in port. In addition, since 2007 an Automated Identification System (AIS) provides the capability to track all ships and marine vehicles with AIS transponders in support of an upgraded search and rescue capability in all Turkish marine waters. The first phase (2006-07) established 25 base stations to track continually all vessels within range. Every large vessel is required to carry AIS transponders consistent with international (IMO and SOLAS) specifications.

Turkey is a *party to numerous international and regional accords* designed to prevent and respond to marine accidents: the 1972 Convention on the International Regulations for Preventing Collisions at Sea; 1974 International Convention for the Safety of Life at Sea (SOLAS); 1976 Convention on Limitation of Liability for Maritime Claims; 1979 International Convention on Marine Search and Rescue; 1998 Agreement on Co-operation Regarding Maritime Search and Rescue Services Among Black Sea Coastal States; and protocols to the Barcelona and Bucharest Conventions concerning maritime safety and ship pollution. Under Turkish law, ships not meeting these and related safety requirements established under conventions to which Turkey is a party *are excluded from Turkish territorial and inland waters*.

Box 7.3 **Sea of Marmara**

The Sea of Marmara, with a 663 km coastline on its Asian side, is an *inland sea within Turkey*. It has unique hydrodynamic features, due in large part to the structural characteristics of the Turkish Straits (the Çanakkale Straits or Dardanelles, and the Istanbul Straits or Bosphorous), which connect it to the Aegean and Black Seas, respectively. Collectively, the two Straits and the Sea of Marmara provide an important "acclimatisation zone" for transiting species of pelagic fishes of Atlantic origin during their migration from the Black Sea to the Aegean and *vice versa* . Further, monk seals and crabs in the Sea of Marmara are threatened by rising pollution levels and wetlands degradation.

The Sea of Marmara *receives heavy inputs of municipal and industrial waste water* from Istanbul and adjacent populated areas. Most industrial waste water and a significant amount of municipal waste water still enter untreated. Especially critical areas in need of stronger pollution control measures include the Bay of Izmit, which receives wastes from Turkey's major industrial centre, and Gemlik Bay. A major pollution source here and in the Straits is the *release of bilge and ballast waters,* as well as solid wastes, from increasingly heavy ship traffic.

Pollution control priorities, programming and investment are carried out within the framework of a Marmara Sea Management Plan. *Control of land-based pollution sources*, with major investment in new waste water treatment facilities, is a principal focus. Despite efforts over the past decade, water quality has continued to decline, with rising levels of turbidity, BOD and pathogens detected at many of the monitoring stations in the sea. The risk this presents for public health and for the rich tourism potential of the coastal waters and offshore islands suggests that *much larger investment in pollution control is needed in the near term*.

Oil spills

As oil tanker traffic has increased, the threat of *oil spills* from maritime accidents has received high priority attention by Turkey. During the review period, ratification was completed of the 1990 London Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) and of the 1992 London Protocols to the 1971 Brussels Convention on Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND), and to the 1969 Brussels Convention on Civil Liability for Oil Pollution Damage (CLC), replacing in practice these Conventions.

Turkey is a long-standing party to the *protocols to the Barcelona and Bucharest Conventions* requiring response and co-operation in dealing with pollution of the Mediterranean and Black Seas by oil and dangerous substances in case of emergency. It also participates in the Regional Marine Pollution Emergency Response Centre (REMPEC) established in 1976 to plan and oversee co-ordinated regional rapid response activities. The Mediterranean Oil Industry Group (MOIG), an offshoot of REMPEC, was established, largely through an initiative of the Turkish Petroleum Company, to serve as a regional forum for oil companies to consult and plan with respect to marine accidents and associated oil spills. As called for under the Black Sea and Mediterranean Action Plans and the Law Pertaining to Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Harmful Substances, Turkey has developed *National Oil Spill Contingency Plans for all Turkish seas and straits*; contingency plans, including at regional level, are prepared by MoEF through TUBITAK. The plans are in place at the local level in some instances, as well as for cities (including Istanbul).

A major step forward was taken in 2005 with the entry into force of a *comprehensive national Law on Response to Emergencies and Compensation of Losses in the Case of Marine Pollution due to Oil and other Dangerous Substances*. Implementing regulations followed in 2006 to address: eliminating and minimising pollution risk from ship accidents; assigning responsibilities to public authorities and others; ensuring compatibility with international obligations; establishing principles for damage assessment and compensation; and determining policies and measures for accident preparedness and response. In support of the new legislation, a project on "Formation of Rapid Response Centres and Identification of the Current Situation Regarding our Various Marine Environments" has been initiated by the Under-Secretariat for Maritime Affairs, through the Marmara Research Center of the Scientific and Technological Research Council of Turkey (TUBITAK). The project will access the vehicles, equipment, materials and manpower required to deal with various levels and types of spills, along with their optimal location. It will also determine the most efficient and effective response methods and training, and

establish a database on areas most vulnerable and sensitive to oil spills. Equipment to deal with oil spills is owned by the primary government authority, the General Directorate of Coastal Safety, located in Istanbul. In cases of emergency, private equipment can be requisitioned by the government.

Protecting the quality of the marine environment

Protecting the quality of the marine environment has been a broader and long-standing Turkish priority. A wide array of national laws, policies and measures to cope with *marine pollution* has been introduced over the 1990s and during the review period.

In 2004, a *Regulation on Water Quality Control* was adopted. It promotes quality categorisation of water conditions and uses, creates planning guidelines for infrastructure, and establishes principles and guidelines for effluent discharge in coastal waters, as well as for monitoring and inspection. Sea and coastal waters are classified according to uses: fish production; recreational uses; and areas for industrial, commercial and urban development. Dumping of contaminated wastes is banned, and other waste dumping requires permission.

A regulation on the *Recovery and Control of Ship Waste* was also adopted in 2004. It seeks to prevent the release of wastes by the routine activities of ships (deballasting, solid waste dumping, incidental and accidental spills of petroleum and related hazardous materials) and to regulate the rules and procedures for waste-receiving facilities. MoEF carries out inspections of receiving facilities; the inspection of vessels is shared among MoEF, the Under-Secretariat for Maritime Affairs and provincial governors' offices. In 2005, 18 ports were licensed by MoEF, with the number having certified waste-receiving facilities climbing to 42 in 2006.

In 2006, a *National Action Plan on Land-Based Sources of Pollution* was published, identifying primary land-based sources in Turkey, recommending policy and legislative changes, and setting out investment priorities and their costs.

In the same year, a project on *Control and Management of Harmful Aquatic Organisms Carried by Ballast Water* was initiated by the Marmara Research Center of TUBITAK, in co-operation with the Under-Secretariat for Maritime Affairs. It responds to the increasing appearance of new invasive species and viruses in Turkish waters and related growing concern for fisheries management and public health. The objectives are to improve scientific understanding of the threat posed by alien species, establish measures to reduce the risk, identify forbidden areas for discharge of ballast water, strengthen the Regional Aquatic Invasive Species Information Centre on flora and fauna biodiversity in Turkish waters, and examine possibilities for a regional agreement on ballast water management.

Black Sea

The Black Sea extends 1 200 km from east to west, and 600 km north to south. Although *90% anoxic*, its surface waters to a depth of 50 metres are fed by rivers from the north and east that are rich in nutrients. Rich in plankton as a consequence, the *Black Sea provides the bulk of Turkey's fish production*. The only outflow connection is through the narrow Turkish Straits, with a counter current of highly saline water moving at depth from the Mediterranean northward through the Çanakkale Strait (Dardanelles) and the Istanbul Strait (Bosphorus) into the Black Sea. Six countries are littoral and 17 countries occupy a drainage basin which is 15 times the area of the sea itself.

Over the last half century, Black Sea water quality and biota have come under *heavy pressure from a variety of pollution sources. Much of the pollution emanates from large rivers in Central and Eastern Europe* (the Danube, Don, Dnieper, Dniester), along with mining, waste dumping (from vessels and coastal towns), industrialisation and coastal development (e.g. untreated municipal sewage discharges) along the sea's northern and eastern shores. Turkey's principal pollution contribution is through coastal and agricultural development along the southern shore. Turkey provides less than 10% of the region's BOD input, compared to some 75% from the Danube.

Black Sea oil production is minimal, but areas with reserves off the west coast of Georgia may become productive and thus pose a pollution threat. The substantial and growing transit trade in crude and refined petroleum products is of greater concern at the moment. Pipelines from the Russian Federation, Georgia, Kazakhstan and Azerbaijan currently supply crude oil to terminals located on the Black Sea coastline of Russia, Ukraine and Georgia, with the prospect of significantly increased transport from the Caspian region and countries further east via new Black Sea transport and receiving facilities which are already under construction. The quantity of oil shipped from all Black Sea terminals increased from 500 million barrels in 2001 to more than 700 million by 2004. Turkey has 11 ports on the Black Sea coast, but no oil refinery or production terminals.

Regional co-operation on Black Sea pollution control is carried out within the framework of the 1992 Convention on the Protection of the Black Sea Against Pollution (the *Bucharest Convention*), which was initiated by Turkey and largely inspired by the Barcelona Convention. It entered into force in 1994. The five other riparian states are the Russian Federation, Ukraine, Georgia, Bulgaria and Romania. The latter two countries are now members of the EU. Protocols exist on: land-based sources of pollution; controlling pollution from oil and other harmful substances; dumping at sea; and biodiversity and landscape conservation. Turkey hosts the

Secretariat of the Istanbul Commission, and one of four Activity Centres on Land-Based Pollution Sources. A Strategic Action Plan was adopted by the six riparian states in 1996 (with the objective of reducing organic and toxic discharges by 30%, nitrogen pollution by 14% and phosphorus levels by 27% within a decade) and revised in 2002 *to emphasise basin-wide reforms*, including agricultural policy, waste water treatment, rehabilitation of key basin systems and stronger legislative frameworks. A new revision will be completed by the end of 2008.

International funding has been mobilised in support of the Strategic Action Plan. The *EU* has been making major investments through its PHARE[11] and TACIS[12] programmes. Two other Black Sea-related efforts were launched more recently with GEF funding: a GEF/World Bank project on Strategic Partnership for Nutrient Reduction in the Danube River and Black Sea began in 2001 (USD 375 million for research, monitoring and investment) and a GEF/UNDP project on Control of Eutrophication, Hazardous Substances and Related Measures for Rehabilitating the Black Sea began in 2001 (USD 19.5 million).

However, data from the Black Sea Monitoring Programme indicate that progress in reducing the levels of most Black Sea pollutants is slow. Clearly, the *efforts of riparian states* have to be strengthened as well as those concerning the Danube basin.

3.2 Marine fisheries

Due to a unique combination of climate, geography and water conditions, Turkey has a wide variety of *fish species*: 247 in the Black Sea, 200 in the Sea of Marmara, 300 in the Aegean and 500 in the Mediterranean**.** A declining number have commercial value, with upwards of 50 species under threat of extinction. The *fisheries' share of the economy is small*, at 0.3% of GDP, but they are locally significant as a source of food, employment and recreation. Some 110 000 fishermen were licensed in 2006; 22 000 fishing vessels (Table 7.6) are registered, with the larger, industrial vessels (trawlers, crawlers and purseseiners) operating largely in the Black Sea and Sea of Marmara.

Institutional framework

The fisheries sector is managed under the 1971 Law on Fisheries, as amended in 1986 and 2003. Its evolution reveals an *increasing concern for conservation and enforcement*, with the 2003 amendment increasing the penalties for regulation infractions and authorising inspectors to issue fines on the spot.

The *Ministry of Agriculture and Rural Affairs (MARA)* is the main state organisation responsible for fisheries management, including the operation of control

systems for capture, processing, storage and marketing, in accordance with international standards. Key roles are also played by MoEF, the Prime Ministry Under-Secretariat of Customs, the Under-Secretariat for Maritime Affairs, the Coast Guard under the Ministry of the Interior, and the Ministry of Health. Licensing of both fishermen and vessels is mandatory; regulations cover net size, size of fish, types of permissible gear, closed seasons, and catch areas. Bans on protected species have been introduced for dolphin, sea turtle, sturgeon, certain sponges, and coral. Seasonal prohibitions to protect spawning stocks are also in place (e.g. bans on the use of trawling and purse seines between May and September).

Turkey has linked its national fisheries legislation and management regime to a number of *international conventions and programmes* designed to promote sustainable fisheries and to control marine pollution. These include the FAO Code of Conduct on Responsible Fisheries; Bucharest Convention for the Protection of the Black Sea Against Pollution; and provisions of the Barcelona Convention on the Mediterranean concerning land-based pollution control.

Table 7.6 **Number of fishing vessels,** by regions and operating type, 2002

Sea products regions	Total	Trawler	Purseseiner	Trawler-Purseseiner	Carrier vessels	Others
TOTAL	17 696	566	448	416	53	16 213
East Black Sea	4 301	130	62	80	15	4 014
West Black Sea	2 713	170	74	203	6	2 260
Marmara	3 238	88	194	106	22	2 828
Aegean	5 023	62	72	8	10	4 871
Mediterranean	2 421	116	46	19	–	2 240

Source: Prime Ministry, TurkStat.

The fisheries sector

Marine fisheries accounted for some *80% of Turkey's total fisheries production in 2005*, or some 560 000 metric tonnes. The Black Sea provided 74% of the catch; the Sea of Marmara 15%; the Aegean 9%; and the Mediterranean 2%. European anchovy, horse mackerel, blue fish, bonito, whiting, sardine, chub mackerel and mullet made up more than 90% of total marine production. Marine aquaculture has been increasing, amounting to some 70 000 metric tonnes in 2005 from 44 offshore

sites. Shellfish production is important in the Istanbul Strait (Bosphorus) and Çanakkale Strait (Dardanelles), as well as in the west and central Black Sea and the north Aegean. Turkey's marine fisheries production increased steadily to 670 000 tonnes until 1988, when catches started to decline precipitously (mainly anchovy stocks collapsed); from 1992 they started to rise again. Experts predict a "stagnation level" of 550 000-650 000 tonnes to continue. However, the composition of the catch continues to change with a trend towards lower-value species. Heavy fishing pressures in the regional seas and straits, coupled with growing pollution levels, *call into question whether economically viable marine fisheries operations* can be sustained over the long term.

In the *Black Sea*, Turkey's richest fish source, spawning grounds are under threat from phosphate and sand mining, dumping sites, and oil terminals located in neighbouring countries to the north and east. Eutrophication, resulting from land-based discharges of nitrogen and phosphorous from major rivers in Central and Eastern Europe, is of increasing concern. Turkey's contribution to Black Sea pollution is relatively limited. Nonetheless, Turkey's impact overall, especially on its own coastal and inland fisheries, is significant and growing, given the pressures of urban and industrial development and associated waste discharges into coastal wetlands and waters. In the *Istanbul Strait (Bosphorus)* some 60 species were found 30 years ago (26 of commercial value, including tuna, bluefish, swordfish, sea bass and mackerel). Today, 20 species are recognized (with only 11 of commercial value).

The changes in fisheries production levels and species caught have generated interest in *marine-based* (as well as freshwater) *aquaculture*. Sea farming began in 1985 with sea bream and sea bass in the Aegean Sea. The trend since has been towards larger farms and enlargement of the existing one. Since 2000, the collection of juvenile fish from the wild has been prohibited, with the demand filled by private and MARA hatcheries. Concerns about pollution from aquaculture facilities, and the impact of disease inoculants used in production, have given rise to new regulations governing their operation and an expanded oversight and monitoring role for MoEF. Aquaculture facilities cannot now be established in closed gulfs and bays, in otherwise natural sites or at archaeological sites.

Shellfish grounds are also under increased surveillance to protect public health in Turkey and to ensure that international quality control standards are met to protect foreign markets. Distinct bivalve mollusc production areas have been designated, beginning in 1991 and continuing with three new designations by MARA in 2005. These are accompanied by regulations which define health standards for production and marketing. A monitoring programme for water quality now covers 5 production areas and 32 sub-areas; industrial facilities discharging wastes in the vicinity of

shellfish production sites are subject to twice-yearly inspections by MARA, with samples taken and legal action initiated if pollution limits are exceeded.

Perspectives

An *upgrading of marine fisheries management in Turkey* was initiated through a 2002 EU project, "Support to Turkish Authorities in Change of Legislative Alignment to the Acquis in the Fisheries Sector". Follow-up to the project recommendations by a Fisheries Working Group, involving MARA, the Coast Guard, the Turkish Statistics Institute and a variety of other public and private stakeholders, has led to efforts to improve fisheries management, including new conservation strategies and regulations, strengthened inspection and control measures, and computerised vessel registration and monitoring. Plans are to expand the number of fisheries control officers and Coast Guard officers; establish fishing port offices at 30 ports; create a Fisheries Policy and Planning Unit within MARA; and revise the management plans of all marine fisheries. These are *important and necessary steps*: current regulations and enforcement capabilities *do not appear adequate to allow fish resources to recover*, nor are data collection and vessel licensing strategies commensurate with the requirements for sustainable fisheries (and for convergence with EU standards and Directives).

3.3 Transboundary rivers

Turkey *shares a number of major rivers with neighbouring countries*: the Meriç (also called Maritza and Evros) with Bulgaria and Greece; the Çoruh (Chorokhi) with Georgia; the Aras (Arpaçay) with Armenia; the Asi (Orontes) with Syria; and the Dicle (Tigris) and Firat (Euphrates) with Syria and Iraq (Table 7.2).

Co-operation so far

The *Meriç is a heavily polluted boundary river,* with periodic downstream flooding in Turkey and Greece from rapid melting of snow in the mountains of Bulgaria. The two downstream riparians are moving ahead with joint flood control projects. Concerning the Aras (Arpaçay), which runs into Turkey, Turkish and Armenian experts meet periodically to discuss water measurements and releases associated with the operation of the Arpaçay dam. In the case of the *Asi (Orontes)*, Syria has several dams on the river, which empties into the Mediterranean in Turkey's Hatay Province. Turkey, which uses 10% of the natural flow (the only water it receives from Syria), has proposed a joint dam on the border, and the Prime Ministers have agreed in principle.

The Dicle (Tigris) and Firat (Euphrates) *basins are particularly important for the region*. With some 90% of the annual flow of the Firat (Euphrates) originating in Turkey, as well as 52% of that of the Dicle (Tigris), Syria and Iraq have expressed strong concerns over the years about the impacts on their water supplies of Turkey's hydroelectric and irrigation diversion works on the two rivers. The current concern is about the potential for rising salinity and pesticide levels from the irrigation return flows from Turkey's South-eastern Anatolia Project (GAP), which will expand irrigated agriculture and rural development over an area as large as Belgium. The control of water flow provided by the dams should smooth out the historic variations in water flow which have led to intensive flooding and serious low flows in Syria and Iraq.

On the Dicle (Tigris) the Ilsu *hydroelectric dam project*, a component of the GAP, has been pursued by Turkey to meet projected electricity demand. The project has drawn criticism from Syria and Iraq, which contend that it will impair downstream water quantity and quality, and from some Turkish citizens and NGOs, which have expressed concern about the displacement of towns and villages as well as the prospect of poor reservoir water quality due to untreated sewage discharges.

Attempts over the years by the riparians to *negotiate a comprehensive agreement on water management for* the Dicle (Tigris) and Firat (Euphrates), including dispute settlement, did not lead to concrete outcomes. The results of joint commission studies and consultations, which go back to the 1940s, have been limited to an agreement by Turkey and Syria (in 1987) to release a minimum of 500 m^3/s from the Firat (Euphrates) as a monthly average "until final allocation of the waters".

Prospects

Turkey's position on transboundary water rights is grounded on the *principle of* "*equitable and optimal use*" *of water resources* (as set out in the 1974 OECD Recommendation on Principles concerning Transfrontier Pollution). Concerning transfrontier pollution and the second principle of the Rio Declaration on the right of sovereign nations to exploit their own natural resources, Turkey has consistently insisted in a variety of international forums on its right to exploit its resources in line with its environmental and developmental policies. On this basis, Turkey participated in the development of the Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1992) within the UNECE, an accord signed by Greece and Bulgaria, among others, but not yet by Turkey itself.

Turkey has also not signed the 1997 *UN Convention on the Law of the Non-Navigational Use of International Watercourses*. Turkey (along with China and Burundi) voted against the Convention based on its failure to establish the "primacy

of equitable and reasonable utilisation over the obligation not to cause significant harm", and also based on the perception that the Convention envisioned a compulsory dispute resolution mechanism.

Turkey has noted that it has consistently given due regard to *not causing significant harm to its neighbours*, pointing to, *inter alia* : the advance notification it provided of the completion of the Ataturk Dam, thus providing time for the downstream riparians to plan allocations and storage, and the minimum flow to which it has committed itself for the Firat (Euphrates). Officials have also noted that the water issue can be viewed as a source of future co-operation among Turkey, Syria and Iraq, and they envision that the combined water potential of the Dicle (Tigris) and Firat (Euphrates) can be managed to meet the needs of all three riparian states.

In the absence of a comprehensive, formal agreement among the riparian states, it behoves Turkey to take significant, visible *measures to maintain the integrity and quality of the Dicle-Firat (Tigris-Euphrates) water system* as the GAP proceeds. This includes promoting water conservation and water use efficiency (e.g. choice of crops, water-conserving agricultural practices) as well as waste water treatment and reuse. Further, in accordance with a plan proposed by Turkey to its neighbours in 1984 (Three-staged Plan for the Optimal, Equitable and Reasonable Utilisation of the Transboundary Watercourses of the Euphrates-Tigris Basin), a *new data-gathering effort* in the basin should be launched, involving inventories of both water and land resources. This would help establish a sound basis for allowing all riparians to decide on future water availability, uses and allocations, and on the selection of future development projects. It would also be consistent with the starting points proposed for sound management of transboundary rivers, as set out in the UNECE conventions on this subject.

Encouragingly, over the past two years *Turkey and Greece have relaunched expert meetings* on water management co-operation; *meetings at ministerial level* have been conducted by *Turkey, Syria and Iraq* on the *Dicle-Firat (Tigris-Euphrates)* situation.

3.4 Transboundary air pollution

Transboundary air pollution has not been perceived and addressed by Turkey as a priority environmental problem at either the national or regional level. As industrialisation and economic growth continue in Turkey and adjacent countries, *this issue is likely to grow in importance*, both environmentally and politically.

However, Turkey did ratify the *1979 Convention on Long-range Transboundary Air Pollution (LRTAP)*, developed within the UNECE, which covers Europe and

North America. It is a signatory to the associated 1984 protocol on the Co-operative Programme for Monitoring and Evaluation of the Long-range Transmissions of Air Pollutants in Europe (EMEP), and has made annual financial contributions to the Programme. Turkey has, in the past, taken some steps to *monitor air pollutants associated with transboundary environmental impacts*. In 2003, it hosted a NATO-CCMS conference on Air Pollution Monitoring and its Application, which included consideration of transboundary flows.

Turkey *did not sign the LRTAP Convention's protocols* on sulphur, nitrogen oxides, VOC and heavy metals, which commit the parties to specific pollutant reduction targets; nor is it a party to the Convention's Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone. Its position regarding these protocols is that, as long as it does not cause damage in other countries due to transboundary effects, it does not accept limitations on its right to emit pollution unless due regard is given to its special needs as a developing country (a position also adopted with respect to the Kyoto Protocol). Given Turkey's low emissions of the controlled air pollutants on a per capita basis, it contends that its stance on the UNECE protocols is consistent with this position and compatible with the UNCED Rio Principles. Turkish officials also note that implementation of the UNECE protocols would require costly measures to modify technology in various sectors, establish new treatment plants and upgrade fuel quality. Since 2000, Turkey has not provided annual reports on policies and measures or emissions data to the EMEP Secretariat.

It has also stopped participating actively in the EMEP Working Group on Effects. This situation is likely to change, given the importance the EU is attaching to transboundary air pollution in its work with Turkey on the environmental component of the *EU approximation process*. Technical studies are underway on legislative, administrative and other measures that Turkey will have to adopt to approximate EU approaches to air pollution, which should move it closer to ratification of the UNECE emission control protocols.

3.5 Desertification

Desert margins occupy 54.4% of Turkey's land area, rendering them a *vulnerable ecosystem of semi-arid and arid landscapes* prone to desertification.[13] Overall, 86% of Turkey's land area is affected by medium to serious soil erosion. Given the continuing expansion of agriculture, forestry and livestock raising in water-short regions of the country, and the possibility of future climate change-induced aridity, concern about desertification has grown in Turkey over the review period. Turkey participated during 2004-06, along with Italy, Greece and Portugal, in "Desert

Watch", a *satellite-based desertification monitoring programme* under the auspices of the European Space Agency.

In 1998, Turkey acceded to the *UN Convention on Desertification*. A *National Action Plan* for Combating Desertification was adopted in 2005; the Plan establishes principles for combating desertification, defines areas and levels of potential risk, and sets out methods, tools and criteria to prevent desertification and to remediate affected areas. MoEF is the central body responsible for co-ordinating the implementation of the National Action Plan, operating through its General Directorate of Afforestation and Erosion Control. A National Co-ordinating Body to Control Desertification integrates the capacities of other government ministries (e.g. MARA), universities and NGOs.

The latter include the Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection of Natural Habitats (TEMA), which participated actively in the design of the National Action Plan (Box 6.3). TEMA has subsequently carried out important anti-desertification efforts at the local level, including conducting courses in erosion control and other anti-desertification techniques for some 400 000 Turkish soldiers. *Numerous local-level projects* to combat desertification are underway across Turkey, involving erosion control, afforestation and rehabilitation of watersheds, rangelands and forests. MoEF and related organisations' plans call for efforts over 400 000 ha in 2007 and 420 000 ha in 2008. Given the scale of the threat nationally, however, the current collective level of effort by Turkey will have to be expanded substantially over the next decade if the economic and social values of large areas of arable lands are to be protected or enhanced.

Notes

1. The implementation of the CBD Convention is reviewed in Chapter 3, "Nature and Biodiversity Management".
2. Support is also provided by universities and private sector scientific institutes, including the Technology Development Foundation of Turkey (TTGV), an independent non-profit institution for R&D innovation and funding, which has assumed a prominent role in Turkey's efforts on stratospheric ozone depletion and climate change. The TTGV has aimed to raise the industrial sector's awareness of R&D and to support technology development projects by Turkish industry through funds provided by the Under-Secretariat of the Treasury from World Bank resources.
3. Most were negotiated on an agency-to-agency basis, beginning in 1991 with an agreement between the Turkish Ministry of Environment and its United States counterpart.
4. The Rotterdam and Stockholm Conventions have been signed by Turkey but not ratified.
5. Turkish private sector institutions also co-operate with their international counterparts on environmental management issues. The Society for the Protection of Nature of Turkey, for example, is a member of Bird Life International and is associated with the World Wild Fund for Nature (WWF), co-operating on biological diversity protection and the sustainable use of resources.
6. Consumption equals production of ODS plus imports minus exports.
7. 1 teragram (Tg) equals 10^{12} grams or 1 megatonne.
8. Notably, a National Climate Co-ordination Group was established in 1991 to study climate change implications and mitigation in preparation for the 1992 Rio Earth Summit.
9. The 1936 Montreux Convention Regarding the Regime of the Turkish Straits recognises and affirms the principle of freedom of transit and navigation by sea in the Istanbul Strait (Bosphorus) and the Çanakkale Strait (Dardanelles). It regulates the exercise of this freedom.
10. The value of VTS in navigational safety goes back to 1968 and a recommendation by the International Maritime Organisation (IMO), followed by specific IMO Guidelines for Vessel Traffic Services in 1985. Application of VTS systems was subsequently reinforced and refined by a series of IMO recommendations to governments under the International Convention for the Safety of Life at Sea (SOLAS). In 2000, the IMO endorsed VTS as an important contributor to improve safety at sea, more efficient navigation, and enhanced protection of the marine and near-shore environments. It noted that the use of VTS may only be made mandatory in sea areas within the territorial seas of a coastal state, but that contracting parties should endeavour to ensure compliance by ships under their flag.
11. EU-PHARE supported transition to democracy and market economies, with a main channel of assistance to potential new EU members.
12. EU-TACIS (Technical Assistance to the Commonwealth of Newly Independent States) included assistance to Georgia to meet its obligations under the Black Sea Action Plan.
13. This compares to desert margins coverage of 2.6% of Italy's land area, 79% of Iraq's, 36.5% of Greece's and 25% of Portugal's.

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The government documents, OECD documents and other documents used as sources for this chapter included the following. Also see list of websites at the end of this report.

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REFERENCES

I.A Selected environmental data

I.B Selected economic data

I.C Selected social data

II.A Selected multilateral agreements (worldwide)

II.B Selected multilateral agreements (regional)

III. Abbreviations

IV. Physical context

V. Selected environmental websites

I.A: SELECTED ENVIRONMENTAL DATA (1)

		CAN	MEX	USA	JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN
LAND													
Total area (1000 km^2)		9971	1958	9629	378	100	7713	270	84	31	79	43	338
Major protected areas (% of total area)	*2*	8.7	9.2	25.1	17.0	9.6	18.5	32.4	28.0	3.4	15.8	11.1	9.1
Nitrogenous fertiliser use (t/km^2 of agricultural land)		2.5	1.2	2.7	9.0	20.1	0.2	2.6	2.9	10.7	6.9	7.8	5.9
Pesticide use (t/km^2 of agricultural land)		0.06	0.04	0.08	1.24	1.20	-	0.02	0.09	0.69	0.10	0.11	0.06
Livestock densities (head of sheep eq./km^2 of agr. land)		192	256	191	1011	1560	62	685	492	1790	287	912	290
FOREST													
Forest area (% of land area)		45.3	33.9	32.6	68.9	63.8	21.4	34.7	41.6	22.4	34.1	12.7	75.5
Use of forest resources (harvest/growth)		0.4	0.2	0.6	0.4	0.1	0.6	..	0.7	0.9	0.7	0.7	0.7
Tropical wood imports (USD/cap.)	*3*	1.6	0.2	2.1	10.7	6.1	4.0	3.4	0.4	24.2	0.3	3.8	1.4
THREATENED SPECIES													
Mammals (% of species known)		20.3	31.8	16.8	23.3	11.4	23.8	18.0	22.0	30.5	20.0	22.0	10.8
Birds (% of species known)		9.8	16.2	11.7	13.1	6.3	13.0	21.0	27.7	28.1	50.0	16.3	13.3
Fish (% of species known)		29.6	27.6	31.7	36.0	8.9	1.0	10.0	50.6	23.8	41.5	15.8	11.8
WATER													
Water withdrawal (% of gross annual availability)		1.5	15.9	19.2	20.4	36.2	4.8	1.7	5.0	32.5	12.7	4.1	2.1
Public waste water treatment (% of population served)		72	35	71	67	79	..	80	86	46	71	88	81
Fish catches (% of world catches)		1.2	1.4	5.3	4.7	1.7	0.2	0.6	-	-	-	1.1	0.1
AIR													
Emissions of sulphur oxides (kg/cap.)		64.0	25.9	44.8	5.9	8.5	123.6	20.4	3.2	13.8	21.4	4.0	13.0
(kg/1000 USD GDP)	*4*	2.1	2.9	1.2	0.2	0.4	4.2	0.9	0.1	0.5	1.2	0.1	0.4
% change (1990-2005)		-34	-3	-37	-24	-50	58	54	-64	-60	-88	-88	-73
Emissions of nitrogen oxides (kg/cap.)		73.6	14.0	57.3	15.0	27.1	78.0	39.6	27.3	25.6	27.2	34.3	33.5
(kg/1000 USD GDP)	*4*	2.4	1.6	1.5	0.6	1.4	2.7	1.7	0.9	0.9	1.5	1.1	1.1
% change (1990-2005)		-1	14	-26	-6	50	25	58	7	-26	-63	-32	-40
Emissions of carbon dioxide (t./cap.)	*5*	17.0	3.7	19.6	9.5	9.3	18.5	8.5	9.4	10.7	11.6	8.8	10.6
(t./1000 USD GDP)	*4*	0.55	0.40	0.53	0.35	0.47	0.63	0.37	0.31	0.38	0.64	0.29	0.36
% change (1990-2005)		28	33	20	15	98	45	63	34	3	-23	-6	1
WASTE GENERATED													
Industrial waste (kg/1000 USD GDP)	*4, 6*	..	..	..	40	40	20	10	..	50	30	10	110
Municipal waste (kg/cap.)	*7*	420	340	750	400	380	690	400	560	460	290	740	470
Nuclear waste (t./Mtoe of TPES)	*8*	6.2	0.1	1.0	1.5	3.2	-	-	-	2.2	1.7	-	1.9

.. not available. - nil or negligible.

1) Data refer to the latest available year. They include provisional figures and Secretariat estimates.
Partial totals are underlined. Varying definitions can limit comparability across countries.

2) IUCN management categories I-VI and protected areas without IUCN category assignment; national classifications may differ.

3) Total imports of cork and wood from non-OECD tropical countries.

4) GDP at 2000 prices and purchasing power parities.

Source: OECD Environmental Data Compendium.

OECD EPR / SECOND CYCLE

FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SLO	ESP	SWE	CHE	**TUR**	UKD*	OECD*
549	357	132	93	103	70	301	3	42	324	313	92	49	506	450	41	**779**	245	35042
13.3	31.5	5.2	8.9	9.5	1.2	19.0	17.1	18.9	6.4	29.0	8.5	25.2	9.5	9.5	28.7	**4.3**	30.1	16.4
7.6	10.4	2.9	5.8	0.7	7.9	5.2	-	13.8	10.1	4.8	2.3	3.7	3.5	5.2	3.6	**3.6**	6.3	2.2
0.27	0.17	0.12	0.17	-	0.05	0.58	0.33	0.41	0.08	0.06	0.40	0.16	0.14	0.05	0.10	**0.06**	*0.21*	*0.07*
514	689	245	207	65	1139	488	4351	2142	845	315	498	226	339	409	794	**290**	*674*	208
31.6	30.2	22.8	19.5	1.3	9.4	23.3	34.5	9.5	39.2	30.0	36.9	41.6	33.3	73.5	30.8	**27.0**	11.6	34.4
0.6	0.5	0.6	0.5	-	0.7	0.5	0.5	0.6	0.5	0.6	0.8	0.5	0.5	0.7	0.8	**0.5**	0.6	0.6
6.8	1.8	2.7	0.1	2.8	11.2	7.2	-	15.6	3.6	0.3	17.6	0.1	6.2	2.2	0.6	**0.5**	2.7	4.0
19.0	37.9	37.8	37.8	-	1.8	40.7	51.6	18.6	13.7	13.5	26.2	21.7	13.3	18.3	32.9	**14.3**	*15.8*	..
19.2	27.3	1.9	14.5	44.0	5.4	18.4	23.1	21.6	16.1	7.8	38.1	14.0	26.9	17.5	36.4	**3.7**	*16.2*	..
36.1	68.2	26.2	43.2	-	23.1	35.1	27.9	22.1	9.4	21.0	62.9	24.1	51.4	10.9	38.9	**11.1**	*11.1*	..
17.5	18.9	12.1	4.8	0.1	2.3	44.0	3.3	10.0	0.9	18.3	12.0	1.3	33.3	1.5	4.7	**19.1**	*22.4*	*11.5*
79	93	56	60	50	70	69	95	99	76	59	60	52	55	85	97	**42**	*98*	*68*
0.7	0.3	0.1	-	1.9	0.3	0.3	-	0.6	2.7	0.2	0.2	-	0.9	0.3	-	**0.5**	0.7	26.2
7.6	6.8	49.1	12.8	27.5	17.0	7.1	6.3	3.8	5.2	33.2	20.7	16.5	28.9	4.4	2.3	**26.9**	11.8	25.7
0.3	0.3	2.2	0.8	0.8	0.5	0.3	0.1	0.1	0.1	2.7	1.1	1.2	1.3	0.1	0.1	**3.4**	0.4	1.0
-65	-90	16	-87	12	-62	-77	-80	-67	-54	-61	-31	-84	-42	-63	-59	**28**	-81	-45
19.8	17.5	29.9	20.1	94.0	28.0	19.0	30.3	21.1	42.6	21.3	24.6	18.1	35.1	22.7	11.5	**15.0**	27.1	32.1
0.7	0.7	1.3	1.3	2.8	0.8	0.7	0.5	0.7	1.1	1.7	1.3	1.3	1.5	0.8	0.4	**1.9**	1.0	1.2
-34	-50	19	-15	1	-5	-43	-39	-38	-7	-49	4	-55	22	-35	-47	**66**	-45	-22
6.4	9.9	8.6	5.7	7.5	10.6	7.7	24.9	11.2	8.0	7.8	6.0	7.1	7.9	5.6	6.0	**3.0**	8.8	11.0
0.23	0.38	0.39	0.37	0.22	0.31	0.30	0.42	0.38	0.20	0.62	0.32	0.52	0.34	0.19	0.19	**0.39**	0.31	0.43
9	-16	36	-18	16	42	14	8	16	29	-15	59	-33	65	-4	9	**70**	-5	16
50	20	..	30	10	40	20	30	40	20	120	50	130	30	110	-	**30**	30	50
540	600	440	470	520	740	540	710	620	760	250	470	270	650	480	650	**430**	580	560
4.2	1.2	-	1.7	-	-	-	-	0.1	-	-	-	3.0	1.2	4.1	1.9	**-**	1.0	1.5

UKD: pesticides and threatened species: Great Britain; water withdrawal and public waste water treatment plants: England and Wales.

5) CO_2 from energy use only; sectoral approach; international marine and aviation bunkers are excluded.

6) Waste from manufacturing industries.

7) CAN, NZL: household waste only.

8) Waste from spent fuel arising in nuclear power plants, in tonnes of heavy metal, per million tonnes of oil equivalent of total primary energy supply.

I.B: SELECTED ECONOMIC DATA (1)

		CAN	MEX	USA	JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK
GROSS DOMESTIC PRODUCT												
GDP, 2006 (billion USD at 2000 prices and PPPs)		1017	1028	11319	3537	1008	611	96	255	304	195	170
% change (1990-2006)		55.4	60.9	59.1	23.3	136.7	68.4	62.4	42.6	37.6	31.5	43.0
per capita, 2006 (1000 USD/cap.)		31.2	9.8	37.8	27.7	20.9	29.7	23.3	30.8	29.0	19.1	31.3
Exports, 2006 (% of GDP)		36.3	31.9	11.1	16.1	43.2	20.9	29.3	56.3	87.5	76.3	52.0
INDUSTRY	*2*											
Value added in industry (% of GDP)		32	27	23	31	43	26	25	32	27	40	27
Industrial production: % change (1990-2005)		46.7	51.3	55.9	3.2	210.9	30.5	29.5	70.1	21.0	11.8	38.3
AGRICULTURE												
Value added in agriculture (% of GDP)	*3*	3	4	2	1	4	4	7	2	1	4	3
Agricultural production: % change (1990-2005)		25.6	41.5	27.6	-12.3	19.3	25.4	47.9	9.9	13.0	..	0.7
Livestock population, 2005 (million head of sheep eq.)		118	275	787	53	30	283	99	17	25	12	24
ENERGY												
Total supply, 2005 (Mtoe)		272	177	2340	530	214	122	17	34	57	45	20
% change (1990-2005)		29.9	42.0	21.4	19.3	128.9	39.3	22.9	37.1	15.2	-7.7	9.6
Energy intensity, 2005 (toe/1000 USD GDP)		0.27	0.18	0.21	0.15	0.22	0.20	0.18	0.14	0.19	0.25	0.12
% change (1990-2005)		-14.1	-7.5	-21.5	-1.2	1.5	-15.3	-22.9	-0.8	-13.8	-25.3	-20.7
Structure of energy supply, 2005 (%)	*4*											
Solid fuels		10.2	4.9	23.8	21.1	23.1	44.5	11.9	11.9	9.1	43.6	19.1
Oil		35.5	58.8	40.8	47.4	45.0	31.1	40.4	42.5	40.7	21.6	42.1
Gas		29.4	25.0	21.8	13.3	12.8	18.9	18.9	24.2	25.2	16.6	22.6
Nuclear		8.8	1.6	9.0	15.0	17.9	-	-	-	22.1	14.0	-
Hydro, etc.		16.1	9.7	4.7	3.2	1.2	5.5	28.9	21.4	2.9	4.2	16.3
ROAD TRANSPORT	*5*											
Road traffic volumes per capita, 2004 (1000 veh.-km/cap.)		9.8	0.7	16.2	6.5	3.2	9.8	12.3	9.3	9.0	4.6	7.8
Road vehicle stock, 2005 (10 000 vehicles)		1883	2205	24119	7404	1540	1348	271	502	559	439	245
% change (1990-2005)		13.8	129.3	27.8	31.1	353.5	37.9	47.0	36.0	31.2	69.4	29.5
per capita (veh./100 inh.)		58	21	81	58	32	66	66	61	54	43	45

.. not available. - nil or negligible.

1) Data may include provisional figures and Secretariat estimates. Partial totals are underlined.

2) Value added: includes mining and quarrying, manufacturing, gas, electricity and water and construction; production: excludes construction.

Source: OECD Environmental Data Compendium.

OECD EPR / SECOND CYCLE

FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SLO	ESP	SWE	CHE	**TUR**	UKD	OECD
161	1743	2225	257	162	11	151	1556	28	494	188	505	198	79	1036	282	245	**603**	1760	31225
44.5	34.9	30.1	62.5	38.6	64.7	174.6	23.5	108.2	49.4	65.0	79.2	40.2	46.5	60.7	42.1	22.2	**86.3**	47.7	48.7
30.5	28.5	27.0	23.1	16.1	34.6	35.6	26.4	61.7	30.2	40.4	13.3	18.7	14.7	23.5	31.1	32.7	**8.2**	29.2	26.6
44.5	26.9	45.1	18.6	77.8	32.2	79.8	27.9	166.4	73.2	46.6	40.3	31.1	85.7	26.0	51.3	52.5	**28.2**	28.4	26.0
32	25	30	23	31	27	42	29	20	26	38	30	29	32	30	28	27	**31**	26	29
75.6	18.2	16.9	19.5	92.2	..	312.8	10.5	57.6	20.8	35.5	113.0	15.1	19.5	27.0	55.3	27.6	**78.3**	8.6	34.6
4	3	1	7	4	9	3	3	1	3	2	3	4	5	3	2	1	**12**	1	3
-3.9	0.9	-4.7	10.1	-10.5	5.4	2.6	10.7	13	-9.2	-9.4	-15.8	1.1	..	7.4	-10.2	-4.3	**18.2**	-8.0	..
8	156	117	21	12	1	50	64	6	42	9	58	19	6	100	13	12	**111**	113	2639
35	276	345	31	28	4	15	185	5	82	32	93	27	19	145	52	27	**85**	234	5548
19.8	21.1	-3.2	39.7	-2.8	66.9	47.5	25.2	33.7	22.6	49.3	-6.9	53.1	-11.7	59.4	9.7	8.6	**60.9**	10.3	22.6
0.23	0.16	0.16	0.13	0.18	0.36	0.11	0.12	0.18	0.17	0.18	0.20	0.14	0.26	0.15	0.19	0.11	**0.15**	0.14	0.18
-13.0	-8.2	-23.3	-10.4	-27.1	5.7	-43.2	3.3	-31.9	-15.5	-6.9	-44.8	10.6	-34.7	3.0	-19.3	-8.2	**-8.4**	-23.2	-15.1
14.8	5.1	23.7	29.2	11.3	2.7	17.8	9.1	1.8	10.2	2.3	58.1	12.6	22.2	14.1	5.0	0.6	**26.3**	16.2	20.4
32.0	32.5	35.8	57.7	26.5	24.5	56.7	45.2	70.3	41.0	42.8	23.6	59.8	18.1	49.1	28.3	48.1	**35.0**	36.3	40.6
10.8	14.6	23.4	7.7	44.4	-	23.0	39.0	26.2	44.0	15.6	13.0	14.1	30.8	20.5	1.6	10.5	**26.7**	36.4	21.8
18.1	41.9	12.3	-	13.3	-	-	-	-	1.3	-	-	-	24.4	10.3	35.9	23.0	**-**	9.1	11.0
24.3	5.9	4.8	5.4	4.5	72.7	2.6	6.7	1.7	3.6	39.3	5.3	13.5	4.5	6.0	29.2	17.9	**11.9**	2.0	6.2
9.7	8.6	7.1	8.7	2.3	10.2	9.5	8.9	8.9	8.0	7.8	3.9	7.4	2.7	4.8	8.2	8.0	**0.8**	8.2	8.4
282	3617	4803	552	333	21	198	3894	34	806	252	1472	552	150	2516	463	419	**843**	3217	64939
26.2	27.1	28.8	118.7	49.4	59.8	108.5	30.2	68.0	40.7	29.9	126.8	151.3	44.4	74.2	17.9	28.9	**257.1**	35.0	38.7
54	59	58	50	33	72	48	66	74	49	55	39	52	28	58	51	56	**12**	54	56

3) Agriculture, forestry, hunting, fishery, etc.

4) Breakdown excludes electricity trade.

5) Refers to motor vehicles with four or more wheels, except for Italy, which include three-wheeled goods vehicles.

I.C: SELECTED SOCIAL DATA (1)

		CAN	MEX	USA	JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK
POPULATION												
Total population, 2006 (100 000 inh.)		326	1049	2994	1278	483	206	41	83	105	103	54
% change (1990-2006)		17.8	24.9	19.9	3.5	12.7	20.7	23.1	7.3	5.5	-1.1	5.7
Population density, 2006 (inh./km^2)		3.3	53.6	31.1	338.2	484.9	2.7	15.3	98.8	344.3	130.0	126.1
Ageing index, 2006 (over 64/under 15)		76.4	17.4	61.3	152.6	51.0	68.6	58.6	106.0	100.5	97.0	81.8
HEALTH												
Women life expectancy at birth, 2005 (years)		82.6	77.9	80.4	85.5	81.9	83.3	81.7	82.2	81.6	79.1	80.2
Infant mortality, 2005 (deaths /1 000 live births)		5.3	18.8	6.8	2.8	5.3	5.0	5.1	4.2	3.7	3.4	4.4
Expenditure, 2005 (% of GDP)		9.8	6.4	15.3	8.0	6.0	9.5	9.0	10.2	10.3	7.2	9.1
INCOME AND POVERTY												
GDP per capita, 2006 (1000 USD/cap.)		31.2	9.8	37.8	27.7	20.9	29.7	23.3	30.8	29.0	19.1	31.3
Poverty (% pop. < 50% median income)		10.3	20.3	17.0	15.3	..	11.2	10.4	9.3	7.8	4.4	4.3
Inequality (Gini levels)	*2*	30.1	48.0	35.7	31.4	..	30.5	33.7	26.0	26.0	25.0	24.0
Minimum to median wages, 2000	*3*	42.5	21.1	36.4	32.7	25.2	57.7	46.3	x	49.2	32.3	x
EMPLOYMENT												
Unemployment rate, 2006 (% of civilian labour force)	*4*	6.3	3.2	4.6	4.1	3.5	4.8	3.8	4.7	8.2	7.1	3.9
Labour force participation rate, 2006 (% 15-64 years)		79.4	64.4	75.2	79.5	69.1	77.2	80.3	79.1	67.8	71.1	81.7
Employment in agriculture, 2006 (%)	*5*	2.6	14.1	1.5	4.3	7.7	3.5	7.1	5.5	2.0	3.8	3.0
EDUCATION												
Education, 2005 (% 25-64 years)	*6*	85.2	21.3	87.8	84.0	75.5	65.0	78.7	80.6	66.1	89.9	81.0
Expenditure, 2004 (% of GDP)	*7*	6.1	6.4	7.4	4.8	7.2	5.9	6.9	5.4	6.1	4.9	7.2
OFFICIAL DEVELOPMENT ASSISTANCE	*8*											
ODA, 2006 (% of GNI)		0.29	..	0.18	0.25	..	0.30	0.27	0.47	0.50	..	0.80
ODA, 2006 (USD/cap.)		113	..	79	88	..	103	62	181	188	..	411

.. not available. - nil or negligible. x not applicable.

1) Data may include provisional figures and Secretariat estimates. Partial totals are underlined.

2) Ranging from 0 (equal) to 100 (inequal) income distribution; figures relate to total disposable income (including all incomes, taxes and benefits) for the entire population.

3) Minimum wage as a percentage of median earnings including overtime pay and bonuses.

Source: OECD.

OECD EPR / SECOND CYCLE

FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SLO	ESP	SWE	CHE	**TUR**	UKD	OECD
53	612	824	111	101	3	42	589	5	163	47	381	106	54	441	91	75	**731**	603	11753
5.6	8.0	3.8	10.2	-2.9	19.2	20.9	3.8	19.8	9.3	10.1	0.3	7.2	1.7	13.4	6.1	11.5	**30.2**	5.4	12.6
15.6	111.5	230.7	84.3	108.3	2.9	60.3	195.3	177.9	393.6	14.4	122.0	115.1	109.9	87.1	20.2	181.3	**93.8**	246.3	33.5
94.7	89.5	144.5	129.6	103.6	53.9	54.4	138.3	77.3	79.0	75.5	83.4	111.5	72.3	115.0	101.2	101.4	**21.3**	90.2	73.5
82.3	83.8	81.8	81.7	76.9	83.1	81.8	83.2	82.3	81.6	82.5	79.4	81.4	77.9	83.9	82.8	83.9	**74.0**	81.1	..
3.0	3.6	3.9	3.8	6.2	2.3	4.0	4.7	2.6	4.9	3.1	6.4	3.5	7.2	4.1	2.4	4.2	**22.6**	5.1	..
7.5	11.1	10.7	10.1	8.1	9.3	7.5	9.0	7.4	9.2	8.7	6.2	10.2	7.1	8.3	9.1	11.3	**7.6**	8.3	..
30.5	28.5	27.0	23.1	16.1	34.6	35.6	26.4	61.7	30.2	40.4	13.3	18.7	14.7	23.5	31.1	32.7	**8.2**	29.2	26.6
6.4	7.0	9.8	13.5	8.2	..	15.4	12.9	5.5	6.0	6.3	9.8	13.7	..	11.5	5.3	6.7	**15.9**	11.4	10.2
25.0	28.0	28.0	33.0	27.0	35.0	32.0	33.0	26.0	27.0	25.0	31.0	38.0	33.0	31.0	23.0	26.7	**45.0**	34.0	30.7
x	60.8	x	51.3	37.2	x	55.8	x	48.9	47.1	x	35.5	38.2	..	31.8	x	x	**..**	41.7	..
7.7	9.2	9.8	8.9	7.4	2.9	4.4	6.8	4.7	3.9	3.5	13.8	7.7	13.3	8.5	7.0	4.1	**9.7**	5.3	6.1
75.2	68.8	77.7	65.4	60.7	85.7	73.5	63.2	67.5	79.1	79.7	62.9	78.1	68.7	72.4	78.7	87.6	**52.5**	76.4	71.8
4.7	3.4	2.3	12.0	4.9	6.3	5.7	4.3	1.3	3.0	3.3	15.8	11.8	4.4	4.8	2.0	3.7	**27.3**	1.3	5.5
78.8	66.3	83.1	57.1	76.4	62.9	64.5	50.1	65.9	71.8	77.2	51.4	26.5	85.7	48.8	83.6	83.0	**27.2**	66.7	68.1
6.1	6.1	5.2	3.4	5.6	8.0	4.6	4.9	3.6	5.1	6.6	6.0	5.4	4.8	4.7	6.7	6.5	**4.1**	5.9	5.7
0.40	0.47	0.36	0.17	..	..	0.54	0.20	0.89	0.81	0.89	..	0.21	..	0.32	1.02	0.39	**..**	0.51	0.31
158	173	127	38	..	..	241	62	632	334	633	..	37	..	87	436	220	**..**	207	63

4) Standardised unemployment rates; MEX, ISL, TUR: commonly used definitions.

5) Civil employment in agriculture, forestry and fishing.

6) Upper secondary or higher education; OECD: average of rates.

7) Public and private expenditure on educational institutions; OECD: average of rates.

8) Official Development Assistance by Member countries of the OECD Development Assistance Committee.

II.A: SELECTED MULTILATERAL AGREEMENTS (WORLDWIDE)

Y = in force S = signed R = ratified D = denounced

				CAN	MEX	USA
1946	Washington	Conv. - Regulation of whaling	Y	D	R	R
1956	Washington	Protocol	Y	D	R	R
1949	Geneva	Conv. - Road traffic	Y	R		R
1957	Brussels	Conv. - Limitation of the liability of owners of sea-going ships	Y	S		
1979	Brussels	Protocol	Y			
1958	Geneva	Conv. - Fishing and conservation of the living resources of the high seas	Y	S	R	R
1959	Washington	Treaty - Antarctic	Y	R		R
1991	Madrid	Protocol to the Antarctic treaty (environmental protection)	Y	R		R
1960	Geneva	Conv. - Protection of workers against ionising radiations (ILO 115)	Y		R	
1962	Brussels	Conv. - Liability of operators of nuclear ships				
1963	Vienna	Conv. - Civil liability for nuclear damage	Y		R	
1988	Vienna	Joint protocol relating to the application of the Vienna Convention and the Paris Convention	Y			
1997	Vienna	Protocol to amend the Vienna convention	Y			
1963	Moscow	Treaty - Banning nuclear weapon tests in the atmosphere, in outer space and under water	Y	R	R	R
1964	Copenhagen	Conv. - International council for the exploration of the sea	Y	R		R
1970	Copenhagen	Protocol	Y	R		R
1969	Brussels	Conv. - Intervention on the high seas in cases of oil pollution casualties (INTERVENTION)	Y		R	R
1973	London	Protocol (pollution by substances other than oil)	Y		R	R
1969	Brussels	Conv. - Civil liability for oil pollution damage (CLC)	Y	D	D	S
1976	London	Protocol	Y	R	R	
1992	London	Protocol	Y	R	R	
1970	Bern	Conv. - Transport of goods by rail (CIM)	Y			
1971	Brussels	Conv. - International fund for compensation for oil pollution damage (FUND)		D	D	S
1976	London	Protocol	Y	R	R	
1992	London	Protocol (replaces the 1971 Convention)	Y	R	R	
2000	London	Amendment to protocol (limits of compensation)	Y	R	R	
2003	London	Protocol (supplementary fund)	Y			
1971	Brussels	Conv. - Civil liability in maritime carriage of nuclear material	Y			
1971	London, Moscow, Washington	Conv. - Prohib. emplacement of nuclear and mass destruct. weapons on sea-bed, ocean floor and subsoil	Y	R	R	R
1971	Ramsar	Conv. - Wetlands of international importance especially as waterfowl habitat	Y	R	R	R
1982	Paris	Protocol	Y	R	R	R
1987	Regina	Regina amendment	Y	R	R	
1971	Geneva	Conv. - Protection against hazards of poisoning arising from benzene (ILO 136)	Y			
1972	London, Mexico, Moscow,	Conv. - Prevention of marine pollution by dumping of wastes and other matter (LC)	Y	R	R	R
1996	London	Protocol to the Conv. - Prevention of marine poll. by dumping of wastes and other matter	Y	R	R	S
1972	Geneva	Conv. - Protection of new varieties of plants (revised)	Y	R	R	R

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	**TUR**	UKD	EU
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		R	R		R	R	R	R	R		R	
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		R	R		R	R	R	R	R		R	
R	R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R	R	R	S	**R**	R	
D		D			D		D	D	D	D			R		S		D	D	R	R		R	D	R		D	
		R			R			S		S						R			R	R		R		R		D	
		R	S		R		R	R	R				S	S			R			R		R		R		R	
R	R	R	R	R	R	R	R	R	R	R	R	R			R		R	R	R		R	R	R	R	**R**	R	
R	R	R	R	S	R	R	S	R	R	R	R	S			R		R	R	R		S	R	R	S		R	
R					R	R	R	R	R	R	R	R			R		R	R	R	R	R	R	R	R	**R**	R	
	S				S					S				S			R			R							
						R						R							R		R	S				S	
					S	R	R	R	S	R	R	R			R		R	R	R	S	R	S	R	S	**R**	S	
						S						S			S				S								
R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	S	R	R	R	R	**R**	R	
					R		R	R	R	R			R	R			R	R	R	R		R	R			R	
					R		R	R	R	R			R	R			R	R	R	R		R	R			R	
R	S	R	R		R		R	R	R	R	S		R	R	R		R	R	R	R		R	R	R		R	
		R	S		R		R	R	R	R				R	R		R	R	R	R		R	R	R		R	
D	D	D	D		D		D	D	D	D	D		D	D	D	D	D	D	D	D		D	D	D		D	
R	R	R			R		R	R	R	R	R		R	D	R	R	R	R	R	R		R	R	R		D	
R	R	R	R		R		R	R	R	R	R	R	R	R	R	R	R	R	R	R		R	R	R	**R**	R	
				R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	
D	D	D	D		D		D	D	D	D	D		D	D	D		D	D	D	D		D	D	D		D	
R		R			R		R	R	R	R	R		R	D	R		R	R	R	R		R	R			D	
R	R	R	R		R		R	R	R	R	R	R	R	R	R	R	R	R	R	R		R	R	R	**R**	R	
R	R	R	R		R		R	R	R	R	R		R	R	R	R	R	R	R	R		R	R	R	**R**	R	
R					R		R	R	R	R	R	R		R	R		R	R		R		R	R			R	
					R		R	R	R	R					R		R	R		S		R	R			S	
R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	
R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	
R	R	R	R	R			R	R	R	R	R	R	R	R		R	R	R	R				R	R	**R**	R	
						R		R	R	R	R	R			R						R	R		R			
R	R	R	R		R		R	R	R	R	R	R	R	R	R	R	R	R	R	R		R	R	R		R	
		R	R		R		R		R	R			R	R	R	R	S	R				R	R	R		R	
R	R	R	R	R	R	R	R	R	R	R		R	R	R	R		R	R	R	R	R	R	R	R		R	R

II.A: SELECTED MULTILATERAL AGREEMENTS (WORLDWIDE) (cont.)

Y = in force S = signed R = ratified D = denounced

			CAN	MEX	USA
1978	Geneva	Amendments	Y R	R	R
1991	Geneva	Amendments	Y		R
1972	Geneva	Conv. - Safe container (CSC)	Y R	R	R
1972	London, Moscow, Washington	Conv. - International liability for damage caused by space objects	Y R	R	R
1972	Paris	Conv. - Protection of the world cultural and natural heritage	Y R	R	R
1973	Washington	Conv. - International trade in endangered species of wild fauna and flora (CITES)	Y R	R	R
1974	Geneva	Conv. - Prev. and control of occup. hazards caused by carcinog. subst. and agents (ILO 139)	Y		
1976	London	Conv. - Limitation of liability for maritime claims (LLMC)	Y	R	
1996	London	Amendment to convention	Y S		
1977	Geneva	Conv. - Protection of workers against occupational hazards in the working environment due to air pollution, noise and vibration (ILO 148)	Y		
1978	London	Protocol - Prevention of pollution from ships (MARPOL PROT)	Y R	R	R
1978	London	Annex III	Y R		R
1978	London	Annex IV	Y		
1978	London	Annex V	Y	R	R
1997	London	Annex VI	Y		S
1979	Bonn	Conv. - Conservation of migratory species of wild animals	Y		
1991	London	Agreem. - Conservation of bats in Europe	Y		
1992	New York	Agreem. - Conservation of small cetaceans of the Baltic and the North Seas (ASCOBANS)	Y		
1996	Monaco	Agreem. - Conservation of cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area	Y		
1996	The Hague	Agreem. - Conservation of African-Eurasian migratory waterbirds	Y		
2001	Canberra	Agreem. - Conservation of albatrosses and petrels (ACAP)	Y		
1982	Montego Bay	Conv. - Law of the sea	Y R	R	
1994	New York	Agreem. - relating to the implementation of part XI of the convention	Y R	R	S
1995	New York	Agreem. - Implementation of the provisions of the convention relating to the conservation and management of straddling fish stocks and highly migratory fish stocks	Y R		R
1983	Geneva	Agreem. - Tropical timber	Y R		R
1994	New York	Revised agreem. - Tropical timber	Y R	R	R
2006	Geneva	Revised agreem. - Tropical timber		S	R
1985	Vienna	Conv. - Protection of the ozone layer	Y R	R	R
1987	Montreal	Protocol (substances that deplete the ozone layer)	Y R	R	R
1990	London	Amendment to protocol	Y R	R	R
1992	Copenhagen	Amendment to protocol	Y R	R	R
1997	Montreal	Amendment to protocol	Y R	R	R
1999	Beijing	Amendment to protocol	Y R	R	R
1986	Vienna	Conv. - Early notification of a nuclear accident	Y R	R	R
1986	Vienna	Conv. - Assistance in the case of a nuclear accident or radiological emergency	Y R	R	R

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	**TUR**	UKD	EU
R	R	R	R	R		R	R	R	R	R		R	R	R	R		R	R	R	R	R	R	R	R		R	R
R	R	R		R		R	R	R		R		R	R				R		R			R	R			R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	**S**	R	
R	R	R	R	R	R	R	R	R	R	R	R	R	S	R	R	R	R	R	R		R	R	R	R		R	
R	R	R	R	R	R	S	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	
R					R	R	R	R	R	R		R	R	R	R			R		R	R		R	R			
R		R	R		R		R	R	R	R	R			R		R	R	D	R			R	R	R	**R**	R	
R		R					R	R	R	R						R	S	R				R	R			R	
					R	R	R	R	R	R		R			R			R	R	R	R	R	R			R	
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		R	
R	R	R		R	R	R	R	R	R	R	R	R			R	R	R	R	R	R	R	R	R	R		R	
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	
R	R	R			R		R	R	R	R	R				R	R	R	R	R			R	R			R	
		R	R	R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R		R	R
				R	R	R	R	R	R	R		R		R		R	R	R	R	R	R		R			R	
					R		R	R	R	R							R		R				R			R	S
									R		R				R					R		R					
					R	R	R	R	R	R	S	R		R	R	R	R			R	R	R	R	R		R	R
		R	R						R									R				R				R	
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	S		R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	S		R	R
S	S	R	R	R	R		R	R	R	R	R		R	R	R	R	R	R	R	R		R	R			R	R
R	R	R	R	R	R		R	R	R	R	R			R	R	R	R	R		R		R	R	R		R	R
R	R	R	R	R	R		R	R	R	R	R			R	R	R	R	R		R		R	R	R		R	R
R											S							S						S			R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	
R	R	R	R	R	R	R	S	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	

II.A: SELECTED MULTILATERAL AGREEMENTS (WORLDWIDE) (cont.)

Y = in force S = signed R = ratified D = denounced

		CAN	MEX	USA
1989 Basel	Conv. - Control of transboundary movements of hazardous wastes and their disposal	Y R	R	S
1995 Geneva	Amendment			
1999 Basel	Prot. - Liability and compensation for damage			
1989 London	Conv. - Salvage	Y R	R	R
1990 Geneva	Conv. - Safety in the use of chemicals at work (ILO 170)	Y	R	
1990 London	Conv. - Oil pollution preparedness, response and co-operation (OPRC)	Y R	R	R
2000 London	Protocol - Pollution incidents by hazardous and noxious substances (OPRC-HNS)	Y		
1992 Rio de Janeiro	Conv. - Biological diversity	Y R	R	S
2000 Montreal	Prot. - Biosafety (Cartagena)	Y S	R	
1992 New York	Conv. - Framework convention on climate change	Y R	R	R
1997 Kyoto	Protocol	Y R	R	S
1993 Paris	Conv. - Prohibition of the development, production, stockpiling and use of chemical weapons and their destruction	Y R	R	R
1993 Geneva	Conv. - Prevention of major industrial accidents (ILO 174)	Y		
1993	Agreem. - Promote compliance with international conservation and management measures by fishing vessels on the high seas	Y R	R	R
1994 Vienna	Conv. - Nuclear safety	Y R	R	R
1994 Paris	Conv. - Combat desertification in those countries experiencing serious drought and/or desertification, particularly in Africa	Y R	R	R
1996 London	Conv. - Liability and compensation for damage in connection with the carriage of hazardous and noxious substances by sea (HNS)	S		
1997 Vienna	Conv. - Supplementary compensation for nuclear damage			S
1997 Vienna	Conv. - Joint convention on the safety of spent fuel management and on the safety of radioactive waste management	Y R		R
1997 New York	Conv. - Law of the non-navigational uses of international watercourses			
1998 Rotterdam	Conv. - Prior informed consent procedure for hazardous chemicals and pesticides (PIC)	Y R	R	S
2001 London	Conv. - Civil liability for bunker oil pollution damage			
2001 London	Conv. - Control of harmful anti-fouling systems on ships		R	S
2001 Stockholm	Conv. - Persistent organic pollutants	Y R	R	S

Source: IUCN; OECD.

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	**TUR**	UKD	EU
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
			R	R	R	R	R	R	R	R		R				R	R	R	R	R	R	R	R	R	**R**	R	R
							S	S	S			S				S								S	S		S	
		R	R		R		R	R	R	R	R		R	R	R		R	R	R			R	R	R		R	
	R														R			R	R				R				
R	R	R	R				R	R	R	R	R		R	R	R		R	R	R	R		R	R	R	**R**	R	
		R					S	S	S	S	R						R		R	R		R	R				
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
R	R		R	R	R	R	R	R	R	R	R	R	S	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	
					R												R						R				
R	R	R	R															R						R			R	
R	R	R		R	R	R	R	R	R	R	R	R	S	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
							S	S		S							S	S					S			S	
		S				S									S												
R	R	R		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		R	
								R		R		R				S	R	R		R			R				
R	R	R	R	R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R	**S**	R	R
										R	R				S	R						R	S			R	
R		R					R	S	R		R					R		R	R			R	R				
R	R	R	R	R	R	R	R	R	R	R	R	R	R	S	S	R	R	R	S	R	R	R	R	R	**S**	R	R

II.B: SELECTED MULTILATERAL AGREEMENTS (REGIONAL)

			CAN	MEX	USA
1946	London	Conv. - Regulation of the meshes of fishing nets and the size limits of fish	Y		
1950	Paris	Conv. - Protection of birds	Y		
1957	Geneva	Agreem. - International carriage of dangerous goods by road (ADR)	Y		
1975	New York	Protocol	Y		
1958	Geneva	Agreem. - Adoption of uniform conditions of approval and reciprocal recognition of approval for motor vehicle equipments and parts	Y		
1960	Paris	Conv. - Third party liability in the field of nuclear energy	Y		
1963	Brussels	Supplementary convention	Y		
1964	Paris	Additional protocol to the convention	Y		
1964	Paris	Additional protocol to the supplementary convention	Y		
1982	Brussels	Protocol amending the convention	Y		
1982	Brussels	Protocol amending the supplementary convention	Y		
1988	Vienna	Joint protocol relating to the application of the Vienna Convention and the Paris Convention	Y		
1964	London	Conv. - Fisheries	Y		
1968	Strasbourg	Agreem. - Restriction of the use of certain detergents in washing and cleaning products	Y		
1968	Paris	Conv. - Protection of animals during international transport	Y		
1969	London	Conv. - Protection of the archaeological heritage	Y		
1976	Barcelona	Conv. - Protection of the Mediterranean Sea against pollution	Y		
1976	Barcelona	Protocol (dumping from ships and aircraft)	Y		
1995	Barcelona	Protocol (dumping from ships and aircraft or incineration at sea)			
1976	Barcelona	Protocol (pollution by oil and other harmful substances in cases of emergency)	Y		
2002	Valletta	Protocol (preventing pollution from ships and, in cases of emergency, combating pollution)	Y		
1980	Athens	Protocol (pollution from land-based sources)	Y		
1996	Syracuse	Protocol (pollution from land-based sources and activities)			
1982	Geneva	Protocol (specially protected areas)	Y		
1996	Monaco	Protocol (specially protected areas and biological diversity)	Y		
1994	Madrid	Protocol (pollution from exploitation of continental shelf, seabed and subsoil)			
1995	Barcelona	Amendment to convention	Y		
1996	Izmir	Protocol (pollution by transboundary movements of hazardous wastes and their disposal)			
2008	Madrid	Protocol (Integrated Coastal Zone Management for the Mediterranean)			
1976	Monaco	Agreem. - Protection of the waters of the mediterranean coastline (RAMOGE)	Y		
1979	Bern	Conv. - Conservation of European wildlife and natural habitats	Y		
1979	Geneva	Conv. - Long-range transboundary air pollution (CLRTAP)	Y	R	R
1984	Geneva	Protocol (financing of EMEP)	Y	R	R
1985	Helsinki	Protocol (reduction of sulphur emissions or their transboundary fluxes by at least 30%)	Y	R	
1988	Sofia	Protocol (control of emissions of nitrogen oxides or their transboundary fluxes)	Y	R	R
1991	Geneva	Protocol (control of emissions of volatile organic compounds or their transboundary fluxes)	Y	S	S
1994	Oslo	Protocol (further reduction of sulphur emissions)	Y	R	
1998	Aarhus	Protocol (heavy metals)	Y	R	R
1998	Aarhus	Protocol (persistent organic pollutants)	Y	R	R
1999	Gothenburg	Protocol (abate acidification, eutrophication and ground-level ozone)	Y	S	R

OECD EPR / SECOND CYCLE

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	**TUR**	UKD	EU
					R		R		R	R			R	R			R	R	R	R		R	R			R	
				S	R				S		S		R		R	R	R			S		R	R	R	**R**		
				R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R		R	
				R	R		R	R	R	R		R			R	R	R	R	R	R		R	R	R		R	
R	R	R	R	R	R	R	R	R	R	R	R	R			R	R	R	R	R	R	R	R	R	R	**R**	R	R
				S	R		R	R	R	R	R				R	S	R	R		R		R	R	S	**R**	R	
				S	R		R	R	R	R					R	S	R	R				R	R	S		R	
				S	R		R	R	R	R	R				R	S	R	R		R		R	R	S	**R**	R	
				S	R		R	R	R	R					R	S	R	R				R	R	S		R	
				S	R		R	R	R	R	R				R	S	R	R		R		R	R	S	**R**	R	
				S	R		R	R	R	R					R	S	R	R				R	R	S		R	
					S	R	R	R	S	R	R	R			R		R	R	R	S	R	S	R	S	**R**	S	
					R		R		R	R				R	R	S	R		R	R		R	R			R	
					R		R		R	R					R	R	R					R		R		R	
				R	R	R	R	R	R	R	R		R	R	R	R	R	D		R		R	D	R	**R**	R	
				R	R		D		D	R	D		R		R	R				D		R	D	D		D	
									R		R				R							R			**R**		R
									R		R				R							R			**R**		R
									R						R							R			**R**		R
									R		R				R							R			**R**		R
									R		S				S							S			**R**		R
									R		R				R							R			**R**		R
									R		R				R							R			**R**		R
									R		R				R							R			**R**		R
									R		S				R							R			**R**		R
											S				S							S					
									R		R				R							R			**R**		R
											S				S							S			**R**		
									R		R				R							R					
									R						R												
				R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
				R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
				R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R	**R**	R	R
				R	R	R	R	R	R	R		R			R	R	R	R	R		R		R	R			
				R	R	R	R	R	R	R	R	R		R	R	R	R	R	S		R	R	R	R		R	R
				R	R	R	R	R	R	R	S	R			R	R	R	R		S	R	R	R	R		R	S
				R	R	R	R	R	R	R	R	R		R	R	R	R	R	S		R	R	R	R		R	R
				R	R	R	R	R	R	R	S	R	S	S	S	R	R	R	S	S	R	S	R	R		R	R
				R	R	R	R	R	R	R	S	R	R	S	R	R	R	R	S	S	R	S	R	R		R	R
				S	R	R	R	R	R	R	S	R		S	S	R	R	R	S	R	R	R	R	R		R	R

II.B: SELECTED MULTILATERAL AGREEMENTS (REGIONAL) (cont.)

		CAN	MEX	USA
1980 Madrid	Conv. - Transfrontier co-operation between territorial communities or authorities	Y		
1995 Strasbourg	Additional protocol	Y		
1998 Strasbourg	Second protocol	Y		
1980 Bern	Conv. - International carriage of dangerous goods by train (COTIF)	Y		
1982 Paris	Memorandum of understanding on port state control	Y	R	
1989 Geneva	Conv. - Civil liab. for damage caused during carriage of dang. goods by road, rail, and inland navig. (CRTD)			
1991 Espoo	Conv. - Environmental impact assessment in a transboundary context	Y	R	S
2001 Sofia	Amendment			
2003 Kiev	Prot.- Strategic environmental assessment			
1992 Helsinki	Conv. - Transboundary effects of industrial accidents	Y	S	S
2003 Kiev	Prot. - Civil liability and compensation for damage caused by the transboundary effects of industrial accidents on transboundary waters			
1992 Bucharest	Conv. - Protection of the Black Sea against pollution	Y		
1992 Bucharest	Protocol (combatting pollution by oil and other harmful substances in emergency situation)	Y		
1992 Bucharest	Protocol (protection of the Black Sea marine environment against pollution from dumping)	Y		
1992 Bucharest	Protocol (protection of the Black Sea marine env. against poll. from land based sources)	Y		
1992 Helsinki	Conv. - Protection and use of transboundary water courses and international lakes	Y		
1999 London	Prot. - Water and health	Y		
2003 Kiev	Prot. - Civil liability and compensation for damage caused by the transboundary effects of industrial accidents on transboundary waters			
1992 La Valette	European Conv. - Protection of the archaeological heritage (revised)	Y		
1992 Vienna	Agreem. - Forecast, prevention and mitigation of natural and technological disasters			
1993 Lugano	Conv. - Civil liability for damage resulting from activities dangerous to the environment			
1993 Copenhagen	Agreem. - Co-op. in the prevention of marine poll. from oil and other dangerous chemicals	Y		
1994 Lisbon	Treaty - Energy Charter	Y		
1994 Lisbon	Protocol (energy efficiency and related environmental aspects)	Y		
1998 Aarhus	Conv. - Access to env. information and public participation in env. decision-making	Y		
2003 Kiev	Prot. - Pollutant Release and Transfer Registers (PRTR)			
1998 Strasbourg	Conv. - Protection of the environment through criminal law			
2000 Florence	Conv. - European landscape convention	Y		
2000 Geneva	Agreem. - International carriage of dangerous goods by inland waterways (AND)			

Source: IUCN; OECD.

OECD EPR / SECOND CYCLE

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	**TUR**	UKD	EU
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				S	S	S	S	S	S	R	S	S		S	S	R	R	S	S	S		S	S	R		S	R
				S	S		S	S	S	S	S		S		S	S							S				
					R	R	R	R	R		S	S		R	R	R	R	R	R	R	R	S	S	S	**R**	R	
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Reference III
ABBREVIATIONS

AEWA	African-Eurasian Migratory Waterbirds Agreement
APELL	Awareness and Preparedness for Emergencies at a Local Level (UNEP)
ARIP	Agricultural Reform Implementation Project
ATAK	Mediterranean-Aegean Tourism Infrastructure and Coastal Zone Management
BMU	Biodiversity Monitoring Unit
ÇATAK	Environmentally Based Agricultural Land Protection
ÇATOM	Multi-purpose social centres
CBD	UN Convention on Biological Diversity
CFCs	Chlorofluorocarbons
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Bonn Convention on the Conservation of Migratory Species of Wild Animals
CO	Carbon monoxide
CO_2	Carbon dioxide
DAP	Eastern Anatolia Project Master Plan
DGEM	Directorate General of Environmental Management (MoEF)
DIS	Direct import support
DOKAP	Eastern Black Sea Regional Development Plan
DSI	General Directorate of State Hydraulic Works
ECOSOC	Economic and Social Council of the United Nations
EEA	European Environment Agency
EECB	Energy Efficiency Co-ordination Board
EIA	Environmental impact assessment
EIE	Electrical Power Resources Survey and Development Administration
EIE/NECC	National Energy Conservation Centre
ESP	Electrostatic precipitator
FAO	Food and Agriculture Organization of the United Nations
FGD	Flue gas desulphurisation
GAP	South-eastern Anatolia Project

GDRS	General Directorate of Rural Services
GEF	Global Environment Facility
GHG	Greenhouse gas(es)
HC	Hydrocarbon
HCFC	Hydrochlorofluorocarbon
IEA	International Energy Agency
ILO	International Labour Organization
IMO	International Maritime Organisation
IPA	Instrument for Pre-Accession
IPPC	Integrated Pollution Prevention and Control
IUCN	World Conservation Union
KOP	Pollution prevention charge
KOSGEB	Small and Medium Industry Development Organisation
LPG	Liquefied petroleum gas
MARA	Ministry of Agriculture and Rural Affairs
MENR	Ministry of Energy and Natural Resources
MoCT	Ministry of Culture and Tourism
MoEF	Ministry of Environment and Forestry
NATO-CCMS	North Atlantic Treaty Organization-Committee on the Challenges to Modern Society
NBSAP	National Biodiversity Strategy and Action Plan
NDP	National Development Plan
NEAP	National Environment Strategy and Action Plan
NMVOC	Non-methane volatile organic compound
NO_x	Nitrogen oxides
O_3	Ozone
OIZs	Organised Industrial Zones
ODS	Ozone-depleting substances
PM	Particulate matter
PM_{10}	Particulate matter 10 micrometres in diameter
PTH	Health Transformation Programme
REC	Regional Environment Center for Central and Eastern Europe
RIS	Regulatory Information System
SO_2	Sulphur dioxide
SPA	Specially Protected Area
SPO	State Planning Organisation
SUV	Sport utility vehicle
TAEK	Turkish Atomic Energy Agency
TCDD	Turkish State Railways
Ten-T	Trans-European Transport Network

TFC	Total final energy consumption
Tg	Teragram
TINA	Transport Infrastructure Needs Assessment
TLV	Target limit value
TPES	Total primary energy supply
TTGV	Technology Development Foundation of Turkey
TUBITAK	Scientific and Technological Research Council of Turkey
TurkStat	Turkish Statistical Institute
UÇES	*EU Integrated Environmental Approximation Strategy*
UNDP	UN Development Programme
UNECE	UN Economic Commission for Europe
UNEP	UN Environment Programme
UNFCCC	UN Framework Convention on Climate Change
UNIDO	UN Industrial Development Organization
VOC	Volatile organic compound
WWF	World Wild Fund for Nature

Reference IV
PHYSICAL CONTEXT

Turkey, with an *area* of 779 452 km^2, straddles Europe and Asia across the Sea of Marmara and the Istanbul Strait (Bosphorus) and Çanakkale Strait (Dardanelles).[1] On the north-west, Turkey *is bordered* by Bulgaria and Greece. Anatolia, which stretches over 1 600 kilometres, is bordered on the east by Georgia, Armenia, Azerbaijan and Iran, and on the south by Iraq and Syria. Turkey's 8 333 km coastline extends along the Black Sea, the Sea of Marmara, the Aegean and the Mediterranean. Physically, and in regard to its many human and economic characteristics, Turkey can be divided into *7 regions*: 4 coastal (corresponding to the 4 seas) and 3 mountainous (Central Anatolia, Eastern Anatolia and South-eastern Anatolia).[2] Turkey's rugged landscape was formed in recent geological times. It lies in an area that experiences frequent tremors and occasional destructive *earthquakes*. About 92% of the land area and population are at risk of medium- to high-level earthquakes.

Only 10% of Turkish territory is less than 250 metres above sea level. *Mountain ranges* run along the northern and southern coasts, surrounding the central Anatolian plateau, which rises from 500 metres in the west to 2 000 metres in the east. Along the Black Sea coast, the Eastern Black Sea Mountains reach an elevation of 3 932 metres while the Toros (Taurus) Mountains, running along the Mediterranean, reach 4 116 metres. The mountains of Eastern Anatolia, along the Iranian border, include the country's highest point, Mount Ar (5 165 metres). *Forests* cover 27% of the country, and arable and permanent crop land covers 34%. About 4.9 million ha is *irrigated*. The *South-eastern Anatolia Project* (GAP), one of the world's most ambitious regional development projects, is expected to foster growth in the region, irrigating about 1.8 million ha with water from the Dicle (Tigris) and Firat (Euphrates) Rivers by 2010, generating much hydroelectricity, and helping to develop other economic and social sectors.

Inland waters occupy about 1.6% of Turkey's area. Some 200 natural lakes cover about 906 000 ha, and numerous reservoirs cover an additional 380 000 ha. The largest natural lake is the highly saline Lake Van, covering over 374 000 ha, in Eastern Anatolia. There are several shallow salt lakes on the central Anatolian plateau, the largest of which is Lake Tuz (128 000 ha). Turkey's longest rivers, the Kizilirmak, Yeşilirmak and Sakarya, flow into the Black Sea. The Dicle (Tigris) and Firat (Euphrates) rise in Eastern Anatolia and flow south into the Persian Gulf.

Regional *climatic differences* are marked. The south and west coasts have a Mediterranean climate, with warm dry summers and mild wet winters, while the Black Sea coast is cooler and more humid year round. Rainfall ranges annually and regionally from 250 mm to as much as 3 000 mm. The semi-arid interior and south-east experience extreme seasonal differences in climate; the high north-eastern plateaus are subject to severe winters. About 40% of the country is semi-arid; 25% consists of arid areas where annual rainfall can average as little as 250 mm. Over two-thirds of total land area is affected by *soil erosion*.

Turkey is endowed with relatively few *natural resources*, notably lignite, coal, iron, boron and copper. It produces small quantities of oil and gas and has great potential for hydroelectric and geothermal energy production. Exploitable water resources amount to 1 500 m^3 per capita, but are unevenly distributed.

Notes

1. In 2004, 53 000 ships passed through the Turkish Straits, of which more than 8 000 transported a dangerous cargo.
2. Those seven regions are used for census purposes; they do not represent an administrative structure.

Reference V
SELECTED ENVIRONMENTAL WEBSITES

Website	Host institution
www.cevreorman.gov.tr/	Ministry of Environment and Forestry
www.did-cevreorman.gov.tr/index-eng.asp	Department of Foreign Relations and the EU (MoEF)
www.dsi.gov.tr/english/index.htm	General Directorate of State Hydraulic Works (MoEF)
www.ogm.gov.tr	General Directorate of Forestry (MoEF)
www.dpt.gov.tr/ing/	State Planning Organization
www.enerji.gov.tr	Ministry of Energy and Natural Resources
www.bayindirlik.gov.tr/english/index.php	Ministry of Public Works and Settlement
www.saglik.gov.tr/EN/Default.aspx	Ministry of Health
www.denizcilik.gov.tr/tr/english.asp	Under-Secretariat of Maritime Affairs of the Prime Ministry
www.tika.gov.tr/en/	Turkish International Co-operation and Development Agency
www.epdk.gov.tr	Energy Market Regulatory Authority
www.eie.gov.tr/english/index-e.html	General Directorate of Electrical Power Resources, Survey and Development Administration
www.turkstat.gov.tr/	Turkish Statistical Institute
www.meteor.gov.tr/2006/english/eng-main.aspx	Turkish State Meteorological Service
www.dpt.gov.tr/konj/DPT_Tanitim/index4.html	Turkey's Millennium Development Goals
www.gap.gov.tr/gapeng.html	Southeastern Anatolia Project Regional Development Administration

www.avrupa.info.tr/DelegasyonPortal.html	Delegation of the European Commission to Turkey
ec.europa.eu/enlargement/candidate-countries/turkey/index_en.htm	European Commission Enlargement: Turkey Profile
www.abgs.gov.tr/tarama/tarama_files/27/27at_annotated.htm	European Commission, Enlargement Directorate-General: Analytical examination of the EU acquis – Chapter 27 Environment, Turkey
www.cowiprojects.com/envest/index.htm	Environmental Heavy-Cost Investment Planning in Turkey
www.worldbank.org.tr	World Bank Office in Turkey
www.rec.org.tr/ www.rec.org/rec/introduction/countryoffices/turkey.html	Regional Environmental Center – Turkey Country Office
english.tema.org.tr/index.htm	Turkish Foundation for Combating Soil Erosion, for Reforestation and Protection of Natural Habitats
www.bseanetwork.org/turkey.htm	Black Sea NGO Network

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