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Chapter 4

Agriculture and the Management of Natural Resources in Turkey

This chapter addresses the role of agriculture in the management of natural resources. A discussion of the environmental performance of agriculture, focusing on pressures on land and water, is followed by an analysis of Turkey's agri-environmental policies, particularly those implemented under the Environmentally-Based Agricultural Land Protection Programme (ÇATAK). The importance of organic farming is also discussed.

4.1. Environmental performance of agriculture

Environmental issues, including those relating to agriculture, only began to be consistently addressed by the Turkish government during the 1990s (OECD, 1999). Nevertheless, with the adoption of various international commitments, plus the prospect of becoming a member of the EU, the environment is becoming an increasingly important item on the policy agenda (Redman and Hemmami, 2008). In particular, agri-environmental issues attained more prominence during the pre-accession negotiations, as the adoption of the EU *aquis* emphasises the integration of environmental concerns and good practices in land management and rural development, in general.

Overall, pressures from agriculture on the environment have risen steadily with the growing intensity of agricultural production (OECD, 2008a). However, this intensity is still considerably lower than in many other OECD countries. In some areas over-grazing remains a problem, although the occurrence of a reduction in cattle, sheep and goat numbers at the same time as an increase was made to the area under permanent pasture, has eased pressure on land susceptible to erosion.

The key environmental concerns relate to: soil degradation (especially from erosion); over-exploitation of water resources; water pollution (including salinisation from poor irrigation management practices); and the adverse impacts of farming on biodiversity (OECD, 2008a).

Soil

The most widespread form of soil degradation is erosion, with approximately 86% of the land suffering from some degree of erosion, mainly caused by water. Turkey loses as much as 1 billion tonnes of topsoil annually (MARA, 2007). The main causes of these elevated rates of erosion include: natural conditions, especially climate and steep topography and the mismanagement of cultivated land (*e.g.* inappropriate tillage; stubble burning; abandonment of rural infrastructure; and, in particular, terracing and inappropriate or excessive irrigation); deforestation (forest degradation due to forest fires; over-harvesting; illegal cutting; misuse of fuel wood or clearing of land for farm and urban uses) and over-grazing, in some regions (OECD, 2008a; MARA, 2007).

Even though livestock density is less than half the level of European OECD member countries, over-grazing 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.

Other forms of soil degradation are more limited, with an estimated 6% of arable land suffering yield limitation due to salinisation, and a further 12% being affected by waterlogging. Inappropriate irrigation and fertiliser-management practices, as well as excessive water extraction, have been important causes of soil salinity in some areas, with the problem rapidly escalating in parts of the area under the South-East Anatolia Project (GAP) (OECD, 2008a).

Water use

There are two aspects to the impact of agriculture upon water resources – agricultural water use and agricultural pollution. Water use is one of the most critical environmental issues facing Turkey. The pressure on water resources is increasing over time, as a result of several factors: global climate change; alterations in water consumption habits due to increasing socio-economic development and growing urbanisation; and the increasing demands of agriculture and the tourism industry but – most importantly – from rapid population growth (MARA, 2007).

Irrigated agriculture currently consumes 75% of total water consumption, which corresponds to about 30% of renewable water availability (Çakmak, 2010). Over the last 40 years, the development of Turkey's irrigation systems has been remarkable. The irrigated area has increased by about 2.5 times since the 1970s. The share of the area developed by public agencies is 80%. The rest is developed by the farmers themselves. The objective of the General Directorate of State Hydraulic Works (DSI) is to increase the irrigated area from 5.1 to 8.5 million ha of irrigated land by 2030 (DSI, 2009a; 2009b).

Although most of the water used for irrigation is derived from dams and reservoirs, approximately 35% is also pumped from groundwater. Over-pumping of groundwater for irrigation purposes is a major problem and many aquifers are being exploited beyond their natural recharge rate, especially in the Mediterranean region, which is a matter of concern, as two-thirds of the drinking water in the region is supplied from groundwater (OECD, 2008b).

The over-extraction of groundwater in such coastal regions is a growing problem both because of the intrusion of sea water into aquifers, and because of the increasing competition for water resources coming from the tourism industry, whose peak demand period in the summer coincides with that of agriculture (OECD, 1999). Some major irrigation projects, such as the GAP, have also been undertaken with little consideration of environmental management or impacts, with the loss of valuable ecosystems (*e.g.* steppe, wetlands), and problems of salinity and agri-chemical run-off are becoming widespread. However, the GAP project is increasing the supply of domestically produced hydro-electricity and has brought socio-economic welfare gains to villagers.

Irrigation is a threat to groundwater balance, since almost three-quarters of the total freshwater extracted is used for agricultural purposes. The pressure of agriculture on groundwater is expected to continue to increase in the future, to meet the growing needs of an expanding population. With the rise in demand for water from the agricultural sector, competition with other users of water resources will rise and environmental concerns will increase.

Most irrigation methods depend on gravity systems, which are characterised by low water efficiency and with the loss of as much as 60% of irrigation water. The number of pressurised irrigation systems is, however, increasing. Farms tend to be irrigated from dams and reservoirs mainly subsidised by the government, with 1% of farmers using 15% of the irrigated land, while smaller farmers are more likely to irrigate from wells constructed at their own expense.

Although agriculture is not yet the highest sole source of pressure on water resources, the utilisation of pressurised irrigation techniques (drip irrigation); the optimisation of water drained onto fields and the careful management of irrigation are critical issues, and practices to optimise these procedures should be adopted by farmers, as a contribution towards addressing one of Turkey's major environmental problems. The significant role

of irrigation in improving the performance of the agricultural sector is recognised in the Ninth National Development Plan for 2007-13 (SPO, 2010). The Plan establishes the priority for a more efficient use of water resources in agriculture and for completing the irrigation projects currently under construction.

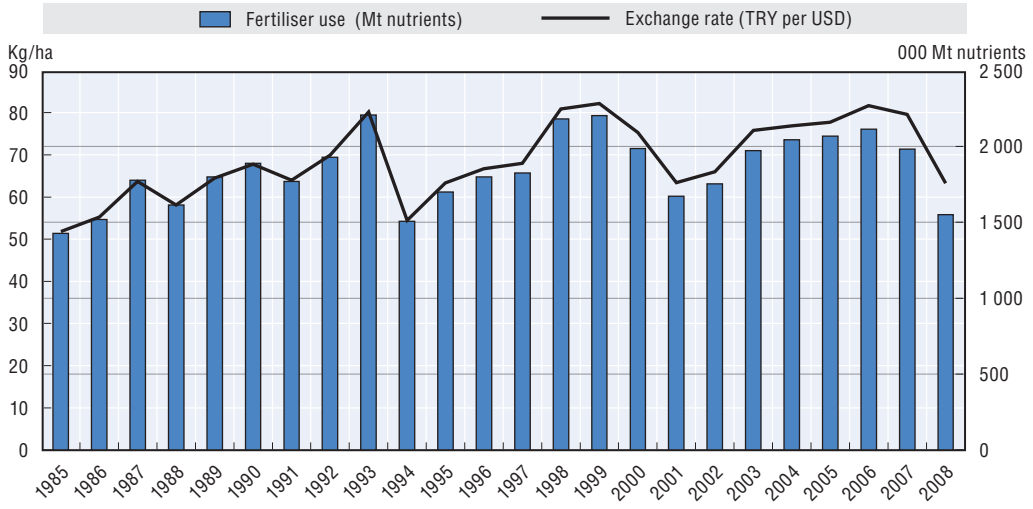
Water quality

In terms of water quality, the levels of water pollution caused by agriculture are generally considered to be low, compared to many other OECD countries (OECD, 2008a). Nevertheless, in some regions the pressure on water quality from farming is high, especially in the Aegean and Mediterranean regions, which are the most intensively farmed.

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, 2008a). Evidence suggests that the uptake rates of nutrient management practices are low, as many farmers have little access to the necessary capital for investing in manure storage and other manure-treatment technologies, and their knowledge of nutrient management practices is limited.

The use of inorganic fertilisers has fluctuated considerably over time. During the period of agricultural policy reform (2000-02) support for fertilisers was lowered and use fell substantially, by around 20% (in volume) (Figure 4.1). It subsequently recovered, but remained below the peak of the late 1990s. Inorganic fertiliser application appears to be below requirements, with national estimates for nitrogen fertiliser use at 65% below soil requirements and phosphorus fertiliser use at 45% below requirements (OECD, 2008b). Wheat accounts for around 40% of fertiliser consumption in Turkey, while fruit and vegetables receive approximately 18% (Annex Table A.16). While there has been a substantial reduction in agricultural nutrient surpluses, there is a wide difference in the use of fertilisers between large commercial farms (*e.g.* in the Marmara and Mediterranean regions) and smaller, poorer holdings (OECD, 2008a; 2008b).

Figure 4.1. **Fertiliser use, 1985-2008**



Note: Fertiliser use is measured in nutrients (nitrogen, phosphate and potassium).

Source: International Fertilizer Industry Association (IFA), October 2010.

The growth of pesticide use in Turkey is among the most rapid in the OECD area (in volume of active ingredients) and is closely linked to the increase in crop production (OECD, 2008b). Horticultural production in irrigated areas of the Marmara, Aegean and Mediterranean regions accounts for over 70% of Turkey's total pesticide use. Overall, the intensity of pesticide use is low, compared with that in other OECD countries.

Biodiversity

Turkey has a very rich biodiversity, but it is coming under increasing pressure from agriculture, and the impacts are diverse, complex and poorly monitored (OECD, 1999; 2008b). The growing pressure on biodiversity is mainly due to: intensive farming in fertile areas, with an increased use of agri-chemicals; the construction of large rural development projects that alter the ecology of entire regions (*e.g.* GAP); and the diversion of water for irrigation to the detriment of wetlands (Redman and Hemmami, 2008). At the same time, there is some loss of farmed habitats from conversion to urban use and, in some marginal farming areas, from afforestation and abandonment of semi-natural farmed habitats, although the overall area of agricultural land has increased since 1990 (OECD, 2008a; 2008b).[1]

Climate change

Farming accounts for around 6% of total national agricultural greenhouse gas (GHG) emissions (OECD, 2008a). In Turkey the main agricultural and livestock production activities causing GHGs can be described as follows: livestock production; use of fertilisers; stubble burning; and, to a lesser extent, rice production.

Agricultural GHG emission reductions are largely explained by the decrease in cattle, sheep and goat numbers (lowering methane emissions), partly offset by higher fertiliser use and crop production. With the projected expansion of agricultural production up to 2016 and rising direct on-farm energy consumption, it can be expected that agricultural GHG emissions may rise.

4.2. Agri-environmental policies

The development of agri-environmental policies has been limited since 1990, although recently more policy initiatives have been undertaken. In the context of the Turkey-EU accession negotiations, the environment is regarded as one of the most important areas. Under the 2006 Agricultural Policy Strategy (2006-10), the share of budgetary support for agri-environmental purposes is to reach 5% by 2010.

The Environmentally Based Agricultural Land Protection Programme (ÇATAK) came into effect in 2005, as part of the amended (2005) ARIP programme. It was financed by external sources and it was implemented in four pilot provinces in the years 2006, 2007 and 2008. The objectives of the Programme were to protect the quality of soil and water resources in agricultural lands, to ensure the sustainability of renewable natural resources, and to decrease the adverse effects of intensive agricultural activities. In 2009, Turkey assumed full financial responsibility for the project.

ÇATAK was initially implemented in four pilot provinces and subsequently extended to 19 provinces in 2010, and to 25 in 2011. The programme covered 1 726 ha in 2006; 4 041 ha in 2007; 3 994 ha in 2008 and 2 370 ha of land in 2009. ÇATAK was fully financed by The World Bank for the 2005-09 period. Following the completion of ARIP in 2008, the programme is now

financed by national funds. Total payments to farmers were TRY 1.4 million (USD 1 million) in 2006, rising to TRY 8.9 million (USD 5.8 million) in 2010. This increase represented a rise in ÇATAK's share of total agricultural budgetary support, from 0.03% in 2006 up to 0.15% in 2010.

There are also several initiatives underway to implement various EU Environmental Directives, such as the Habitats and Birds Directive, and the Water Directive. In the context of adopting and implementing the EU Water Directive, the Regulation on the protection of water from nitrate pollution caused by agricultural resources was put into force in 2004. For its implementation, five basic phases have been defined necessary: determination of the water resources which are subject, or will be subject, to nitrate pollution; description/determination of the vulnerable zones; development of good agricultural codes and implementation; development of "Action Plans" for all vulnerable zones; and the setting-up of a national monitoring and reporting system.

Economy-wide environmental policies also affect agriculture. The National Environmental Action Plan, which came in force in 1998, provides for national and regional plans to generate information to combat land desertification and reduce discharges of nutrients, and stipulates a number of regulations designed to control water and soil pollution and protect biodiversity. A Nitrate Directive was adopted in February 2004, as part of the goal to harmonise with EU policies, but there is still a need to define the responsibilities of the organisations defined under the Directive. The Regulation on Water Pollution Control (1988) defines water quality criteria according to the purpose for which the water is destined, including treated waste-water used for irrigation.

A number of regional development projects, most of which are partly financed by international development agencies and donors, aim at reducing the impacts of agriculture on the environment. The GAP project, which is the largest regional development project in Turkey, involves, among other objectives, the expansion of agricultural production in the region, to be brought about by building 22 dams and providing irrigation infrastructure for 1.7 million ha of land. The Anatolian Watershed Rehabilitation Project, jointly supported by EU and World Bank funding of TRY 65 million (USD 45 million) over 2004-12, is aimed at the restoration of degraded soils in order to increase farm and forestry production, and supports the monitoring and reduction of agricultural water pollution in the lower parts of watersheds. An Action Plan to accelerate GAP aims at the completion of irrigation schemes over 1 million ha of land by 2012.

The 2004 Law on Organic Farming and the 2005 By-law on Principals and Application of Organic Farming regulate organic agriculture in a similar way to EU Regulation (EEC) 2092/91. MARA is responsible for overseeing the cultivation of organic crops. As of February 2011, 17 firms were authorised by MARA to issue organic certificates.

Up until 2006, no support payments were provided for organic farming. However, as discussed in Chapter 2, the Farmer Transition Programme provides financial incentives to encourage farmers to divert from over-produced commodities to alternative commodities, thus creating an opportunity for the introduction of environmentally benign management practices.

Despite the strong increase in organic farming since 1997, its share in total agricultural land area remains low, at 1.3%. The major organic products produced are wheat, hazelnuts, raisin, figs, cotton, apricots, chick peas, lentils and olives. Most organic produce is exported, primarily to European countries (van Leeuwen *et al.*, 2008). Domestic demand began to

increase in the late 1990s, but is still very small relative to total food demand. Organic produce is almost twice as expensive for the consumer as food of conventional origin. Organic livestock production is very limited (Annex Table A.17).

Note

1. The details of agri-biodiversity, threats and strategic actions for conservation are included in the National Biological Diversity Strategy and Action Plan of Turkey (*www.cbd.gov.tr/documents/NBSAP-2007.pdf)*.

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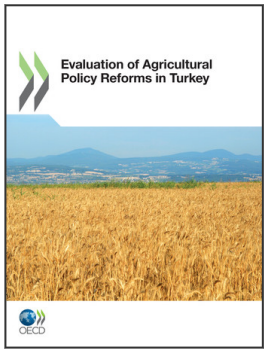

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