



# ENVIRONMENTAL PERFORMANCE OF AGRICULTURE IN OECD COUNTRIES SINCE 1990:

## Italy Country Section

This country section is an extract from chapter 3 of the OECD publication (2008) *Environmental Performance of Agriculture in OECD countries since 1990*, which is available at the OECD website indicated below.

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A summary version of this report is published as *Environmental Performance of Agriculture: At a Glance*, see the OECD website which also contains the agri-environmental indicator time series database at: <http://www.oecd.org/tad/env/indicators>

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## BACKGROUND TO THE COUNTRY SECTIONS

### Structure

This chapter provides an analysis of the trends of environmental conditions related to agriculture for each of the 30 OECD member countries since 1990, including an overview of the European Union, and the supporting agri-environmental database can be accessed at [www.oecd.org/tad/env/indicators](http://www.oecd.org/tad/env/indicators). Valuable input for each country section was provided by member countries, in addition to other sources noted below. The country sections are introduced by a figure showing the national agri-environmental and economic profile over the period 2002-04, followed by the text, structured as follows:

- **Agricultural sector trends and policy context:** The policy description in this section draws on various OECD policy databases, including the *Inventory of Policy Measures Addressing Environmental Issues in Agriculture* ([www.oecd.org/tad/env](http://www.oecd.org/tad/env)) and the *Producer and Consumer Support Estimates* ([www.oecd.org/tad.support/pse](http://www.oecd.org/tad.support/pse)).
- **Environmental performance of agriculture:** The review of environmental performance draws on the country responses to the OECD agri-environmental questionnaires (unpublished) provided by countries and the OECD agri-environmental database supporting Chapter 1 (see website above).
- **Overall agri-environmental performance:** This section gives a summary overview and concluding comments.
- **Bibliography:** The OECD Secretariat, with the help of member countries, has made an extensive search of the literature for each country section. While this largely draws on literature available in English and French, in many cases member countries provided translation of relevant literature in other languages.

**At the end of each country section a standardised page is provided consisting of three figures.** The first figure, which is the same for every country, compares respective national performance against the OECD overall average for the period since 1990. The other two figures focus on specific agri-environmental themes important to each respective country.

Additional information is also provided for each country on the OECD agri-environmental indicator website (see address above) concerning:

- Details of national agri-environmental indicator programmes.
- National databases relevant to agri-environmental indicators.
- Websites relevant to the national agri-environmental indicators (e.g. Ministries of Agriculture)
- A translation of the country section into the respective national language, while all 30 countries are available in English and French.

### Coverage, caveats and limitations

A number of issues concerning the coverage, caveats and limitations need to be borne in mind when reading the country sections, especially in relation to making comparisons with other countries:

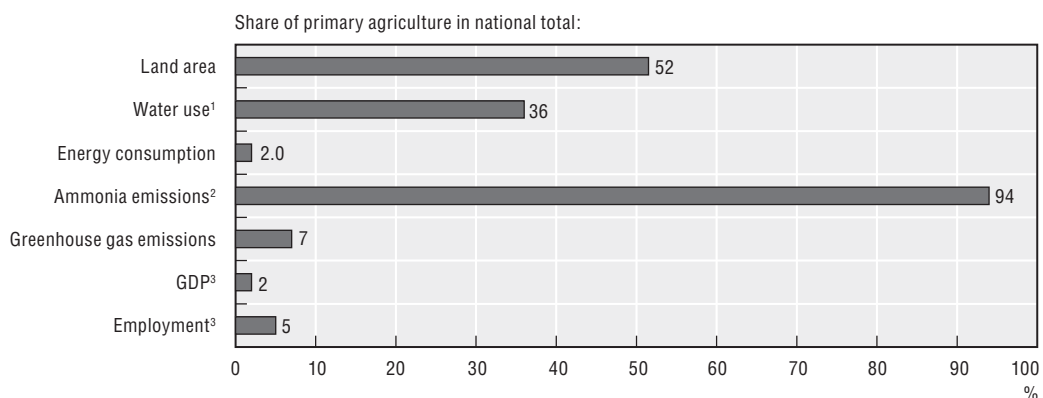
**Coverage:** The analysis is confined to examination of agri-environmental trends. The influence on these trends of policy and market developments, as well as structural changes in the industry, are outside the scope of these sections. Moreover, the country sections do not examine the impacts of changes in environmental conditions on agriculture (*e.g.* native and non-native wild species, droughts and floods, climate change); the impact of genetically modified organisms on the environment; or human health and welfare consequences of the interaction between agriculture and the environment.

**Definitions and methodologies for calculating indicators** are standardised in most cases but not all, in particular those for biodiversity and farm management. For some indicators, such as greenhouse gas emissions (GHGs), the OECD and the UNFCCC are working toward further improvement, such as by incorporating agricultural carbon sequestration into a net GHG balance.

- **Data availability, quality and comparability** are as far as possible complete, consistent and harmonised across the various indicators and countries. But deficiencies remain such as the absence of data series (*e.g.* biodiversity), variability in coverage (*e.g.* pesticide use), and differences related to data collection methods (*e.g.* the use of surveys, census and models).
- **Spatial aggregation** of indicators is given at the national level, but for some indicators (*e.g.* water quality) this can mask significant variations at the regional level, although where available the text provides information on regionally disaggregated data.
- **Trends and ranges in indicators**, rather than absolute levels, enable comparisons to be made across countries in many cases, especially as local site specific conditions can vary considerably. But absolute levels are of significance where: limits are defined by governments (*e.g.* nitrates in water); targets agreed under national and international agreements (*e.g.* ammonia emissions); or where the contribution to global pollution is important (*e.g.* greenhouse gases).
- **Agriculture's contribution to specific environmental impacts** is sometimes difficult to isolate, especially for areas such as soil and water quality, where the impact of other economic activities is important (*e.g.* forestry) or the "natural" state of the environment itself contributes to pollutant loadings (*e.g.* water may contain high levels of naturally occurring salts), or invasive species that may have upset the "natural" state of biodiversity.
- **Environmental improvement or deterioration** is in most individual indicator cases clearly revealed by the direction of change in the indicators but is more difficult when considering a set of indicators. For example, the greater uptake of conservation tillage can lower soil erosion rates and energy consumption (from less ploughing), but at the same time may result in an increase in the use of herbicides to combat weeds.
- **Baselines, threshold levels or targets for indicators** are generally not appropriate to assess indicator trends as these may vary between countries and regions due to difference in environmental and climatic conditions, as well as national regulations. But for some indicators threshold levels are used to assess indicator change (*e.g.* drinking water standards) or internationally agreed targets compared against indicators trends (*e.g.* ammonia emissions and methyl bromide use).

### 3.14. ITALY

Figure 3.14.1. **National agri-environmental and economic profile, 2002-04: Italy**



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1. Data refer to the year 1999.
2. Data refer to the period 2001-03.
3. Data refer to the year 2004.

Source: OECD Secretariat. For full details of these indicators, see Chapter 1 of the *Main Report*.

#### 3.14.1. Agricultural sector trends and policy context

**Agriculture's role in the economy is small and decreasing, but more important in some regions.** Farming contributes just over 2% of GDP, but nearly 5% of employment, although with marked regional differences, contributions rising in the South to over 4% of GDP and nearly 10% of employment [1, 2] (Figure 3.14.1).

**Horticultural and permanent crops play a dominant role in the farming sector.** Horticultural crops; olive groves; and grapes account for nearly 45% of total agricultural value, compared to 11% for cereals and almost 35% for livestock [1]. Horticultural and permanent crop production dominate in the South, with livestock and cereals more prominent in the North. While the total volume of agricultural production declined by 2% over the period 1990-92 to 2002-04, the trend in input use was more varied: pesticides rose by 8%; inorganic nitrogen fertilisers by 5%; and farm energy by 10%; although inorganic phosphorus fertiliser use declined by -26% (Figure 3.14.2). With the area farmed also declining by nearly 14% over this period, this suggests that the intensity of agricultural production has been increasing: both in terms of inputs used per unit volume of output; and per hectare.

**Farming is mainly supported under the Common Agricultural Policy (CAP),** with support also provided through national expenditure within the CAP framework. Support to EU agriculture has declined from 39% of farm receipts in the mid-1980s to 34% in 2002-04 (as measured by the OECD Producer Support Estimate). This compares to the OECD average

of 30% [3]. Nearly 70% of EU farm support is output and input linked, but this share was over 98% in the mid-1980s. Budgetary support to Italian farmers is currently over EUR 6 billion per annum of which 60% is funded by the EU.

**Expenditure on agri-environmental programmes has risen substantially**, accounting for 10% of total agricultural payments in 2002, of which over 80% were EU co-financed. Around 90% of these payments were provided to farmers in central and northern Italy, and 10% in the south. About 90% of payments were provided for conversion to organic farming; adoption of integrated farming; and grassland management [4]. Other measures aim to reduce erosion; limit water use; and enhance biodiversity conservation, such as through payments of EUR 202/head for endangered cattle species [5].

**Agriculture is affected by a number of economy-wide environmental and taxation measures.** The 1992 Hunting Act requires that 20-30% of agricultural and forest land should be devoted to fauna protection [6]. Water abstraction charges were introduced in 1994 under the Galli Act at very low rates for farmers of EUR 36/100 litres/second compared to EUR 1 550 for households and EUR 11 362 for industry in 2001; while subsidies are also provided for irrigation capital and operational costs [6] amounting to almost EUR 3.6 billion over the period 2000-05 [7]. A pesticide tax, introduced in 1999, is 2% of the retail price [6]; and a reduction of 22% of the full fuel tax is provided for agriculture and was equivalent to EUR 857 million in 2005 of budget revenue forgone [3], estimated to cut variable costs by about 14% [8]. Incentives for biofuels are provided, mainly for biodiesel, through exemptions on excise duties amounting to EUR 300 million over the period 2002-05 [9].

**Farming is also affected by commitments under international environmental agreements**, such as lowering ammonia emissions (*Gothenburg Protocol*) and methyl bromide use (*Montreal Protocol*), and addressing desertification (*UN Convention to Combat Desertification*).

### 3.14.2. Environmental performance of agriculture

**With over 75% of mountainous land and a high population density, pressure on land is intense.** Agriculture as the major land using activity accounted for 52% of land use in 2002-04, although the area farmed declined by nearly 14% between 1990-92 and 2002-04, the highest reduction among OECD countries (Figure 3.14.2) [1]. There are a wide variety of agri-ecosystems and landscapes ranging across Mediterranean, Alpine and Continental regimes [10].

**Soil degradation is a major and widespread environmental problem**, but there are no data to assess trends. About 70% of all land is subject to risk of accelerated soil erosion (over 5 t/ha/year) and about 12% is prone to high risk (over 10 t/ha/year) (Figure 3.14.3) [11, 12, 13, 14]. While soil erosion risks are exacerbated by a combination of climate and steep topography, erosion has also been aggravated by: poor adoption of soil conservation practices, notably, limited soil cover over the whole year, and less than 10% of arable land under conservation tillage [15]; monoculture cropping systems; and uncultivated land, notably conversion of cultivated mountain terraces to other uses [6]. *Soil compaction* risks have grown, mainly in Northern areas, such as the Po Valley, due to greater use of heavy farm machinery in wet conditions [16]. In the South and in the major islands about 5% of land is affected by *desertification*, including soil *salinisation*, associated with expanding olive cultivation on fragile land; excessive use of groundwater for their irrigation with the consequent intrusion of saline waters; and poor grove tillage practices [6, 17, 18]. Linked to these soil degradation problems, there has been a loss of soil *organic matter* (SOM), but efforts are being made to raise SOM levels so as to improve soil fertility and enhance soil carbon stocks, so helping to reduce greenhouse gas emissions [19].

**Agriculture is both impacted by, and affects, the growing incidence of flooding and landslides.**

The increasing occurrence and severity of droughts, floods and associated landslides over the 1990s [16], are imposing a considerable human and economic cost [6, 20]. While summer storms and steep topography have led to flooding and landslides which adversely impact on farming, particularly in low lying plains, changes in farmland use have also had an effect. Although some hilly and mountainous land was ploughed in the 1970s/80s; over the 1990s certain areas reverted to shrub and low forest, which has helped increase water holding capacity [20]. However, the 16% decline in farm dams and ponds over the period 1985-2000, has reduced the water retention capacity of agricultural land [21].

**Pressure from farming activities on water pollution has eased, but remains a problem.**

Rivers in the Po Valley are still polluted by different activities including agriculture, especially from livestock farms, while in the South eutrophication of reservoirs for drinking water has resulted from excessive fertiliser use [6]. Groundwater is the source of nearly 85% of drinking water, but about 25% of groundwater supply requires treatment before it is fit for drinking. Little progress has been made in reducing agricultural pollution of the Mediterranean, especially in the Northern Adriatic [6, 22].

**The reduction in agricultural nutrient surpluses has lowered water pollution pressure.** But absolute loadings of nutrients into water bodies remain high, contributing two-thirds of nitrates and one-third of phosphates delivered into rivers, and a major, but decreasing, share of pollution of groundwater, while efficiency of nutrient use is low [6, 23, 24]. Much of the reduction in nutrient surpluses was related to declining livestock numbers and low animal stocking densities compared to the EU15 average, while restrictions on manure spreading in the Po Valley have also had an impact (Figure 3.14.2) [2, 23]. In addition, the volume of inorganic phosphorus fertiliser use declined by -26% between 1990-92 and 2002-04, although nitrogen fertiliser rose by 5% over the same period, while the use of sewage sludge has risen nearly 4 fold between 1995 and 2000 [15]. The decrease in phosphate use is partly due to the switch in area payments, plus an improvement in fertiliser use efficiency and management, with crop production volume declining over this period by nearly 3%, and an increasing number of farms adopting a fertiliser management plan, the proportion rising to 31% of farms by 2000 [2]. But nutrient surpluses vary considerably by region [2] with some Northern regions (Lombardy) having surpluses twelve times greater than in the South (Basilicata) [23], reflecting the greater surpluses from livestock and maize production in the North [24].

**With the increase in pesticide use pressure on water bodies persists** (Figure 3.14.2). Rising levels of pesticides in groundwater could reflect delayed response times between application and detection [6, 23]. In a survey in Northern Italy in 1999-2000 the herbicide atrazine was present in all the groundwater sites surveyed, and in 30% of the sites was above the maximum admissible concentration, despite the ban on the sale of the herbicide since 1986 [25]. Around 2% of fruit and vegetable samples in 2003 had residual pesticides above national standards [1]. There are signs, however, that the pressure on water pollution from pesticides could be easing with the adoption of specifically targeted pesticides and the expansion in organic production [1, 2]. Adoption of low dosage pesticides may reduce human and environmental risks. **Organic farming** accounted for around 7% of farmland (2002-04), with nearly 60% of this area in the south, expanding rapidly during the 1990s to over 20% of the EU15 organic area [1, 2, 6, 26].

**While agricultural water use has been stable, rates of groundwater abstraction are a concern.** Agriculture's share in total water use is about 60%, reflecting the prominent role of irrigation, with two-thirds of water drawn from surface water [2, 7, 27, 28, 29]. About 50% of the value of agricultural production and 60% of farm exports are derived from irrigated farming [29, 30]. The area under irrigation remained unchanged between 1990-92 and 2001-03 and accounted for 17% of farmland by 2001-03, mostly concentrated in drier Southern regions which account for over 60% of the irrigated area [1, 2, 27]. Excessive extraction of groundwater for irrigation occurs in the South (often illegally) which, coupled with high losses through leakage, has led to water shortages over at least 3 months of every year [6, 18, 27, 29]. Estimated water losses across the national irrigation network are 30-50% of water withdrawals. This is due to both poor infrastructure maintenance and inadequate technology [7]. Nevertheless, there are indications of improvements in irrigation water management toward using more efficient water application technologies, such as drip emitters (used on over 20% of the total irrigated area in 2000) [2, 7].

**Overall air pollutant emissions from farming have been declining since 1990.** Agriculture's share in total **ammonia emissions** was 94% in 2003-05, mainly from livestock, with emissions declining by 9% between 1990-92 and 2001-03 (Figure 3.14.2), with a further 4% decline in emissions between 2002 and 2004. To meet Italy's ammonia emission commitments for 2010 agreed under the *Gothenburg Protocol*, total ammonia emissions will need to be reduced by 6% from their 2001-03 level, although in 2005 total emissions were for the first time below the 2010 target. In 1996 Italy used about 13% of the world's **methyl bromide**, but between 1994 and 2001 usage was reduced by over 40% to about 3 900 tonnes. Methyl bromide is used almost entirely in the horticultural sector (mainly tomatoes, eggplants, melons, strawberries and flowers), with nearly 90% used in Sicily, Lazio and Campania [6, 31, 32]. Between 2005 and 2008 "Critical Use Exemption" (CUE), which under the *Montreal Protocol* allows farmers additional time to find substitutes, is being reduced from 1 379 tonnes (ozone depleting potential) to zero.

**Agricultural emissions of greenhouse gases declined by 7% between 1990-92 and 2002-04, accounting for 7% of national emissions** (Figure 3.14.2). This compares to a 12% rise in total GHG emissions across the economy and a commitment under the *Kyoto Protocol* to reduce total emissions by 6.5 % up to 2008-12 under the *EU Burden Sharing Agreement*. An 11% increase in greenhouse (GHG) emissions from farm fuel combustion was offset by emission reductions of 3% for livestock and 1% for crops (CO<sub>2</sub> equivalents) [33], but a reduction in emissions is projected to 2010 [34]. The rise in fuel combustion is largely explained by the 14% growth in the number of farm machines (tractors, combine harvesters) over the period 1990-92 to 2001-03 [35], but also the requirement for field spreading of manure and the expansion in organic production requiring more mechanical weeding. While **carbon storage** has increased with farmland converted to forest use, the ploughing of pasture for arable use together with soil degradation has led to a reduction in soil organic matter and soil organic carbon [33]. Agricultural **biomass production** for fuel and energy has expanded slowly, but would need to double every year from 1997 to meet Italy's renewable electricity generation target by 2010 [9].

**Adverse impacts on biodiversity from farming activities continue**, although the lack of monitoring data makes a precise assessment difficult [10, 36]. Overall agricultural land use changes since 1990 have been detrimental for biodiversity, with a reduction in semi-natural farmed habitats, including the conversion of permanent pastures and meadows to commercial forestry and crop production (Figure 3.14.3) [37]. Some permanent pasture areas, such as in the



Po valley which were established in the 19th century, have a much higher level of plant species diversity than in surrounding cultivated areas [38]. The conversion of marginal mountain farmland to other land uses has also adversely impacted the richness and abundance of open country bird species, flora and cultural landscapes [39]. The drainage of wetlands continues although at a lower rate over the period 1990 to 2004 compared to earlier decades [10]. The area under agri-environmental schemes devoted to biodiversity conservation as a share of the total farmland was 1% in 2001 compared to the EU15 average of 12% [36]. Some areas under these schemes have been beneficial to bird conservation [40], while the *Hunting Act* requires 20-30% of farm and forestry land to be devoted to fauna protection.

**There has also been loss, and endangerment, of local crop and livestock species.** With respect to livestock, Italy has amongst the highest number of endangered breeds across the EU15 [41], and amongst the greatest number of endangered breeds under conservation schemes in the EU [15]. *In situ* and *ex situ* conservation is being undertaken for livestock [6, 21, 36, 41], and to a lesser extent for crops [21, 42].

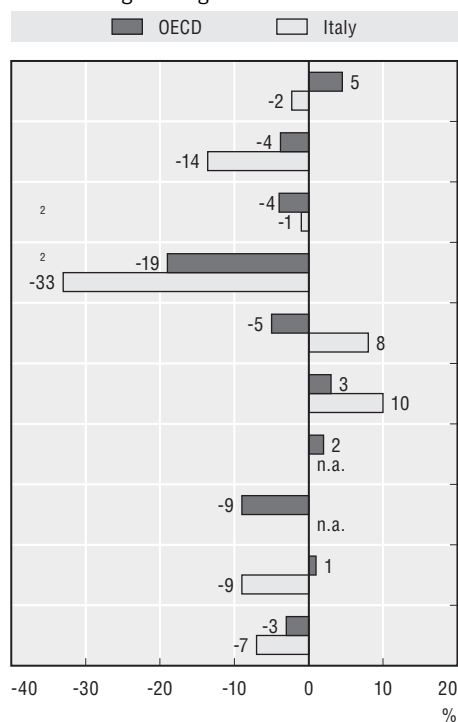
### 3.14.3. Overall agri-environmental performance

**The key agri-environmental problems facing Italy are soil erosion and water pollution.** Other, lesser challenges include: improving energy use and water use efficiency; biodiversity and landscape conservation; and desertification poses a problem in the south, especially in Sicily and Sardinia.

**Adverse environmental impacts from agriculture persist, but some positive trends are emerging.** Reduction in nutrient surpluses, together with declining pesticide use, has helped ease pressure from agriculture on water quality. But water pollution from agriculture remains a key issue as it generates the major share of nutrient pollution, with absolute loadings high and the rapid increase in use of sewage sludge raising concerns of heavy metal pollution. Water use and air emissions from agriculture, both methyl bromide (an ozone depleting substance) and greenhouse gases, have decreased since 1990. For ammonia while emissions rose slightly between 1990-92 to 2001-03, they declined between 2002 and 2004. There is some evidence to suggest that the risk of soil erosion persists across a major part of cultivated land, while poor soil and irrigation management practices have aggravated problems of compaction, salinisation and loss of soil organic matter. Some improvement in biodiversity conservation is evident, reducing risks, particularly, of genetic erosion of local livestock breeds. Even so, the continued conversion of semi-natural agricultural areas, mainly to annual crops and forestry, has had an adverse impact on flora and fauna.

**Monitoring and evaluation of agri-environmental trends is being improved but many gaps remain.** Only a few Italian regions have established a monitoring strategy to track agri-environmental impacts and evaluate agri-environmental programmes [4]. National and sub-national monitoring systems are poorly developed across a number of key agri-environmental concerns [6], including agriculture's impact on soil and water quality, water use, biodiversity and landscape. But initiatives are underway to improve monitoring systems, such as the development of soil monitoring networks [43], and recently the National Institute of Agricultural Economics (INEA) published a national report, periodically updated, measuring the progress of agriculture toward sustainability [2].

**Changes to policies may enhance environmental performance but problems continue.** New provisions under Agenda 2000 and the 2003 CAP reforms will involve, from 2005/06, the use of cross compliance targeted at farming practices intended to benefit the environment. The area enrolled under agri-environmental measures, however, was little more than 20% of the total agricultural area and less than half the EU15 average in 2002 [2, 15]. Water charges are at rates which act as a disincentive to water conservation, with a large gap between farm charges and the cost of water supply, as apparent in the excessive extraction of groundwater for irrigation in areas of water shortage. Fuel tax concessions for farmers undermine more efficient use of energy. Direct farm energy consumption has grown at 10% over the period 1990-92 to 2002-04 compared to a reduction in the volume of farm production by 2%.

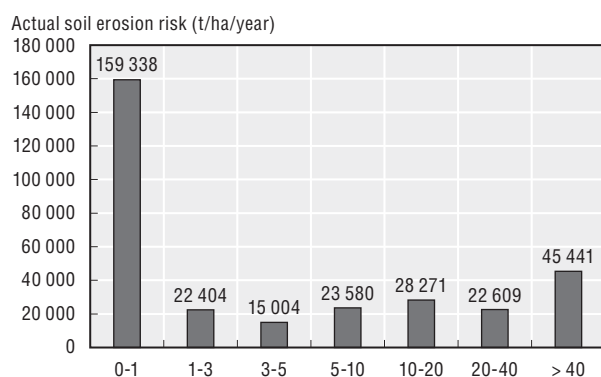
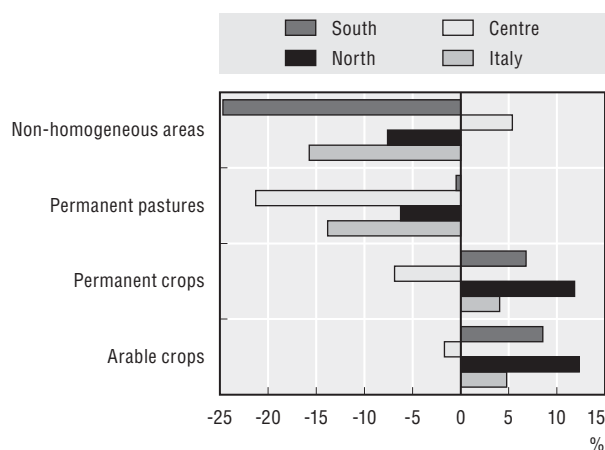
Figure 3.14.2. **National agri-environmental performance compared to the OECD average**Percentage change 1990-92 to 2002-04<sup>1</sup>

Absolute and economy-wide change/level

Variable	Unit	1990-92 to 2002-04	Italy	OECD
Agricultural production volume	Index (1999-01 = 100)	1990-92 to 2002-04	98	105
Agricultural land area	000 hectares	1990-92 to 2002-04	-2 390	-48 901
Agricultural nitrogen (N) balance	Kg N/hectare	2002-04	39	74
Agricultural phosphorus (P) balance	Kg P/hectare	2002-04	11	10
Agricultural pesticide use	Tonnes	1990-92 to 2001-03	+6 075	-46 762
Direct on-farm energy consumption	000 tonnes of oil equivalent	1990-92 to 2002-04	+315	+1 997
Agricultural water use	Million m <sup>3</sup>	2001-03	+20 140	+8 102
Irrigation water application rates	Megalitres/ha of irrigated land	2001-03	7.7	8.4
Agricultural ammonia emissions	000 tonnes	1990-92 to 2001-03	-43	+115
Agricultural greenhouse gas emissions	000 tonnes CO <sub>2</sub> equivalent	1990-92 to 2002-04	-2 929	-30 462

n.a.: Data not available. Zero equals value between -0.5% to &lt; +0.5%.

1. For agricultural water use, pesticide use, irrigation water application rates, and agricultural ammonia emissions the % change is over the period 1990-92 to 2001-03.
2. Percentage change in nitrogen and phosphorus balances in tonnes.

Source: OECD Secretariat. For full details of these indicators, see Chapter 1 of the *Main Report*.Figure 3.14.3. **Actual soil water erosion risk**Km<sup>2</sup> of the Italian land by soil erosion classes, 1999Source: P. Bazzoffi based on Von der Knijff, J.M., R.J.A Jones and L. Montanarella (1999), *Soil Erosion Risk Assessment in Italy*, Joint Research Center, European Commission, Ispra, Italy.Figure 3.14.4. **Regional change in agricultural land area: 1990 to 2000**

Source: APAT Environmental Data Yearbook, 2004 edition.

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