Organisation for Economic Co-operation and Development
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ENVIRONMENTAL PERFORMANCE OF AGRICULTURE IN OECD COUNTRIES SINCE 1990:

Germany 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*. 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*) and the Producer and Consumer Support Estimates (*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The review of environmental performance draws on the country responses to the OECD agri-environmental questionnaires (unpublished) provided by countries and the OECD agri-environmental database supporting Chapter 1 (see website above).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:

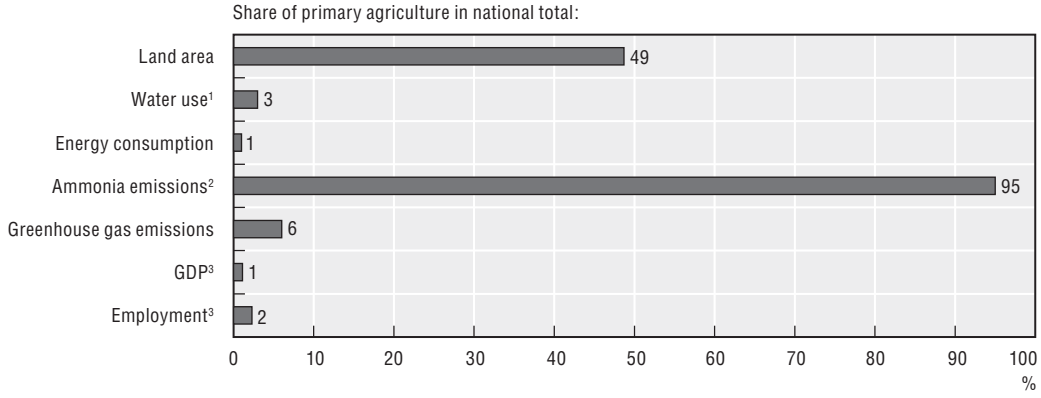
Coverage: The analysis is confined to examination of agri-environmental trends. The influence on these trends of policy and market developments, as well as structural changes in the industry, are outside the scope of these sections. Moreover, the country sections do not examine the impacts of changes 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).

3.9. GERMANY

Figure 3.9.1. **National agri-environmental and economic profile, 2002-04: Germany**



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1. Data refer to the year 2001.
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*.

3.9.1. Agricultural sector trends and policy context

Agriculture plays only a minor role in the German economy. The sector currently contributes about 1.1% to GDP and 2.3% to employment (Figure 3.9.1). Overall the volume of farm production declined slightly over the period 1990-92 to 2002-04, with lower livestock production (–6%) but increasing crop output (+13%). The intensity of agricultural production appears to be diminishing with farm input use declining more rapidly than production. There has been a decrease over the period 1990-92 to 2002-04 in the use of inorganic nitrogen (–6%) and phosphate fertilisers (–49%), pesticides (–11%) and direct on-farm energy consumption (–20%) (Figure 3.9.2).

Since German reunification in 1990, changes in the farming sectors of the Old Länder (former West Germany) and the New Länder (former East Germany) have significantly differed. In the New Länder farming contracted sharply following unification, with farm employment falling to 20% of its 1989 level by the early 1990s [1]. Old Länder farming is dominated by livestock, raising over 75% of the nation's cattle, sheep and pigs. Farm size in the Old Länder is about 30 hectares compared to 200 hectares on average in the New Länder. By contrast in the New Länder crops dominate and farming is more capital intensive [2].

Agriculture is mainly supported under the Common Agricultural Policy (CAP), with support also provided through national expenditure within the CAP framework. Support to EU farmers 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%. Nearly 70% of EU farm support under the Agenda 2000 was output and input linked, falling from over 98% in the mid-1980s [3]. Budgetary support to German farmers is currently EUR 8 billion per annum of which about EUR 5 billion per annum is funded by the Länder. Around a quarter of budgetary expenditure is for less-favoured areas and agri-environmental measures [3, 4].

Expenditure on agri-environmental programmes in Germany has risen substantially and is largely administered at the Länder level. The spending on agri-environmental measures is mainly aimed at providing payments to farmers for environmentally beneficial farming practices, such as: reducing water pollution; enhancing biodiversity conservation; and promoting organic farming [5, 6]. There are also regulatory measures that enforce certain environmental friendly farming practices including those concerning fertiliser application and livestock densities [7, 8], while the 1998 *Federal Soil Protection Act* requires farmers to adopt soil conservation practices [9]. Organic farming accounted for 4.7% of farmland in 2005 (Figure 3.9.3) [2, 10]. To encourage organic farming, under the *Federal Organic Farming Scheme* EUR 16 million was provided in 2007 and EUR 10 million per annum will be provided from 2008 until 2010 [3].

Agriculture is affected by a number of economy-wide environmental and taxation measures, and international environmental agreements. Farmland in nature conservation areas is exempt from property tax [1]. Farmers were also provided an 80% exemption on the standard rate of tax on fuels, equivalent to EUR 420 million of budget revenue forgone in 2006 [1, 3, 11, 12]; although this exemption was reduced to 40% in 2005 [11]. From 2003 a reduced electricity tax rate was also provided to farmers of EUR 12.30/Megawatt hour (MWh). This compares with the full rate of EUR 20.50/MWh for other users [13]. Under the *Renewable Energy Act*, electricity grid operators are obliged to purchase electricity using a differentiated feed-in tariff. Biofuels have tax exemptions and support is provided for the construction of biomass installations for heat production. An Action Plan to reduce ammonia emissions from agriculture was launched in 2003, aiming to lower ammonia emissions relative to 1990 levels by about 25% by 2010 [3]. Farming is also affected by commitments under ***international environmental agreements***, in particular, the reduction of nitrate pollution into the Northeast Atlantic (*OSPAR Convention*) and the Baltic Sea (*HELCOM Convention*), and ammonia emissions under the *Gothenburg Protocol* [1, 14]. A federal ammonia reduction programme was established in 2003 including several measures exceeding substantially requirements of the both the EU and the Gothenburg Protocol.

3.9.2. Environmental performance of agriculture

Two key environmental concerns related to farming include water pollution, especially for areas where there is intensive livestock production, and the interaction of farming with biodiversity. Other environmental issues of importance to agriculture include ammonia and greenhouse gas emissions, soil erosion and land use. Increased attention is being paid to developing agriculture's potential to supply biomass feedstock for renewable energy production.

Agriculture as the major land using activity accounts for around 50% of land use. Despite near zero population growth, pressure on land resources is intense. This is largely because of high population density and also because demand for environmental conservation, as expressed through public opinion surveys, remains high, especially for biodiversity and landscape [1]. A downturn in the economy, however, has seen a decrease in public priority given to environmental issues compared to the early 1990s [1]. Agricultural use of national

water resources is small, a share of about 3% (2001-03), reflecting the minor role of irrigated agriculture, the abandonment of irrigation facilitates in the New Länder following reunification, and underlying climatic conditions. However, agriculture has been adversely impacted by the growing incidence and severity of floods over the 1990s [1].

Soil erosion and compaction are a problem in some regions, but overall soil quality is in good condition. Soil erosion rates reveal considerable differences between regions. [9]. The extent of the problem concerning soil compaction is not clear due to the lack of coherent monitoring [15, 16].

Pollution of water from agriculture declined over the 1990s, but remains a concern. With marked reductions in both agricultural nutrient surpluses and improper pesticide use, the pressure from agriculture on water pollution has been reduced. But as point sources of water pollution (*i.e.* industrial and urban sources) have been drastically reduced over the 1990s [17, 18], agriculture accounts for a growing share but lower absolute quantity of water pollution, estimated at nearly 60% of nitrogen and 50% of phosphorus discharges in surface water [1, 2]. While reductions of nutrient surpluses have been significant, the decrease in nutrient loadings into the Baltic and Northern Atlantic has been smaller [1, 18, 19]. This reflects the time lags between the physical reductions in soil nutrient loadings and the effects showing up in lower discharges in water bodies, which are particularly pronounced for phosphorous [1, 19].

The reduction in agricultural nutrient surpluses over the period 1990-92 to 2002-04 was amongst the largest in the EU15. The closure of many livestock operations in the New Länder following reunification and greater efficiency in the use of inorganic fertilisers (*i.e.* crop production rose by 13% compared to a 6 % reduction in inorganic nitrogen fertiliser use and 49% for phosphate fertiliser over the period 1990-92 to 2002-04), has led to a significant reduction in nutrient surpluses. Nationally, however, average absolute levels of nitrogen surpluses per hectare remain appreciably above the OECD and EU15 averages, but not for phosphorus, although there is considerable regional variation in nutrient surpluses (Figure 3.9.2). For areas where livestock are concentrated (mainly in the North West and South East) nitrogen surpluses are more than double the national average [20].

Reduction of pesticide use has lowered the risk of water pollution (Figure 3.9.2). Although, certain active substances have been regulated since the 1990s, they are still found above the limit stipulated by the *Drinking Water Ordinance* of 0.1 μg/l in water bodies, but with a decreasing trend. Pesticide risk indicators show that over the 1990s the risk to the environment (mainly fauna and algae) from herbicide use has declined, while for some fungicides and insecticides the risks have increased [1]. Farmers appear to have improved their efficiency of pesticide use as the volume of crop output rose by 10% while pesticide use fell by 11% over the 1990s.

Air pollution from farming activities showed a significant reduction over the period 1990 to 2004. Agricultural ***ammonia emissions*** decreased by 10% from 1990-92 to 2001-03, largely because of a decline in livestock numbers, with agriculture contributing about 95% of national total ammonia emissions. Germany has agreed to cut total ammonia emissions to 550 000 tonnes by 2010 under the *Gothenburg Protocol* and by 2001-03 emissions totalled 608 000 tonnes, so a further 11% cut will be required to meet the target.

Agricultural greenhouse gas (GHG) emissions fell by 11% over the period 1990-92 to 2002-04, largely due to the decrease in livestock numbers, fertiliser use, and energy use (Figure 3.9.2) [21]. But the decrease in national total GHGs was greater at 14%, while the

German target for total emissions under the EU *Burden Sharing Agreement* towards the 2008-12 *Kyoto Protocol* is a 21% reduction. To some extent agricultural GHG emissions are offset by agricultural soils being a major sink for carbon, with an estimated 7 billion tons stored in the first 30 cm of soil [2]. Support through the *Renewable Energy Act* is encouraging a rapid expansion of agricultural biomass as a feedstock to produce biofuels and generate heat and electricity (Figure 3.9.4). The current contribution to total fuel and electricity supplies is under 1%; and nearly 4% for heating [22, 23].

Agricultural use of chemicals and land use changes have harmed wild species and habitats, but conservation of farm genetic resources led to some improvement. A major cause of decline in wild plant species has been attributed to farming, although recently the loss of plant species has slowed [1, 24]. Fauna, especially birds, show a similar trend with farming seen as a major threat to 40% of "Important Bird Areas" [21]. Grassland habitats are important to some flora and fauna, and efforts are underway to conserve them, for example extensive grassland [1, 24, 25]. But the area of permanent pasture declined by –8% over the period 1990-92 to 2002-04 with some of this land converted to crop use, although since 2005 measures have been introduced to limit such conversion. Erosion of agricultural genetic resource diversity for both crops and livestock has remained constant or improved slightly over the past decade. Increasing policy efforts are targeted to safeguard genetic resources [1, 26, 27].

Concerns for landscape conservation and flood control management are related to the decline of the area farmed. The agricultural land area declined by about 2% from 1990-92 to 2002-04 (in 2002 about 105 hectares/day was converted from agricultural to other land uses). At the same time, there is evidence of public demand for protecting cultural heritage in some agricultural landscapes, such as conservation of hedgerows [28], but the extent and trends in agriculture's impact on landscapes is unknown [29]. The Federal Government is seeking to reduce the rate of conversion of agricultural and forest land to other uses [1].

3.9.3. Overall agri-environmental performance

Overall pressure on the environment from agricultural activities has declined since 1990. Much of this improvement is due to the marked reduction in purchased farm input use relative to the volume of agricultural production, especially crop production, which rose since 1990 because of the adoption of improved varieties and farming methods. Also, the contraction of the farm sector in the New Länder following reunification has reduced pressure on the environment. Despite these improvements the absolute levels of agricultural water pollutants remains high and national (*e.g.* EU *Nitrates Directive*) and international targets (*e.g. OSPAR and HELCOM Conventions*) have not been met to their full extent, which also applies to ammonia emissions in terms of meeting the *Gothenburg Protocol* targets. In addition, adverse impacts from agriculture on biodiversity persist, although some improvement is evident in the conservation of agricultural genetic resources.

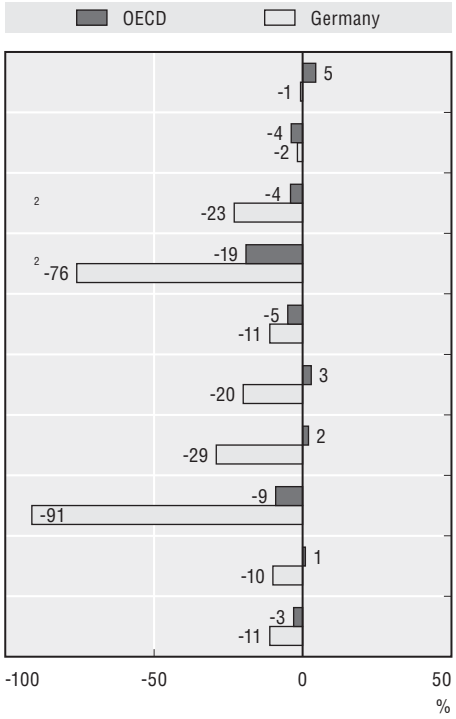
Monitoring and evaluation of agri-environmental trends has been strengthened. Where Germany has reporting obligations under international environmental agreements, such as the *OSPAR and HELCOM Conventions*, data availability are satisfactory. However, information on the impacts of agriculture on soil erosion, biodiversity, landscapes and flood management control is weak, and there is no legal requirement to collect pesticide use data, which are only estimates [30].

Recent strengthening of agri-environmental policies may lead to further improvements in agri-environmental performance. New provisions under Agenda 2000 and the 2003 CAP reforms, however, are expected to contribute to reducing environmentally adverse impacts as they reduce support linked to production, and strengthen the use of cross compliance. This is reinforced by a range of environmental measures at the Länder level and by targets over the next decade, such as reducing water pollution [1]. These measures have encouraged application of sustainable farming practices which are now applied on nearly 30% of the total agricultural area (among the highest share in the EU15) [31]; and reduced land use intensity and production per hectare compared to farms not adopting these practices [6]. The uptake of agri-environmental programmes, however, tends to be lowest in regions with high intensity farming [7, 31].

Water pollution and biodiversity remain key agri-environmental challenges. Despite a significant reduction of water pollution caused by agricultural activities, agriculture accounts for the major and rising share of nitrogen and phosphorus discharges into water bodies, mainly because pollution from non-agricultural sources has been declining more rapidly than for farming. Water pollution from pesticides and heavy metals derived from fertilisers persists, although the risk of pesticide pollution of water bodies has declined. Certain farm chemical use practices and land use changes continue to impact adversely on biodiversity, and agricultural land use changes are also raising concerns regarding landscape conservation and flood management control in some regions. Concessionary fuel and electricity taxes for farmers can act as a disincentive to more efficient energy use, and to limiting greenhouse gas emissions.

Figure 3.9.2. **National agri-environmental performance compared to the OECD average**

Percentage change 1990-92 to 2002-04[1]



Absolute and economy-wide change/level

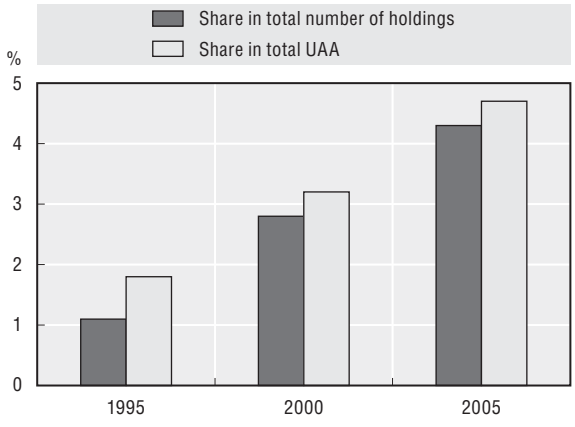
Variable	Unit		Germany	**OECD**
Agricultural production volume	Index (1999-01 = 100)	1990-92 to 2002-04	99	105
Agricultural land area	000 hectares	1990-92 to 2002-04	–292	–48 901
Agricultural nitrogen (N) balance	Kg N/hectare	2002-04	113	74
Agricultural phosphorus (P) balance	Kg P/hectare	2002-04	4	10
Agricultural pesticide use	Tonnes	1990-92 to 2001-03	–3 646	–46 762
Direct on-farm energy consumption	000 tonnes of oil equivalent	1990-92 to 2002-04	–686	+1 997
Agricultural water use	Million m^3	1990-92 to 2001-03	–460	+8 102
Irrigation water application rates	Megalitres/ha of irrigated land	2001-03	0.3	8.4
Agricultural ammonia emissions	000 tonnes	1990-92 to 2001-03	–66	+115
Agricultural greenhouse gas emissions	000 tonnes CO_2 equivalent	1990-92 to 2002-04	–8 066	–30 462

n.a.: Data not available. Zero equals value between –0.5% to < +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.

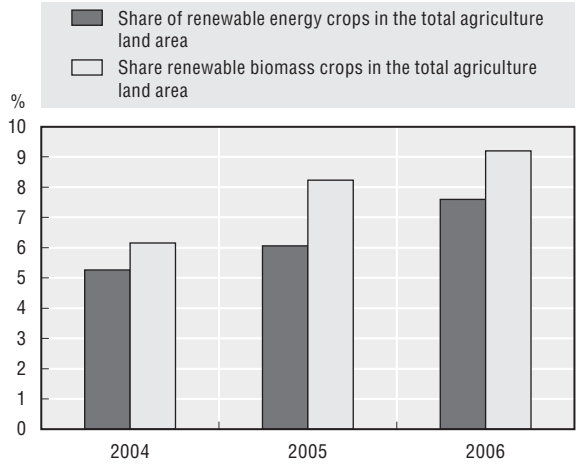
Source: OECD Secretariat. For full details of these indicators, see Chapter 1 of the *Main Report*.

Figure 3.9.3. **Share of the number of farms and Utilised Agricultural Area (UAA) under organic farming**



Source: Federal Ministry of Food, Agriculture and Consumer Protection.

Figure 3.9.4. **Share of renewable biomass and energy crop area in the total agricultural land area**



Source: Federal Ministry of Food, Agriculture and Consumer Protection.

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