Organisation for Economic Co-operation and Development
Organisation de Coopération et de Développement Économiques

# ENVIRONMENTAL PERFORMANCE OF AGRICULTURE IN OECD COUNTRIES SINCE 1990:

## Czech Republic 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The review of environmental performance draws on the country responses to the OECD agri-environmental questionnaires (unpublished) provided by countries and the OECD agri-environmental database supporting Chapter 1 (see website above).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:

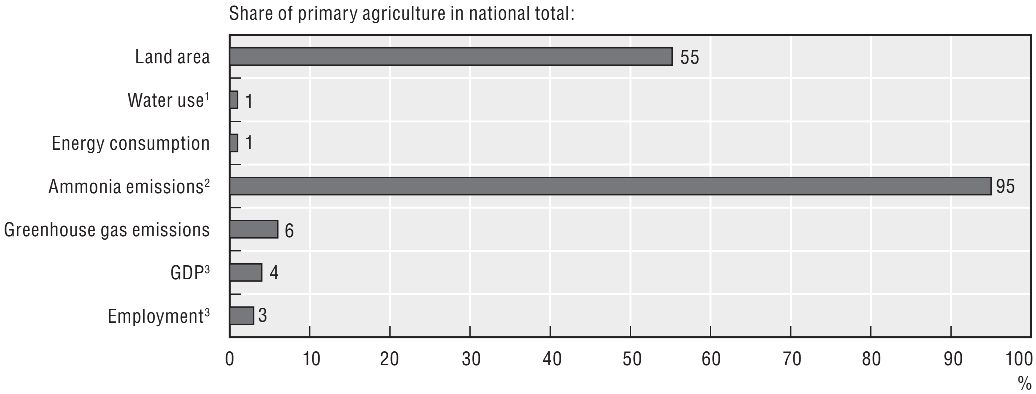
***Coverage:*** The analysis is confined to examination of agri-environmental trends. The influence on these trends of policy and market developments, as well as structural changes in the industry, are outside the scope of these sections. Moreover, the country sections do not examine the impacts of changes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

## 3.5. CZECH REPUBLIC

Figure 3.5.1. **National agri-environmental and economic profile, 2002-04: Czech Republic**




StatLink http://dx.doi.org/10.1787/300013435683

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

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

### *3.5.1. Agricultural sector trends and policy context*

***The long term contraction of the agricultural sector continued over the period 1990 to 2004*** [1]. The share of agriculture in GDP declined steadily from 7% in 1990 to just over 4% by 2004, while over the same period farming's share in total employment fell from 10% to 3% [1, 2, 3, 4, 5] (Figure 3.5.1). These changes are reflected in the reduction of 10% in the volume of agricultural production (1993-95-2002-04), one of the largest decreases across OECD countries (Figure 3.5.2). While livestock numbers declined, continuing a longer term trend since 1990, over the more recent period from 2000 to 2005 arable crop production has risen slightly, especially for cereals, oilseeds and sugar beet [6].

***Transition from a centrally planned to a market economy has impacted significantly on agriculture*** since the early 1990s. Major changes in political and social institutions and economic conditions, the division of Czechoslovakia in January 1993 into the Czech and Slovak Republics, and the shift from a centrally planned to a market economy, have all had implications for land use decisions. There have been extensive changes in farm ownership patterns, productivity and competitiveness [7, 8, 9, 10, 11, 12]. Overall the sharp fall in the volume of farm production during the early 1990s was induced by a major reduction in support (see below), a drop in farm investment, and rising farm debt levels. The use of purchased farm inputs (fertilisers, pesticides, energy and water) decreased sharply in the early 1990s but stabilised and even began to rise slightly from the late 1990s, although by 2005 still remained well below their peak of the late 1980s [6, 13]. While private family farms saw their share of the area farmed rise from under 1% in 1989 to around 27%

by 2002-04, farm production remains concentrated on large co-operative and corporate farms (privatised successors of former state and co-operative farms) with an average size of over 500 hectares (well above the EU average), and accounting for 72% of farmland [1, 5].

***Farming is now supported under the Common Agricultural Policy (CAP)***, with support also provided through national expenditure within the CAP framework. Support to agriculture has fluctuated considerably over the past 20 years. Due to the implementation of economic reforms support declined from almost 70% of farm receipts in the mid-1980s to a low of 10% in 1997 (as measured by the OECD Producer Support Estimate – PSE), but then gradually rose to 27% by 2003, as policies were geared toward EU membership in 2004 [3, 4, 5]. The EU15 PSE was 34% in 2002-04 compared to the 31% OECD average [7, 14]. Nearly 70% of EU15 support to farmers was output and input linked in 2002-04, the forms of support that most encourage production [7]. Total annual budgetary support to Czech agriculture was nearly CZK 28 (EUR 0.88) billion in 2004, of which about 60% was nationally financed, the remainder coming from EU funding [7]. Agri-environmental measures in the Czech Republic accounted for about 5% of total budgetary support in 2004 [1].

***Agri-environmental and environmental policy has had to address some key challenges.*** Firstly, policy had to respond to the environmental problems that are a part of the legacy of central planning; and secondly, policy changes have been required for EU accession and membership. In the early years of transition, agri-environmental policy was not a priority, while the government lacked resources to invest in environmental protection [3, 15]. Indirectly, however, through the removal of government support for purchased farm inputs (*e.g.* fertilisers, pesticides) and other production related support, the effect was to lower agricultural production intensity and pressure on the environment. Even so some agri-environmental policies were introduced over the 1990s, such as: the 1994 *Landscape Care Programme* (Údrzba Krajiny), which provided payments to permanent grassland in less-favoured areas (mountainous and hilly areas) of about CZK 2500 (USD 78) million annually in the late 1990s; specific production restrictions in National Parks and Protected Landscape Zones; area payments to promote organic farming; a tax per head on ruminant animals to reduce ammonia emissions; and an afforestation scheme over the period 1994-2001 which paid farmers about CZK 380 (USD 12) million in total for nearly 3 800 hectares of tree plantings on farmland (about 0.1% of total farmland at this time) [2, 3, 14].

***EU accession and membership from 2004 has also brought policy changes.*** The EU provided pre-accession funds for agriculture up to 2006 (including for environmental purposes) through three programmes: *SAPARD*, the most important for agriculture in terms of funding the establishment of institutions and systems of policy implementation; *PHARE*, covering institutional building; and *ISPA*, to assist infrastructure development, including environmental protection [14, 15]. The EU accession period since 2004 has required the adoption of EU agri-environmental and environmental policies, and harmonisation of technical standards [7, 15]. Policies under the CAP are being phased in up to 2013, when CAP support will reach 100% of the EU15 level. The *Horizontal Rural Development Plan* (HRDP) provides the objectives and outlines the main agri-environmental schemes for 2004 and 2006, including schemes: to reduce soil degradation and water pollution; to protect biodiversity; and to promote environmentally beneficial farming practices. The estimated cost is CZK 10.05 (USD 0.42) billion of which 80% is EU funding [2, 4]. Payments for organic farming are continued under the HRDP, having risen from CZK 48 to 230 (USD 1.5 to 8.2) million between 1998 and 2003, with 6% of agricultural land under organic management [1, 16, 17, 18, 19]. To comply with the *EU Nitrate Directive*, the 2004 *Nitrate*

*Action Programme* established *Nitrate Vulnerable Zones* to regulate farms in terms of fertiliser and manure application and storage practices, and provide farm support of CZK 5 400 (USD 210) million to aid investment for the construction of manure storage facilities [4, 20].

***Agriculture is affected by national environmental and taxation policies.*** The *State Environmental Policy 2004-10* seeks, among other objectives, to reduce non-point water pollution, including from agriculture [17, 21]. Under the *Act on the Protection of Agricultural Land Resources* (1992), a tax is charged for removal of land from agricultural production, with a lump sum for permanent withdrawal and an annual fee for temporary withdrawal. This scheme raised tax income of CZK 590 (USD 18) million in 2002 with 60% of the tax revenue going to the *State Environmental Fund* and 40% to the municipality for rural development and environmental protection [3, 13]. Farm fuel use is supported through a tax exemption. During 2005 this tax exemption was equivalent to about CZK 1 489 (USD 62) million of budget revenue forgone [22, 23]. Support is provided for investment in irrigation infrastructure (for orchards, vineyards and hops), amounting to CZK 23 (USD 1) million in 2006. While farmers are exempt from the surface water withdrawal charge, they pay a groundwater abstraction charge of CZK 3 (USD 0.13 cents) per $m^3$ for volumes in excess of 500 $m^3$ per month [4, 13, 20, 22].

***International environmental agreements also have implications for agriculture***, with respect to limiting emissions of: ammonia (*Gothenburg Protocol*), methyl bromide (*Montreal Protocol*) and greenhouse gases (*Kyoto Protocol*). Emissions of ammonia and methane were taxed at CZK 1 000 (USD 44) per tonne until 2002 after which the tax was removed [3, 24, 25]. The use of agricultural biomass as a feedstock for renewable energy production has been supported since the early 1990s through: income tax relief, interest subsidies and loan guarantees for installations using biomass for producing biofuels and biogas; feed-in tariffs for electricity production from biomass; and reduced value added tax (lowered from 23% to 5% since 1995) amounting to nearly CZK 500 (USD 18) million of budget revenue forgone annually between 2002 and 2004; and exemption from excise duties for biodiesel from 1995 (although the tax was reintroduced from 2000 [3, 4, 6, 24, 26]). As part of its commitments under the *Convention of Biological Diversity*, the *National Biodiversity Strategy*, along with a range of other measures, promotes the conservation and use of agricultural genetic resources through a *National Programme* as well as the protection of mountain biodiversity and agricultural landscapes [17, 21, 27, 28]. The Czech Republic has a number of bilateral and regional environmental co-operation agreements with neighbouring countries, notably concerning water resources and pollution through the *Agreements on International Commission for Protection of the Elbe, Danube and Odra* river basins. These have implications for controlling agricultural water pollution [4, 20].

### *3.5.2. Environmental performance of agriculture*

***Environmental concerns related to agriculture have changed dramatically over the past 20 years.*** With the reduction in farm production and input support, and shift to a market economy, farming moved from an intensive production orientated system to adoption of more extensive farming methods, linked particularly to the large decrease in use of purchased farm inputs. In the pre-transition period the primary agri-environmental problems were soil erosion, heavy pollution of some water bodies and poor uptake of environmentally beneficial farming practices [3]. Over the 1990s certain environmental problems persisted due to the legacy of decades of damaging farming practices, notably soil erosion and in some areas industrial pollution of farmed soils, especially from acidification and heavy metals [3, 13, 21, 29, 30]. While the pressure on water quality and biodiversity has eased with more extensive farming practices, agricultural water pollution continues and land use change and cessation of farming has led to damage to biodiversity in some areas [13, 21, 25, 29, 31].

***Soil erosion is a major and widespread environmental problem***, partly because the share of arable land in total farmland is high at over 70% [13]. Data for the period 1999-2000 indicate that nearly 70% of farmland is affected by a medium to extreme risk of ***water erosion***, with nearly 30% subject to very high to extreme water erosion risk (greater than 6t/ha/year) [6, 13, 32]. Over three – quarters of farmland is at a tolerable and low risk of ***wind erosion***, but up to 40% of farmland in Moravia and 10% in Bohemia is potentially endangered by wind erosion [13]. Research suggests that off-site soil erosion from farmland has decreased significantly since the early 1990s due to land abandonment, conversion of arable land to pasture and forestry, and reduction in field size in some areas [30, 32, 33].

***There has been a substantial increase in the area under soil conservation practices*** (for example conservation and zero tillage), with the share of arable land under these practices rising from 3% to nearly 30% between 1994 and 2000-03 [32]. But the share of farms adopting soil conservation practices in areas of high risk of erosion is less than 40%, while the share of arable land under vegetative cover over the year declined from 18% to 9% between 1989 and 2000-03. The overall share of farmland under vegetative cover over the year is relatively low (around 40%) compared to many other OECD countries (over 60%) [32, 33]. As a consequence off-farm soil sediment flows are causing water pollution through transporting nutrients into water bodies, while the deposit of silt in rivers and reservoirs is exacerbating the severity of floods [2, 25]. Between 30% and 50% of farmland is affected by ***soil compaction***, mostly caused by the movement of unsuitable farm machinery on wet soils [2]. There has been some improvement over the 1990s in the ***industrial air pollution of agricultural soils***, especially from acid rain and heavy metals, including the re-cultivation of previously contaminated soils [3, 13]. Very few soil samples by 2000-03 had above limit contents of hazardous elements, although cadmium in lighter soils remains a concern [13].

***Overall there has been a long term reduction of water pollution from agricultural activities***, between 1990 and 2004 [20]. This has been closely associated with the sharp decrease in nutrient surpluses, especially as a result of lower fertiliser use and livestock numbers, and reduced pesticide use over the 1990s [3]. But in the period from the late 1990s there has been a small rise in nitrogen surpluses (but not phosphorus) and pesticide use, with the pollution of surface water and groundwater in some intensively farmed areas remaining stable and in certain cases slightly rising [20].

***There have been substantial reductions in agricultural nutrient surpluses*** (Figure 3.5.2). The trends in the intensity of nutrient surpluses per hectare of total farmland, both of nitrogen (N) and phosphorus (P), over the period from the late 1980s to 2004, fluctuated considerably [33, 34]. In the late 1980s nitrogen surpluses (expressed as N/kg/ha) were at a level comparable to those of the EU15 average (but above the EU levels for phosphorus), although by the early 1990s nitrogen surpluses were halved, and P surpluses decreased from around 30 kgP/ha of farmland to about 2 kgP/ha by the mid/late 1990s. From the late 1990s there has been a slow increase in N surpluses (stable for P surpluses), although they were still well below the levels of the late 1980s. The reduction in support to fertilisers and crop and livestock products during the transition period largely explains the decrease in nutrient surpluses [4]. This is highlighted by the fluctuations in the use of inorganic N fertilisers which fell from (figures in brackets are for P fertilisers) around 420 000 (300 000) tonnes in the late 1980s down to 200 000 (under 50 000) tonnes in the early 1990s, rising to nearly 300 000 (over 50 000) tonnes by 2002-04, but still well below the level of the late 1980s.

***Agricultural pollution of water bodies from nitrates declined over the 1990s but remains significant*** [13, 17] (Figure 3.5.3). This is illustrated by the *Nitrate Vulnerable Zones* (designated under the *EU Nitrates Directive*) which accounted for around 46% of farmland in 2004 [2, 4, 20]. The high rate of soil erosion in some areas is a key source of ***nitrate water pollution*** from agriculture, despite reductions in nitrogen surpluses. Moreover, all farms have been under a nutrient management plan since the early 1990s, with soil nutrient testing conducted every 6 years since 1993 [32, 35]. With the greater reduction in point sources of nitrate pollution of water (*e.g.* from industry) the importance of diffuse agricultural pollution is growing, with rising levels of nitrogen surpluses since the late 1990s further raising pressure on water quality (Figure 3.5.3) [2, 13]. The pollution of water bodies from agricultural ***phosphorus*** is much less significant, mainly because of the reduction in P surpluses have been greater than for nitrogen over the 1990s [2]. In the late 1990s farming accounted for about 40% of nitrates and 30% of phosphorus in surface water [4, 25]. A number of reservoirs and fishponds suffer eutrophication from agricultural nutrient run-off, erosion and deposition from the air [4, 13, 17, 36]. Around 7% of groundwater monitoring points exceeded EU standards for nitrates in drinking water in 2000 [29].

***The decrease in pesticide use was among the highest across OECD countries from 1990-92 to 2001-03*** (Figure 3.5.2). Its use declined from around 9 000 tonnes (of active ingredients) in the late 1980s to about 3 700 tonnes by the mid-1990s, then rose to 4 300 tonnes by 2001-03 [4, 6, 13]. The reduction in support to pesticides and crops during the transition period explains much of the decrease in pesticide use, but also to some extent the expansion in organic farming and adoption of integrated pest management (IPM). Organic farming grew rapidly over the 1990s and accounted for over 6% of farmland in 2004, compared to under 1% in the early 1990s (among the highest share across OECD countries). Permanent grassland accounts for about 90% of land under organic management [1]. Although the area under IPM more than doubled between 1990 and 2003, it accounted for little more than 1% of the total arable and permanent crop area in 2003 [32]. The decline in pesticide use over the 1990s lowered the pressure on water quality, but rising use since the late 1990s has led to increased concentrations of pesticides in water [20]. Monitoring of pesticides in water is limited, but research has shown that only 1.5% of groundwater monitoring sites in 2003 reported Atrazine above drinking water quality standards [4, 20]. Despite the ban on the use of the DDT pesticide and its metabolites, in certain places concentration levels in soils from 2000 to 2003 were above permissible levels [13, 37].

***As agriculture is largely rain-fed, use of irrigation is limited***, accounting for 1% of the total farmland area in 2001-03, and mainly for horticultural crops. Farming's share in national water use was 1% in 2005 [20], while over the period 1990 to 2003 agricultural water use declined by over 80%, largely because the area irrigated was more than halved over this period [32]. There has been some improvement in the use of irrigation water application technology, with the share of the area irrigated under drip emitters rising from 3% to 18% between 1994 and 2003 [32].

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***The reduction in air pollution linked to agriculture***, has been among the largest decrease across OECD countries over the past 15 years. Total ***ammonia emissions*** fell by 44% between 1990-92 and 2001, with agriculture accounting for 95% of these emissions in 2001 (Figure 3.5.2) [13]. The drop in emission levels has been mainly due to the reduction in livestock numbers and nitrogen fertiliser use, while a tax has also been applied to ammonia emissions. With total ammonia emissions falling to 77 000 tonnes by 2001, the Czech Republic has already achieved its 2010 emission ceiling target of 101 000 tonnes required under the *Gothenburg Protocol*. Meeting the EU emission ceiling of 80 000 tonnes for 2010 will be more challenging, as projections suggest a small expansion in agricultural production up to 2010 [4]. For ***methyl bromide*** use (an ozone depleting substance) the Czech Republic is one of only a few OECD countries to have eliminated its use (by 2001) ahead of the complete phase-out agreed under the *Montreal Protocol* for 2005.

***Agricultural greenhouse gas (GHG) emissions decreased by over 40% from 1990-92 to 2002-04*** (Figure 3.5.2). This compares to an overall reduction across the economy of 18%, and a commitment under the *Kyoto Protocol* to reduce total emissions by 8% over 2008-12 compared to 1990 levels. Agriculture's share of total GHGs was 6% by 2002-04 [38]. Much of the decrease in agricultural GHGs was due to lower livestock numbers (reducing methane emissions) and reduced fertiliser use (lowering nitrous oxide emissions) [39]. Projections suggest that agricultural GHG emissions will steadily rise in the period from 2003-05 to 2020, as the farming sector expands following entry into the EU. Even so, agricultural GHG emissions are projected to be more than 60% below their level of the early 1990s by 2020 [39].

***Agriculture has contributed to lowering GHG emissions by reducing on-farm energy consumption***, but also by expanding renewable energy production and carbon sequestration in agricultural soils. Direct on-farm energy consumption fell by over 80% between 1990-92 and 2002-04 (compared to a reduction of 16% for total national energy consumption), the largest reduction across OECD countries (Figure 3.5.2). This is mainly because of the decrease in farm and energy support leading to lower production and higher energy prices. Farming accounted for only 1% of total energy consumption in 2002-04 [4]. Since the late 1990s on-farm energy consumption has stabilised, in part because of an increase in farm machinery use.

***Renewable energy production from agricultural and other biomass feedstocks is expanding***, but remains under 2% of total primary energy supply [40]. The main agricultural source for renewable energy is methyl-ester produced from rapeseed oil, which increased from 12 000 to 67 000 tonnes between 1995 and 2000 [26, 40, 41]. Methyl-ester production provided GHG emission savings of around 120 000 tonnes ($CO_2$ equivalent) annually between 2000 and 2005, but this is projected to decline to 90 000 annually by 2020 [39]. The use of agricultural biomass feedstocks for power and heat generation has been more limited compared to biofuels, however, there is considerable capacity to increase the use of agricultural biomass for renewable energy production [24, 26, 40, 41].

***Carbon sequestration associated with agriculture has been increasing since the early 1990s***, contributing to the reduction in GHG emissions [42]. The rise in carbon sequestration has been largely due to the conversion of cropland to pasture, and to a lesser extent the reduction in farmland converted mainly to forestry [13, 38, 39]. Over the period 1990 to 2003 the area of agricultural land declined by less than 1%, but the area of pasture grew by 13% in contrast to a 4% decrease in the arable and permanent crop area [38]. Projections suggest that from 2005 to 2020 these trends will continue, although at a slower rate than during the 1990s [39]. It is also likely that the organic carbon content of agricultural soils rose slightly between 1992 and 2002, despite the drop in organic manure application due to lower livestock numbers [33].

***Evaluating the effects of agriculture on biodiversity over the past 20 years is complex.*** This is because of the inheritance from the previous centrally planned economy which led to widespread damage to biodiversity, such as the removal of small habitats (*e.g.* woodlands), land drainage (*e.g.* loss of wet meadows), and farming on marginal soils [2, 3, 25, 29, 31]. Over the 1990s, the pressure on biodiversity from farming activities diminished, especially with the reduction in fertiliser and pesticide use and conversion of cropland to pasture, leading to the revival of some wildlife [29]. But while the overall farming system has become more extensive, in certain areas the abandonment of some semi-natural farmed habitats (*e.g.* grassland) has emerged as a threat to biodiversity [3, 13, 25, 31].

***There are active* in situ *and* ex situ *programmes for agricultural genetic resource conservation*** [17, 27]. ***Crop varieties*** used in production have increased in diversity over the period 1990 to 2002 [32]. Crop genetic resources are mainly conserved *ex situ* in national gene banks and research centres, with over 52 000 accessions of all the major crops, horticultural plants, and grasses [43]. There is also some regular *in situ* monitoring of crop varieties, especially the propagation of horticultural varieties [17, 27, 43]. ***Livestock breeds*** used in marketed production have increased in number over the period 1990 to 2002, with a national programme since 1995 covering *in situ* conservation of livestock breeds and an *ex situ* gene bank established in 2000 [32, 44]. There is little information on the state or conservation of endangered crop varieties and livestock breeds, but concerns have been raised as to the need to conserve endangered varieties and breeds in risk of extinction, notably the Czech red cattle, the Valaska sheep and the Staroklandrubske horse [2, 25, 27].

***Wildlife conservation is threatened, in particular, by the change in management and use of semi-natural grassland*** [2]. While estimates vary, semi-natural grassland accounts for between 10% and14% of agricultural land and 40%-60% of total permanent grassland and pasture [2, 4, 27]. The two key threats to semi-natural grasslands, which are usually associated with a rich and abundant wildlife that coexists with livestock at low stocking densities, are their switch to more intensive forms of management (*i.e.* higher stocking rates); or in some marginal mountain areas their abandonment where it may be too costly to convert them to cropland or forestry [25, 27, 31]. In this context, the ***White Carpathians***, a mountainous region in the east of the Czech Republic, is of significance as it has been recognised as a UNESCO Biosphere Reserve since 1996 with over half the region under pastoral semi-natural grassland [28, 31, 45, 46, 47]. These grasslands are considered to be among the most plant species rich in Europe with many protected species. But their continued existence is coming under a variety of threats, especially the increase in the area under fallow (5% by the late 1990s) and the reduction in livestock over the 1990s leading to the abandonment of some areas, or in others under-grazing below a level necessary to maintain the species richness of the grasslands [28, 31, 45].

***Overall the impact of agriculture on wildlife has been mixed***, despite the trend towards a more extensive agricultural system over the past 15 years. While the national index of bird population trends was almost stable over the period 1990 to 2003, farmland bird populations have sharply declined over the period from the mid-1990s to 2003, after previously rising from the mid-1980s. This trend is of concern as agriculture is estimated to have posed a threat, in the late 1990s, to around 55% of important bird habitats through changes in management practices and land use [48]. Some farmland bird species are seriously threatened, such as the Common Partridge (*Perdix perdix*) and Corncrake (*Crex crex*) (Figure 3.5.4). Some game species have recovered in numbers since the mid-1990s such as the Pheasant (*Phasianus colchicus*), while others declined such as the Brown Hare (*Lepus europaeus*) [2, 4, 13, 17, 25].

### 3.5.3. Overall agri-environmental performance

***Overall agricultural pressure on the environment has declined since 1990.*** The transition to a market economy has resulted in a more extensive farming system, leading to a decrease in the use of purchased farm inputs (fertilisers, pesticides, energy and water) and water and air pollution. With the small rise in farm input use since the late 1990s, water pollution in some intensively farmed areas has risen slightly [20]. Even so, by 2005 farm input use remained below its peak of the late 1980s. Soil erosion is a major and widespread problem, partly because the share of arable land in total farmland is over 70% [13]. With respect to biodiversity there are concerns over damage to semi-natural grasslands and the decline in farmland bird populations since the mid-1990s [2, 13, 17].

***Improvements are being made to agri-environmental monitoring***, to provide the information required to effectively monitor and evaluate agri-environmental performance and policies [25]. In some areas monitoring is well developed and established over a long period, notably soil, ammonia and greenhouse gas emission monitoring [25, 38, 39]. Time series data on agricultural water pollution is lacking, but a monitoring system is under development [4, 20, 21, 25]. Also projects financed under PHARE, for example, are seeking to improve the monitoring and evaluation system [2]. An important data gap is the monitoring of biodiversity, but this is now a priority area for the government [27]. As agri-environmental schemes are expanded, particularly with focus on agri-biodiversity conservation, this information will be important to help evaluate the effectiveness of these schemes.

***Agri-environmental policies have been strengthened in the period since EU membership***, but it is too early to see their effect on environmental outcomes. Particular emphasis has been given to promote organic farming through area payments, and under the 2004 *Action Plan for Organic Farming* the target is to expand organic farming to a 10% share of farmland by 2010 from the 6% share in 2004 [1, 16, 19, 21]. A high priority has also been given to renewable energy production. The goal of the Czech *Energy Policy* is to increase the share of renewable energy in total primary energy supply to 3-6% by 2010 and 4-8% by 2020, of which biomass agricultural and forestry biomass is expected to contribute a major share [40]. A combination of support: tax incentives, interest subsidies and loan guarantees, is being provided to expand agricultural biomass output as a feedstock for bioenergy production. The use of agricultural biomass feedstocks for power and heat generation has been more limited compared to biofuels, but there is considerable capacity to increase the use of agricultural biomass for renewable energy production [24, 26, 40].

***Agricultural pressure on the environment has been much reduced but problems persist.*** With almost 50% of farmland exposed to the threat of ***soil erosion*** from water, soil conservation measures are currently inadequate to address the problem, with continuing off-site damage, including the transportation of nutrients and pesticides into water bodies, and the build-up of silt aggravating the severity of flooding [13, 21, 25, 35]. The conversion of some arable land to grassland in areas at high risk of erosion would bring benefits for soil and water protection [2]. While the uptake of soil conservation practices has risen, the share of farms adopting conservation practices in areas of high erosion risk is less than 40%, and the share of arable land under vegetative cover over the year has been declining [32, 33]. ***Tax exemptions*** on fossil fuel used by farmers provide a disincentive to improve energy efficiency and help further reduce greenhouse gas emissions, although agriculture has reduced GHG emissions, energy use and increased renewable energy production. Moreover, support for irrigation infrastructure and exemption from surface water withdrawal charges reduces incentives to conserve water resources, but farmers do pay a groundwater abstraction charge [4, 13, 20, 22].

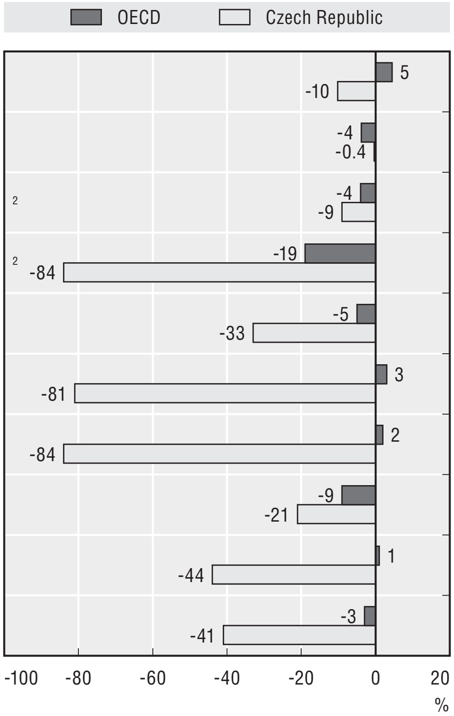
***The pressure on biodiversity has eased as the intensity of farming has decreased.*** But there are concerns with the decline in farmland bird populations since the mid-1990s and threats to semi-natural grasslands [13, 21]. The key threats to semi-natural grasslands, which are associated with a rich and abundant wildlife in coexistence with low intensity pastoral systems, include: the switch to more intensive forms of management (*i.e.* higher stocking rates) in some regions; the increase in the area under fallow; and the reduction in livestock numbers leading to abandonment or under grazing in certain areas below a level sufficient to maintain the species richness of the grasslands [28, 31, 45]. It is possible, however, that wildlife has benefited from the conversion of cropland to grassland, as well as the effects of the lowering of agricultural water and air pollution on ecosystems, although there are few studies that have examined these changes.

***The projected gradual expansion of agricultural production to 2020 could increase environmental pressure*** [39]. Under the recent changes of CAP reforms and together with EU enlargement, studies suggest this could lead to higher wheat and coarse grains production (but also to a reduction in the area under these crops) and contraction in livestock output, except sheep up to 2020 [39, 49]. As a result this may result in an overall rise in farm incomes and the concentration of production on fewer farms [7]. While these trends indicate a further increase in the intensity of production overall, the farming system is likely to remain at a significantly lower level of intensity up to 2020 compared to the 1980s, especially in terms of the use of purchased farm inputs, including fertilisers, pesticides, energy and water. Moreover, the total area farmed is projected to continue its long term decline due to the decrease in arable land, even though the area under permanent grasslands is likely to rise [39].

Figure 3.5.2. **National agri-environmental performance compared to the OECD average**

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




Absolute and economy-wide change/level

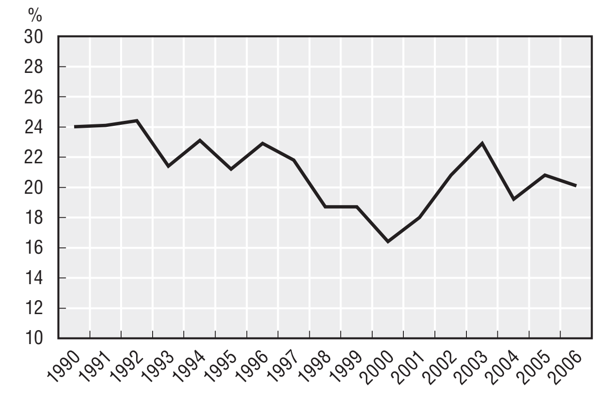
| Variable | Unit | | Czech Republic | **OECD** |
|---|---|---|---|---|
| Agricultural production volume | Index (1999-01 = 100) | 1990-92 to 2002-04 | 90 | 105 |
| Agricultural land area | 000 hectares | 1990-92 to 2002-04 | –16 | –48 901 |
| Agricultural nitrogen (N) balance | Kg N/hectare | 2002-04 | 70 | 74 |
| Agricultural phosphorus (P) balance | Kg P/hectare | 2002-04 | 2 | 10 |
| Agricultural pesticide use | Tonnes | 1990-92 to 2001-03 | –2 237 | –46 762 |
| Direct on-farm energy consumption | 000 tonnes of oil equivalent | 1990-92 to 2002-04 | –1 064 | +1 997 |
| Agricultural water use | Million $m^3$ | 1990-92 to 2001-03 | –78 | +8 102 |
| Irrigation water application rates | Megalitres/ha of irrigated land | 2001-03 | 0.6 | 8.4 |
| Agricultural ammonia emissions | 000 tonnes | 1990-92 to 2001-03 | –58 | +115 |
| Agricultural greenhouse gas emissions | 000 tonnes $CO_2$ equivalent | 1990-92 to 2002-04 | –5 658 | –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.

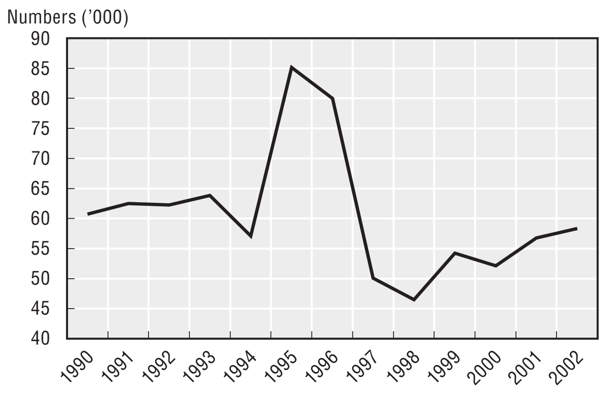
*Source:* OECD Secretariat. For full details of these indicators, see Chapter 1 of the *Main Report*.

Figure 3.5.3. **Share of samples above Czech drinking water standards for nitrates in surface water**




*Source:* Annual reports on agriculture in the Czech Republic (issues from years 1995-2006), Ministry of Agriculture, Prague.

Figure 3.5.4. **Monitored numbers of partridge population**




*Source:* Ministry of Agriculture, Hunter association, *www.mze.cz.*

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