Environment and agriculture 2018

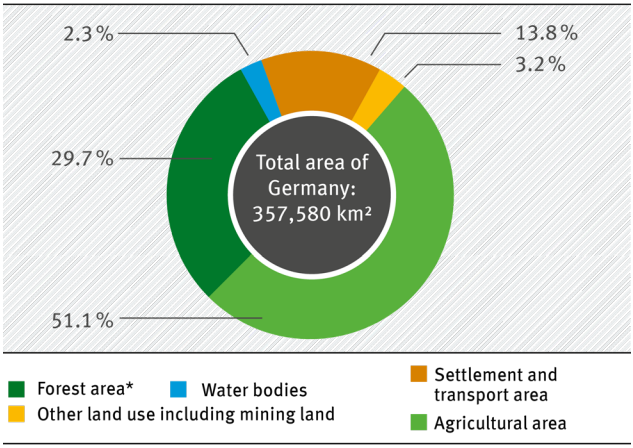
German Environment Agency

Umwelt Bundesamt

Land use for agriculture

Figure 1

Land use in Germany (as at 31.12.2016)



*Since 2016, shrubs have been excluded from the statistics for forests. Shrubs are listed separately under "Other land use". Including shrubs, the share of forest area would be 30.7 %.

Source: Federal Statistical Office of Germany, FS 3 Land- und Forstwirtschaft, Fischerei, R. 5.1 Bodenfläche nach Art der tatsächlichen Nutzung 2016, Wiesbaden 2017

More than half of Germany's surface (51.1 percent) is agricultural land: It is used as farmland, for the cultivation of permanent crops or as permanent grassland, especially for meadows and pastures. In recent years agricultural areas have declined. One reason for this is the increase in land use for settlements and transport infrastructure – a development with negative consequences for nature and the environment.

Land use abroad for the production of foodstuffs

In 2015, the area required to cultivate and produce all foodstuffs consumed in Germany amounted to 19.4 million hectares of land. However, in Germany only 14.2 million hectares have been allocated to the cultivation of foodstuff. Taking into account areas used for the export of foodstuffs (7.2 million hectares), only about 7.0 million hectares were left for domestic consumption.

Germany's agricultural industry not only produces for the domestic market, but is strongly active on the international market. Mainly low-processed goods are imported, which are further processed domestically or used as fodder in order to re-export products of higher quality.

In other words, we purchase land-intensive goods – such as fodder for livestock production – from abroad. This trend has intensified in recent years as results of analyses by the federal Statistical Office of Germany show.

With its increasing livestock production, Germany is contributing to the growth of the global "land footprint": Even though meat consumption in Germany is declining, exports increase. However, the environmental damages resulting from intensive livestock farming take effect in Germany.

Organic farming – share is too low

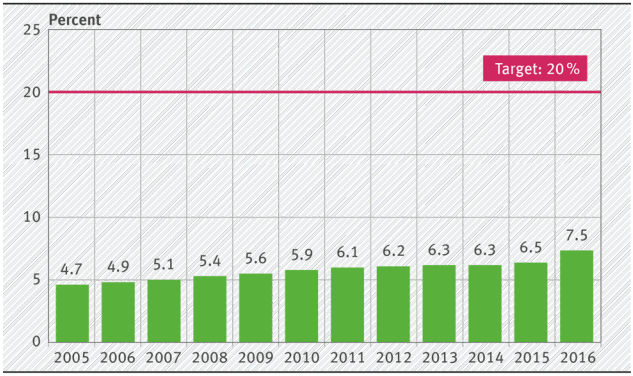
The manner in which agricultural land is cultivated in Germany has significant impacts on the environment. Organic farming is based on the guiding principle of sustainability. It has a pioneering role to play in future sustainable land management, which is resource-saving, environment-friendly and more animal-welfare oriented.

The Federal Government pursues the goal of a 20 percent share of organic farming in total agricultural land. So far only 7.5 percent are used for organic farming (see figure 2). With a turnover of 9.48 billion euros in 2016, Germany is the largest market for organic food in Europe. The organic industry has been recording steady growth for years. If the growing domestic demand cannot be met by the German organic agriculture, organic food must be imported from abroad. In doing so, positive ecosystem services associated with organic farming, such as fertile soils, clean water and air, climate regulation, peoples' recreational value, and opportunities for value creation in rural areas remain untapped.

The low growth rates of organic farming show that a reliable and adequate level of funding for organic farming is imperative. Key factors inhibiting the growth of organic farming must be identified and addressed through efficient measures. Legal certainty is needed to encourage farmers to convert to and continue organic farming.

Figure 2

Share of organic farming in total utilized agricultural area



Source: Federal Ministry of Food and Agriculture (BMEL), Ökologischer Landbau in Deutschland, as at January 2017 and press release 62/2017 "Anbaufläche auf Rekordhoch"

Contributor and affected party of climate change

Agriculture is a major contributor to the emission of climate-damaging greenhouse gases. Those are mainly methane emissions from livestock farming, storage and application of organic fertilizer (liquid manure, slurry, solid dung) and nitrous oxide emissions from agricultural soils, which are among other things a result of high nitrogen surpluses.

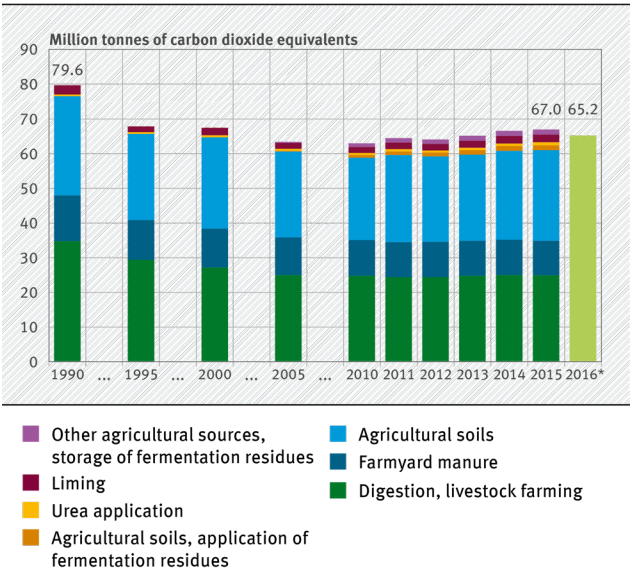
According to an estimate of the German Environment Agency, 65.2 million tonnes of carbon dioxide equivalents were emitted by the agricultural sector in 2016. This accounts for 7.2 percent of total greenhouse gas emissions in Germany. The emissions of greenhouse gases from agriculture were lowest in 2007. Between then and 2016, emissions have increased by 3.2 million tonnes. This means that the sector has replaced the industry as the second-largest emitter of greenhouse gases after the energy sector.

This clearly shows the need for action by the Federal Government if it wants to meet its climate protection goals. An effective reduction of greenhouse gas emissions through technical innovation is only possible to a limited extent. In fact, structural changes are necessary: A significant reduction of nitrogen surpluses, the reduction of livestock numbers – in particular ruminants – and the protection of carbon-rich soils. Without a change in consumption habits, however, there is the risk that emissions will only be shifted abroad, but not reduced on a global level.

On the other hand, agriculture is also affected by the impacts of climate change. Projections indicate hotter and drier summers, which means that precipitation would be lacking in the period of main plant growth.

Figure 3

Greenhouse gas emissions from agriculture according to category



The distribution of emissions corresponds to UN reporting
* 2016: total emissions, as at January 2018 (distribution by category is not possible)

Sources: data from 1990–2015: Thünen-Institute, Calculation of gaseous and particulate emissions from German agriculture 1990–2015. Report on methods and data (RMD). Submission 2017. Thünen Report 46, 2017
2016 data: German Environment Agency, National Trend Tables for German reporting on atmospheric emissions since 1990 (as at 01/2018)
Visualization: German Environment Agency, own presentation

Nitrogen surpluses – sources and distribution

Nitrogen is an essential nutrient for all living beings. However, excessive nitrogen compound inputs to the environment have a negative impact on climate, biodiversity and landscape quality. If, for example, more nitrogen fertilizer is applied to agricultural soils than can be absorbed by the crops, excess nitrogen compounds can enter adjacent water bodies or air.

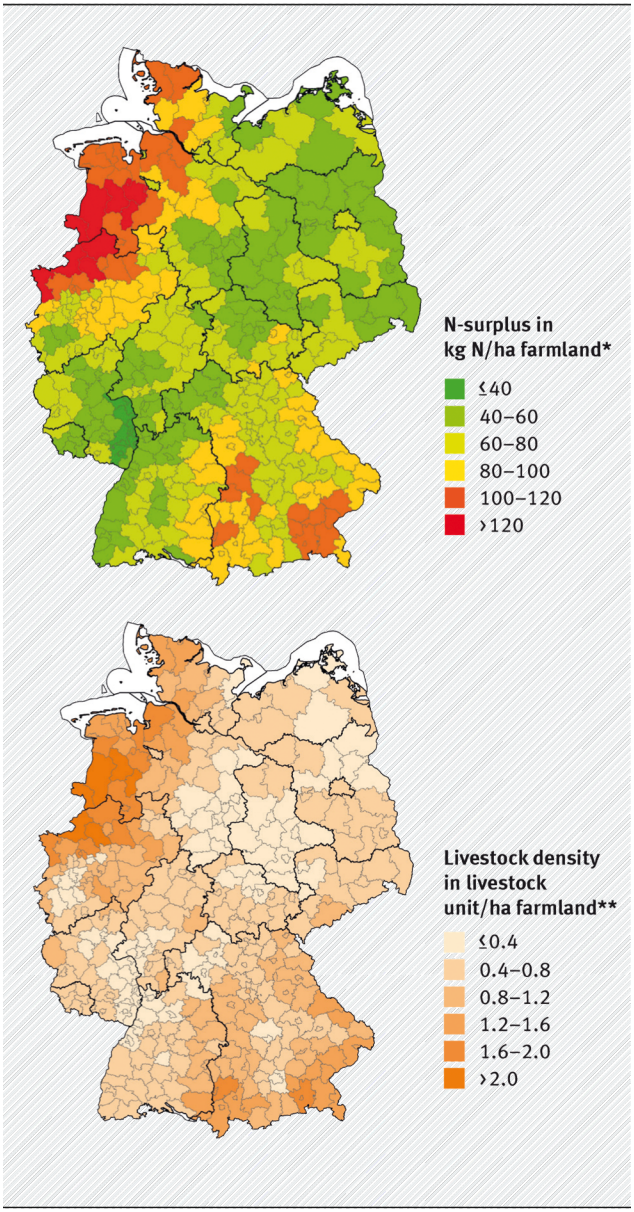
In Germany, agricultural nitrogen surpluses are not evenly distributed. Surpluses at district level sometimes show considerable regional differences. Also, the surpluses are concentrated in certain regions. The surplus of the area balance shown here indicates the leaching and washing-off potential of nitrate nitrogen into groundwater and surface waters, and of the potential emission of ammonia into the air.

In Germany, regions with high livestock density are considered particularly problematic. In such regions, for example in north-western Germany, the volume of slurry and liquid manure is often so high that the quantities of nitrogen contained therein significantly exceed the regional nutrient needs of the crops cultivated.

In order to reduce the negative environmental impact of high nitrogen surpluses, countermeasures are urgently needed, especially in the regions of livestock farming. As a first step, the transfer of surplus manure to agricultural regions is an appropriate option, but in the medium and long term a more even distribution of livestock farming needs to be pursued.

Figure 4

Agricultural area balance of nitrogen surplus and livestock density at district level



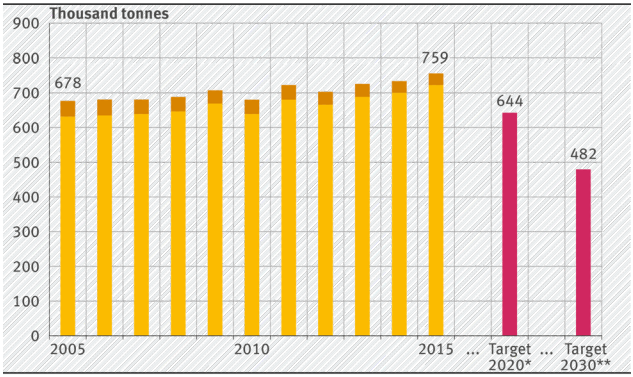
* Mean of the years 2012–2014
** 2013

Source: Häußermann, Bach (Justus-Liebig University Gießen, 2016)

Ammonia acidifies and fertilizes the environment – with impacts on plants, animals and people

Figure 5

Ammonia emissions



* Reduction commitments 2020 onwards of the EU directive 2016/2284
** Reduction commitments 2030 onwards of the EU directive 2016/2284

Source: German Environment Agency, National Trend Tables for the German reporting on atmospheric emissions since 1990, 1990-2015 (as at 02/2017)

In 2015, the input of the nitrogen compound ammonia into the air amounted to 759 thousand tonnes. Of this, 724 thousand tonnes originated from agriculture. They were mainly caused by livestock farming and, to a lesser extent, by the application of mineral fertilizers, and in connection with biogas production.

Ammonia has a fertilizing and acidifying effect on the environment and thus contributes to the pollution of sensitive ecosystems. In parts of northern Germany with high livestock density, the critical load limits have already been exceeded. In natural and near-natural ecosystems (for instance bogs, nutrient-deficient habitats, and water bodies) this can lead to changes in species composition and to a loss of biodiversity. In the environment, ammonia can also transform into different nitrogen compounds with negative consequences for the quality of air (formation of fine particulates), water quality (nitrate in groundwater) and climate change (nitrous oxide).

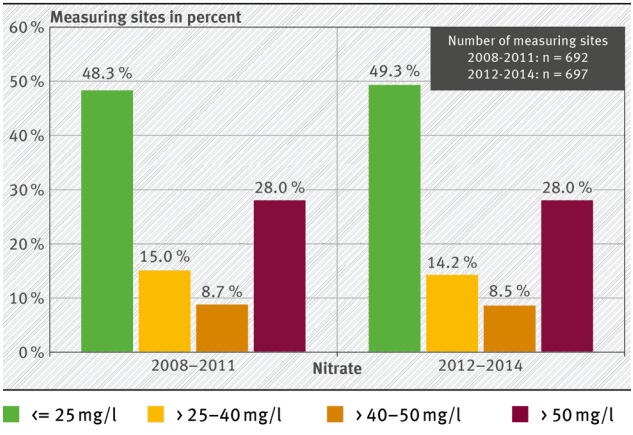
Germany has committed itself to successively reduce ammonia emissions by five percent from 2005 to 2020, and by 29 percent by 2030. The measures introduced by the 2017 amendments to the Fertilizer Legislation are designed to meet this target, starting from 2020. An assessment of the effectiveness of these measures by 2030 is still pending. In order to meet the commitments by 2030, further efforts to reduce agricultural emissions will probably be necessary.

Groundwater is our most important drinking water resource

Figure 6

Development of mean nitrate levels in the new EU monitoring network

Frequency distributions of mean nitrate levels for the periods 2008–2011 and 2012–2014



Source: German Environment Agency 2016 according to information provided by the German Working Group on water issues of the Länder and the Federal Government (LAWA)

Groundwater must be protected from contamination. Water contaminated with nitrate, for example, not only poses a risk to the environment, but also must undergo complex water treatment, if there is no access to other non-contaminated water sources. In Germany, a family of four would then have to pay up to 134 euros more per year for their drinking water.

In areas dominated by arable land and special crops, the nitrate levels measured are significantly more likely to exceed the threshold of 50 milligrams per liter than in areas dominated by forests, meadows or settlements. Approximately 18 percent of all measuring sites in Germany exceed these values. Measured only under farmland (agricultural fields, special crops and grassland), the figure is 28 percent.

This share remained unchanged between 2008 and 2014. This suggests that it has not been possible to significantly reduce nitrogen inputs and thus the pollution of groundwater in recent years in Germany.

In order to reduce the nitrogen input to the groundwater, the guidelines for good professional practice, specified in the Fertilizer Application Ordinance and updated in 2017, should contribute to the reduction of the nitrogen input into the groundwater. In addition, in accordance with the Fertilizer Act, which was also revised in 2017, businesses with intensive livestock farming will be required to monitor, record and evaluate nutrient flows in their operations from 2018 onwards. However, it remains to be seen whether the new regulations will be sufficient to reduce nutrient emissions to the necessary extent.

Biodiversity loss in Germany

Agriculture is the largest land user in Germany and therefore bears a prominent responsibility for conservation of biological diversity. The conservation of biodiversity requires sustainable forms of land use throughout the entire landscape, and a responsible relationship with nature.

The German Sustainable Development Strategy measures biodiversity using an indicator that shows the occurrence of bird populations in different types of landscape. The strongest decline in populations is recorded in the agricultural area.

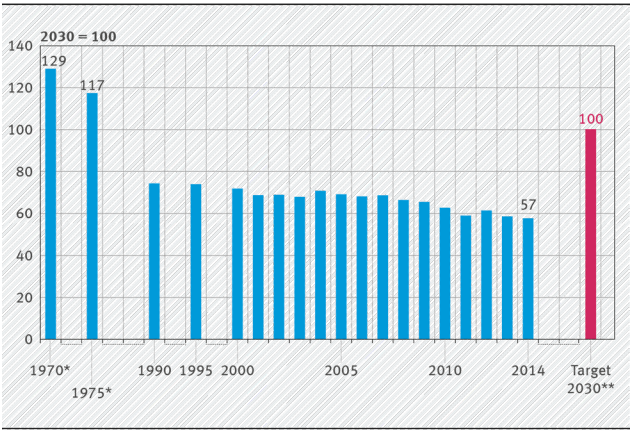
The decline in bird populations clearly shows that biodiversity in Germany is highly at risk, especially so in rural areas with intensive industrial agriculture. This entails intensive use of fertilizers and pesticides, high livestock densities, short crop rotations, large arable land without structuring

landscape elements such as hedges and grassland strips, the use of heavy agricultural machinery, non-suitable soil tillage and an increased cultivation of energy crops.

The German Sustainable Development Strategy stipulates a rise of the bird population indicator to 100 percent by 2030. Using the policies and instruments currently in place, this goal will only be achieved with the greatest effort.

Figure 7

Species diversity and landscape quality – Sub-index farmland



* The values for 1970 and 1975 are based on a reconstruction
** Target from the German Sustainable Development Strategy

Source: Federal Agency for Nature Conservation 2017, data: Dachverband Deutscher Avifaunisten 2017

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