



Environmental data

2023

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LANDWIRTSCHAFT
UND GEOLOGIE



Freistaat
SACHSEN

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Foreword

The annually environmental data provide information on the most important environmental topics in Saxony (e.g. climate protection, forest

condition and conversion, and air as well as water and groundwater and their developments).

There have been positive developments in many of the areas of environmental protection highlighted in this brochure. However, the environmental data show there are immediately ahead of us – such as adapting to climate change and preserving biodiversity.

This year, the focus is once again on the consequences of climate change. The continuing rise in average temperatures, changes in precipitation, and increasing extreme weather events are clear signs

of climate change in the Free State of Saxony. The changes it brings have far-reaching consequences for the environment, society, and the economy. A look at the climatic water balance of the Free State of Saxony shows that since November 2017, there has been a cumulative deficit of about 960 l/m² over five subsequent years.

Saxon forests are particularly affected by the consequences of climate change because drought, extreme weather conditions, and pest infestations pose various challenges for agriculture, forestry, and water management.

The preservation of biodiversity is currently one of the greatest challenges in the Free State of Saxony. Sustainable and nature-friendly land management helps endangered species to stabilise and recover. In order to conserve natural resources, there is

no alternative to reducing the nitrate pollution of soils and water bodies, limiting the use of new land, and reducing the emissions of air pollutants. The results show that further efforts are needed in order to be able to meet the high requirements in terms of nature, environmental, and climate protection.

Current and further information on the environment is available on the Internet at:

www.umwelt.sachsen.de

Heinz Bernd Bettig

President of the Saxon State Office for the Environment, Agriculture and Geology

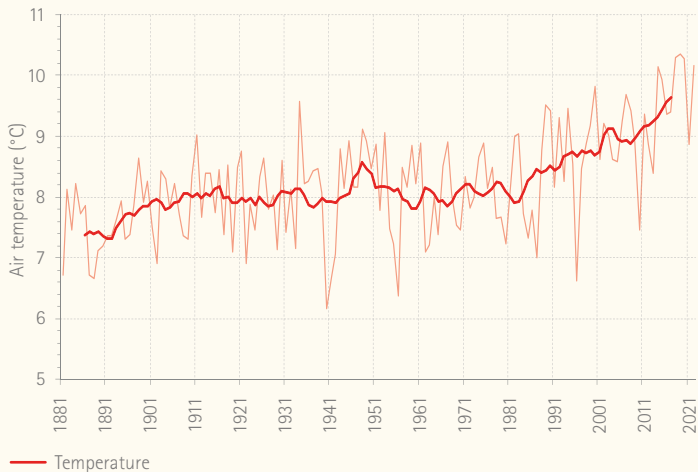
Development of climate conditions in Saxony

The diagrams show the annual mean values of air temperature and precipitation totals in Vegetation period I (April–June) in the Free State of Saxony from 1881 to 2022/23. A better representation of the long-term development is achieved by the 11-year moving average because this is more independent of individual years. A suitable representation of climate change is made possible by the temporal development of air temperature. Among other things, higher temperatures have led to a prolongation of the growing seasons and are accompanied by weather-related extremes (e.g. heat, drought) and the associated risks. Since 1971, each decade has been warmer than the previous one. Since the end of the 1980s/beginning of the 1990s, there has been a noticeable accumulation of the

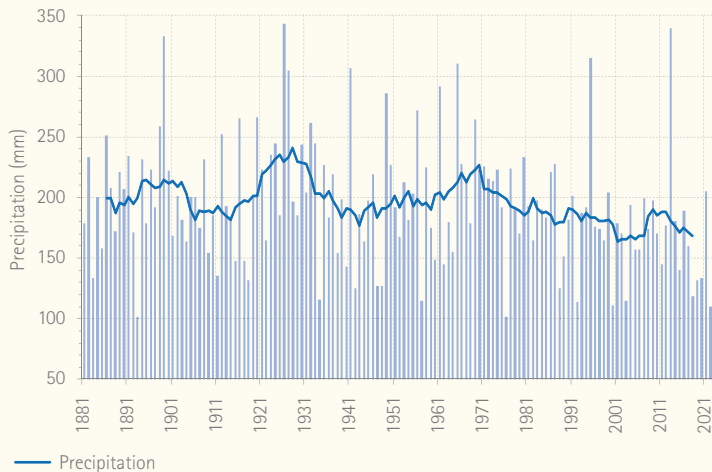
warmest years in Saxony. At 10.2°C, 2022 was one of the warmest years since 1881. The seven warmest years since measurements began have been recorded since the turn of the millennium. Compared with temperature, precipitation is quite heterogeneous with respect to its spatio-temporal occurrence. A decrease in rainfall in Growing season I has slowed the growth of the plants and increased the risk of crop failure. Especially in combination with rising temperatures, this is increasingly affecting agriculture, among other things. Since 1971, each decade has been drier than the previous one. However, Saxon farmers have been able to adapt to the changing conditions with improved water management. The measures range from the choice of variety and

crop type to adapted methods of soil cultivation and fertilisation to the irrigation of certain crops and crop rotations.

Annual mean temperature in Saxony, 1881–2022
(11-year floating mean)



Precipitation in Vegetation period I (April to June)
in Saxony, 1881–2023 (11-year floating mean)

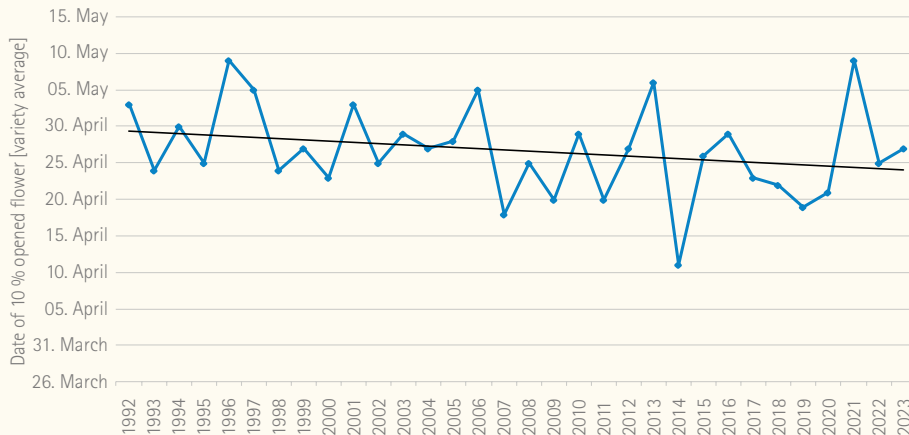


Source: Saxon State Office for the Environment, Agriculture and Geology, German Meteorological Service

Beginning of the fruit tree blooming period

The day when about 10 % of the flowers are open marks the beginning of the fruit tree blooming period. For the representation chosen here, the average value over all the varieties considered is calculated. The beginning of flowering also marks the beginning of fruit development and thus the crucial vegetation phase for fruit growing. The beginning of flowering is an indicator of climate change. The data of the Saxon State Office for Environment, Agriculture and Geology (LfULG) presented here show a slight trend towards a possible earlier beginning of flowering and thus an extension of the vegetation period. This improves the overall cultivation possibilities for plants with a longer vegetation or ripening period with a simultaneous risk of late frost damage. In 2023, the beginning of flowering was again later than the long-term trend.

Mean beginning of apple flowering in Dresden-Pillnitz 1992–2023

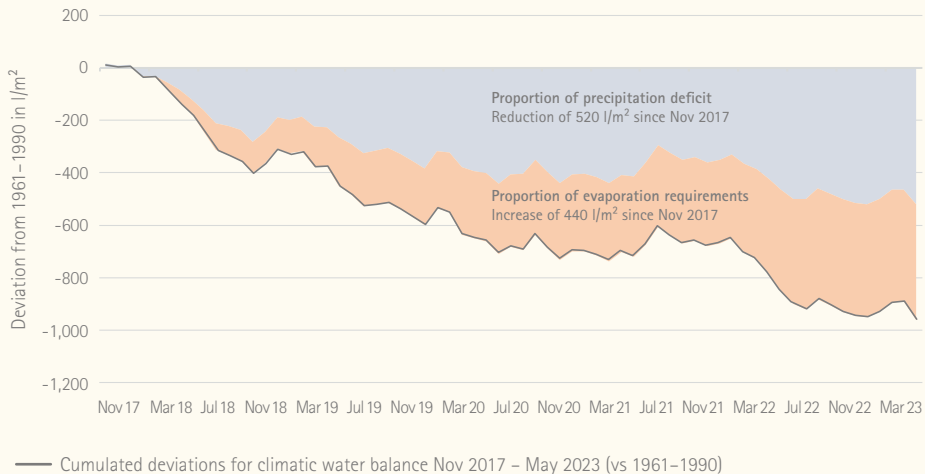


Source: Saxon State Office for the Environment, Agriculture and Geology, German Meteorological Service

Development of the climatic water balance in the Free State of Saxony

The climatic water balance directly relates the precipitation that has fallen (gain) to the evaporation (loss) and is thus a measure of the susceptibility of various environmental systems to the development of drought conditions. Since November 2017, a cumulative deficit of the climatic water balance of about 960 l/m² has arisen in the Free State of Saxony over the five subsequent years. The figure illustrates the water deficit that has accumulated in the meantime. This is caused by below-average precipitation as well as above-average evaporation as a result of the temperature. The direct consequences of this can be seen in the area-wide below-average groundwater levels or in the increasing forest damage.

Development of the climatic water balance

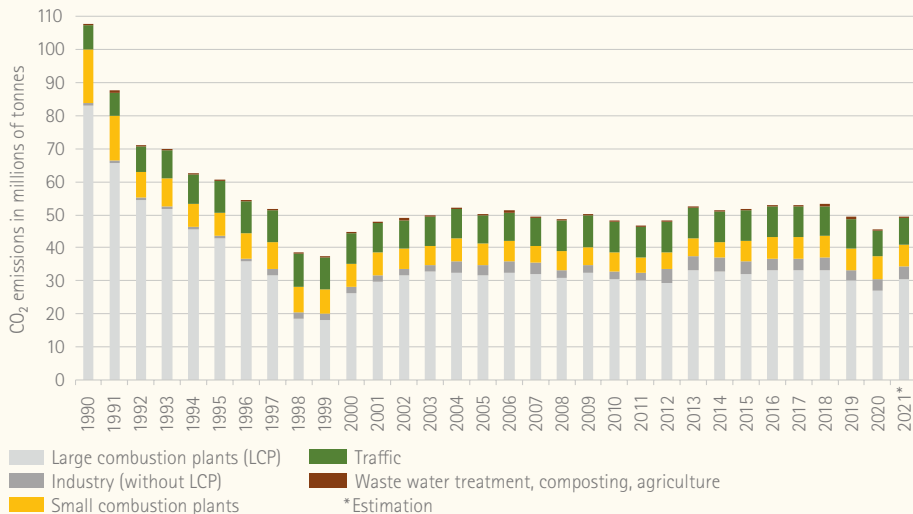


Source: Saxon State Office for the Environment, Agriculture and Geology, German Meteorological Service

Greenhouse gases

Carbon dioxide (CO₂) emissions account for more than 90 % of all greenhouse gases; these accelerate climate change by accumulating in the atmosphere. Large combustion plants (large industrial plants for electricity and heat generation) are still the main polluters. The decline in the 1990s was brought about by the closure of many plants. The increase at the beginning of the 2000s is due to new power plant units. Since 2002, carbon dioxide emissions have stabilised. In addition to Corona, the decline in 2019 and 2020 is also due to shut-down measures at the Lippendorf lignite-fired power plant.

Development of CO₂ emissions in Saxony (1990–2021)



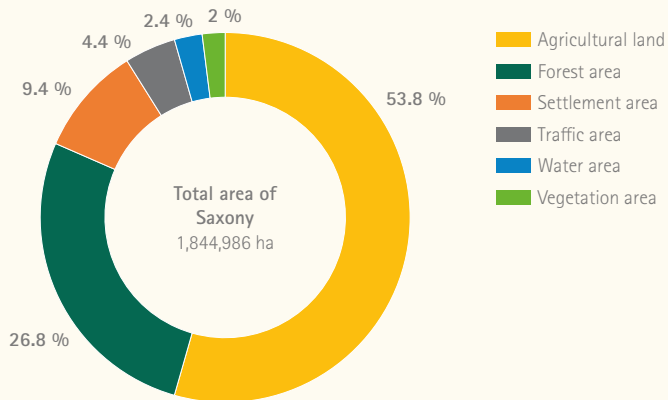
Source: Saxon State Office for the Environment, Agriculture and Geology, Emission cadastre

Land use in Saxony

The percentages of the main land use types in 2023 are shown. Land use change in the Free State of Saxony is highly dynamic. Whilst agricultural land (53.8 %) is subject to constant shrinkage, settlement and transport land (13.8 %) continues to increase. Forest and vegetation areas account for 28.8 % of the land area. The water area has increased to 2.4 %.

All land use types contribute in some way to soil sealing. The Free State of Saxony strives to reduce soil sealing resulting from new land use. This applies to all land use types. The changes are rarely measurable because measures of take-up or take-back are carried out within the respective land use type.

Land use in Saxony



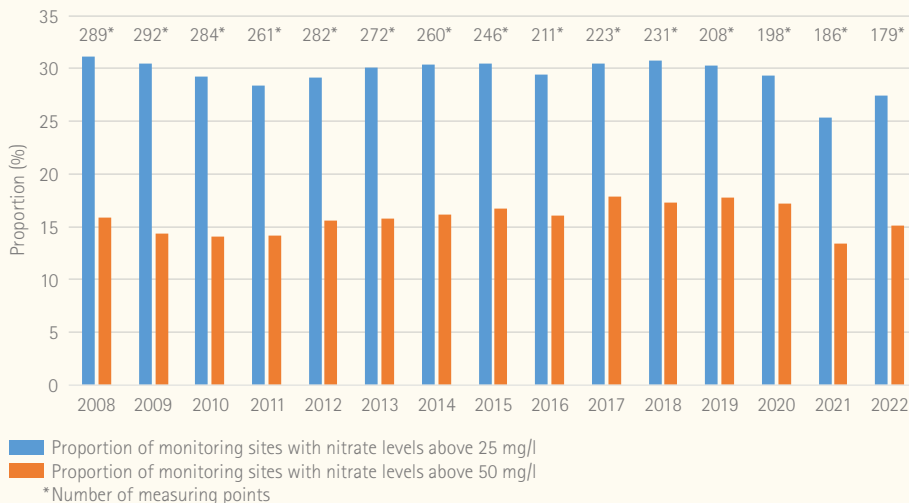
Source: Statistical Office of the Free State of Saxony

Nitrate in groundwater

High nitrate levels in groundwater have negative effects. For example, ecosystems can be damaged or human health impaired.

The figure shows the proportions of monitoring sites in the overview groundwater quality monitoring network with exceedances greater than 25 mg/l nitrate (value of concern under the EC Nitrate Directive) or greater than 50 mg/l (threshold value under the Groundwater Ordinance and action value under the EC Nitrate Directive). From 2008 to 2019, the proportions of measuring points with threshold value exceedances slightly increased. In 2022, the percentage of measured values above 25 mg/l nitrate and above 50 mg/l was below the mean value. A significant downward trend cannot be derived from this.

Nitrate levels in groundwater – measuring network



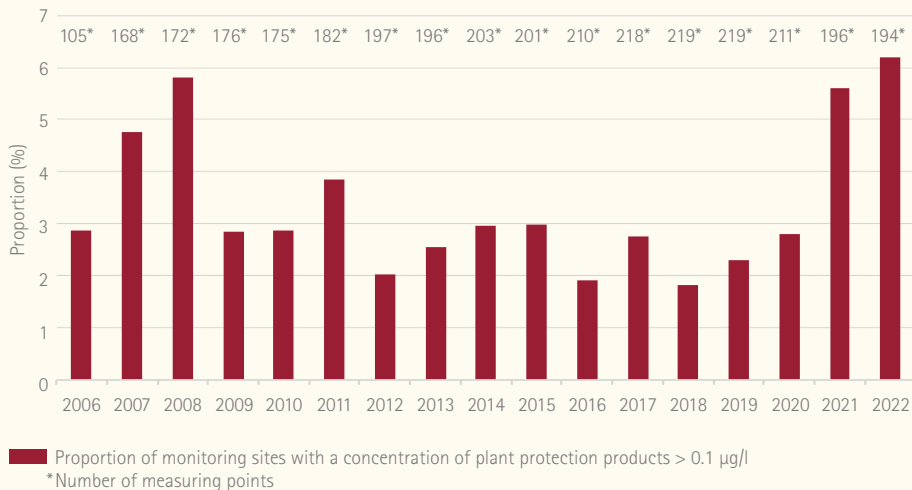
Source: Saxon State Office for the Environment, Agriculture and Geology

Plant protection products in groundwater

Plant protection products (PPPs) are widely used, especially in agriculture. They affect harmful organisms and can pose a risk to other plants and animals as well as to groundwater and surface water.

As of 2006, the figure shows the proportions of monitoring sites in the groundwater quality monitoring network with substance contents > 0.1 µg/l (threshold value for PPP active substances or relevant metabolites in groundwater according to Annex 2 of the Groundwater Ordinance for Groundwater and Drinking Water). The proportion of monitoring sites with levels of active pesticide ingredients or relevant metabolites above 0.1 µg/l ranged between 1.8 and 6.2 % between 2006 and 2022.

Plant protection products in groundwater

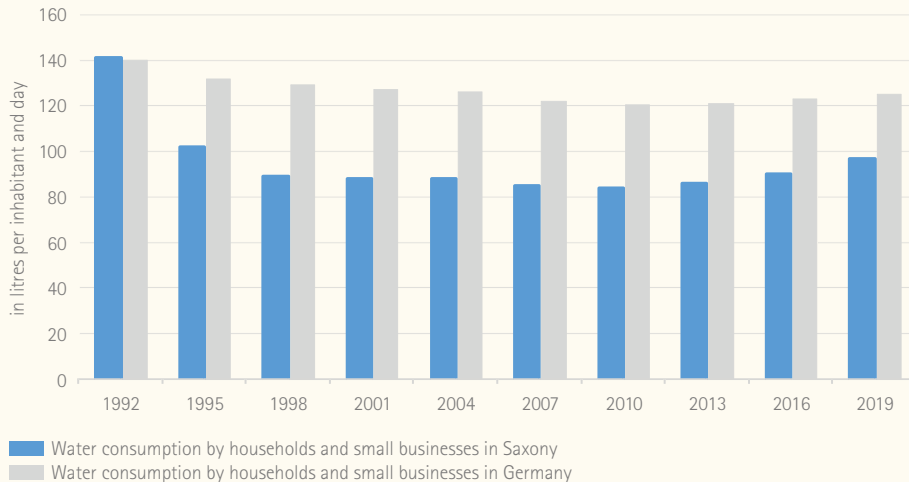


Source: Saxon State Office for the Environment, Agriculture and Geology

Water consumption

The specific water consumption of households and small businesses in the Free State of Saxony has decreased considerably – especially in the 1990s – because of the introduction of water-saving technology, metering, and cost-covering water prices. In 1992, the specific water consumption in Saxony was 141 l/i/d and had fallen sharply to 84 l/i/d by 2010. In recent years, the value has risen slightly again. However, in 2019, at 96.6 l/i/d, it is well below the national average of 125 l/i/d. The increase in the drinking water consumption of households and small business in 2019 compared with 2016 may be due to the very dry and warm years in 2018 and 2019.

Specific water consumption by households and small businesses

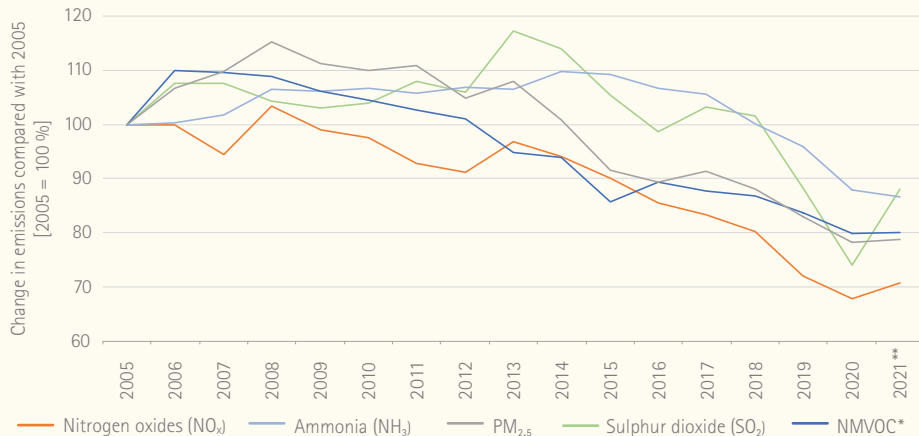


Source: Saxon State Office for the Environment, Agriculture and Geology
Statistical Office of the Free State of Saxony, Federal Statistical Office

Air pollutant emissions

Air pollutants can trigger various negative effects on humans and the environment. From 1990 to 2000, emissions of air pollutants in the Free State of Saxony have been reduced considerably (not shown). This is due mainly to the economic restructuring in East Germany during the 1990s. Since 2000 and 2005, the base year of the Ordinance on National Emission Reduction Commitments (43rd German Federal Immission Protection Ordinance), the reductions achieved have been lower. In 2021, emissions were reduced 12 % for sulphur dioxide and 29 % for nitrogen oxides compared with 2005 levels (preliminary data). The decrease in sulphur dioxide emissions in 2020 is due to shut-down measures at the Lippendorf lignite-fired power plant.

Emissions of air pollutants in Saxony according to 43. BImSchV



*NMVOC = Non-methane volatile organic compounds without methane

NO_x and NMVOC emissions from agriculture not taken into account according to the balance framework of the 43. BImSchV.

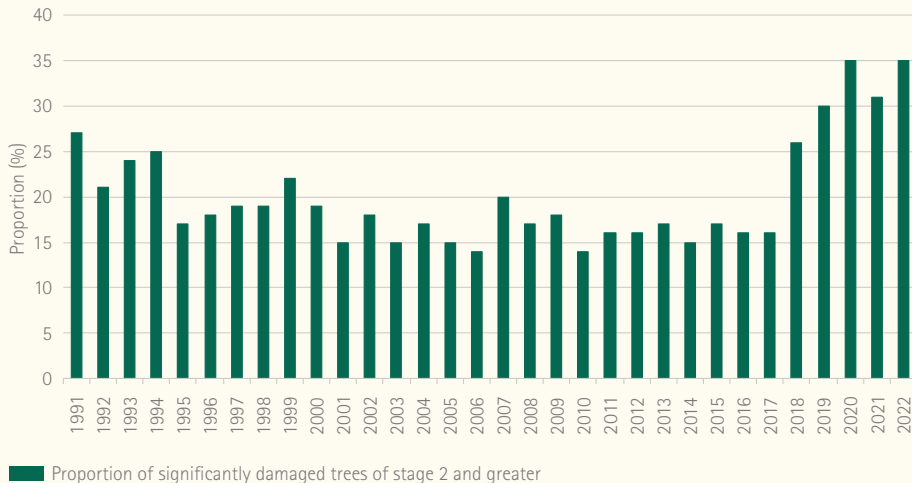
Source: Saxon State Office for the Environment, Agriculture and Geology, Emission cadastre

** Estimation

Forest condition

The proportion of considerably damaged trees in relation to the sample trees assessed in the forest condition survey is an important indicator for assessing the vitality of forests. This indicator decreased from 1991 to 2003 mainly because of the decrease in sulphur dioxide emissions. Since then, the fluctuations in the values have been more strongly caused by weather and biotic factors. The level of these is still too high. In 2018 to 2022, weather extremes such as storms and drought as consequences of climate change as well as the resulting mass reproduction of bark beetles in particular led to a sharp increase in the proportion of considerably damaged trees from 16 % in 2017 to 35 %, 31 %, and 35 % in 2020, 2021, and 2022, respectively.

Forest condition

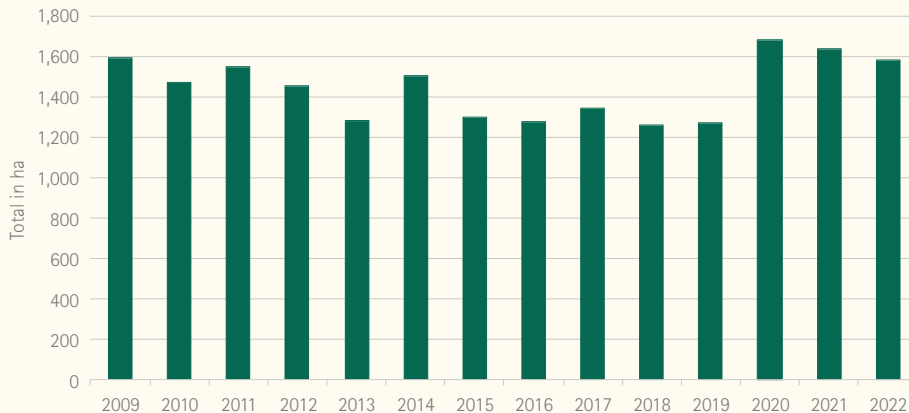


Source: Saxon State Ministry for Energy, Climate Protection, Environment and Agriculture
Forest condition reports of Saxony, Saxony Forest State Enterprise - SBS

Development of the forest conversion area

In order to adapt to climate change, it is necessary to convert mainly pure coniferous forests into climate-stable, species-rich, and structurally efficient mixed forests with a high proportion of deciduous trees and firs. This is anchored as a forest policy goal in the Forest Strategy 2050 of the Free State of Saxony. The area figures for forest conversion refer to active measures such as planting or sowing. These are recorded in the management of the state forest by Saxony Forest and in the promotion of forest conversion in private and corporate forests. The documented forest conversion area represents only the minimum value. The forest conversion areas in the federal forest or the non-subsidised forest conversion in the private and corporate forests as well as areas that develop towards mixed forest because of natural regeneration or succession are not surveyed.

Development of the forest conversion area

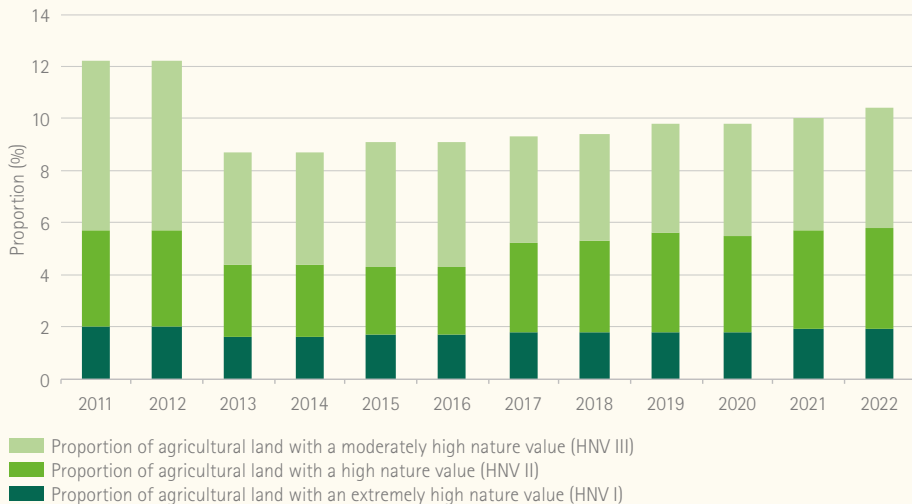


Source: Saxon State Ministry for Energy, Climate Protection, Environment and Agriculture, Saxony Forest State Enterprise - SBS

Agricultural land with high nature value

In the agricultural landscape, near-natural landscape elements and extensively used areas are particularly important for biodiversity. The indicator reflects the proportion of agricultural land with high nature value (HNV) in the total agricultural land. Long-term surveying can reveal the effects of fundamental changes in the use and structure of the landscape (e. g. through intensification) on biodiversity. In 2011, the proportion for Saxony (approx. 12 %) was below the target value of 19 % set for Germany for 2015. From 2012 to 2013, it once again decreased considerably by about 30 % to below 9 %. Starting from this low level, there have been signs of a slight upward trend since 2013.

Agricultural land with high nature value



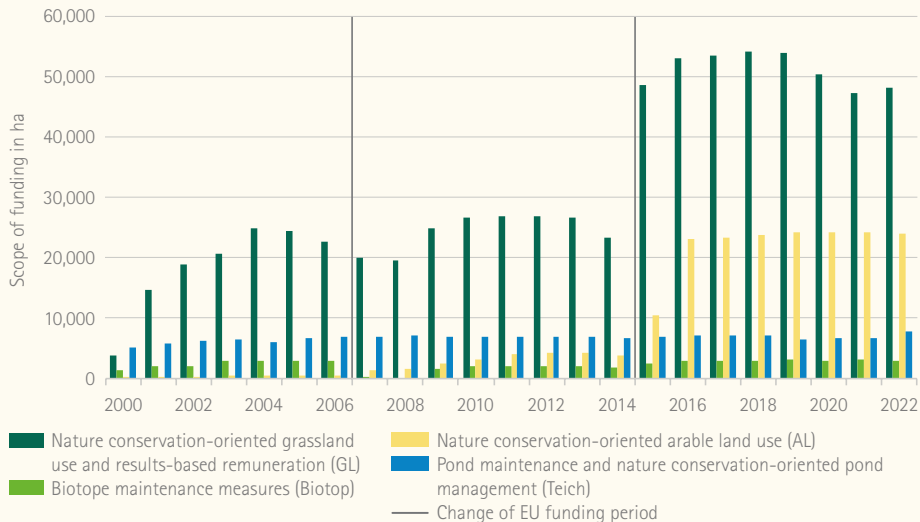
Source: Saxon State Office for the Environment, Agriculture and Geology

Area-based nature conservation measures

For many animal and plant species, extensively managed or cultivated areas are habitats or fulfil a certain important sub-function. In view of the steady loss of biodiversity, such areas are becoming increasingly important. In order to preserve them, measures and special management practices on agricultural land are supported. The agriculture of Saxony is thus also indispensable for nature conservation and the preservation of the landscape.

In the case of the funding shown here, there will be changes in the framework conditions at the latest at the beginning of a new EU funding period. Comparisons between the individual funding periods are therefore possible only to a limited extent.

Area-based nature conservation measures

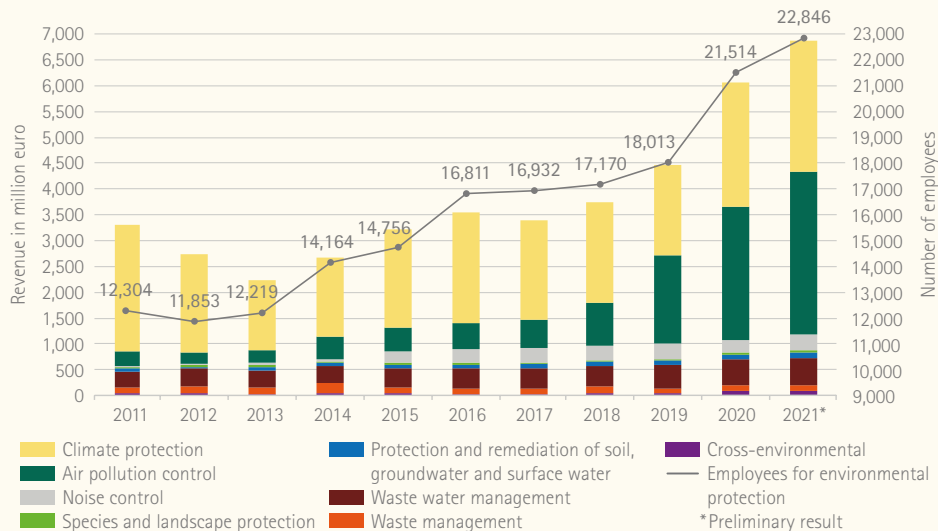


Source: Saxon State Office for the Environment, Agriculture and Geology

Environmental economy

In recent years, the environmental economy has become an integral part of the overall economy in Saxony. Almost 23,000 people are now employed there, and there has been a considerable increase in revenues for environmental protection. For most of the environmental business sectors, there is a continuing positive development in revenues and employment. In recent years, revenues have increased, especially for climate protection and air pollution control. Since the 2019 reporting year, revenues of storage technologies for electromobility haven't no longer been allocated to the area of climate protection but rather to air pollution control. As a result, a considerable proportion of revenue has shifted between the environmental sectors compared with the previous year.

Revenue and employees for environmental protection in Saxony

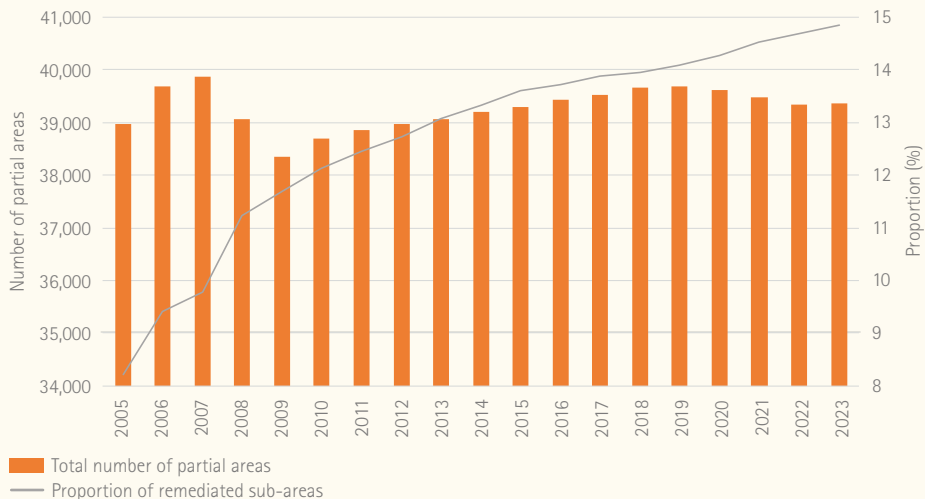


Source: Statistical Office of the Free State of Saxony

Remediated contaminated sites

As of May 2023, 27,822 sites with 39,353 sub-sites are registered in the Contaminated Site Cadastre of Saxony (SALKA). The total number of sites and sub-plots has remained almost unchanged in recent years. With the continual investigations, the suspicion of danger is either confirmed or eliminated depending on the use. If there is no need for action for the areas with confirmed suspicion of danger with current use, the areas remain in the cadastre. The successful management of contaminated sites can be seen, among other things, in the increasing proportion of remediated sub-areas in relation to the total number of sub-areas.

Remediated contaminated sites and recorded contaminated sites or suspected contaminated sites

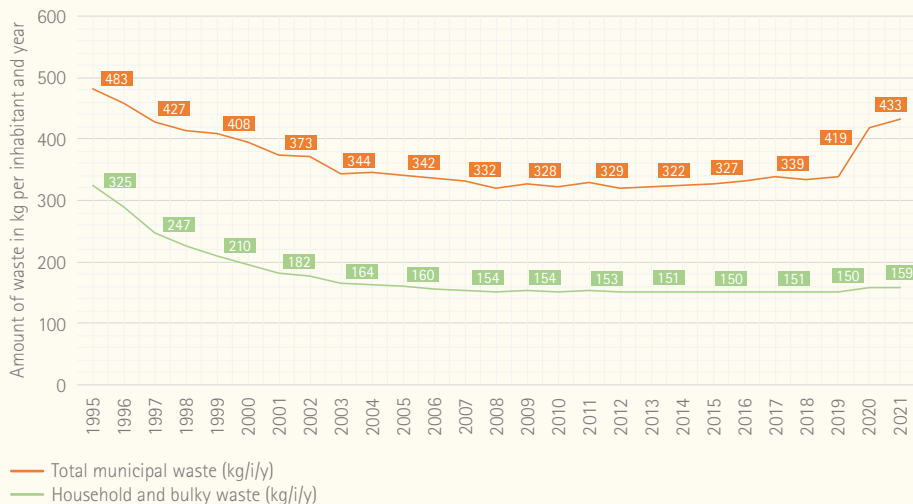


Source: Saxon State Office for the Environment, Agriculture and Geology

Municipal waste

The volume of municipal waste from households indirectly shows the development of the prevention of waste from households. The volume of municipal waste as well as the amount of household waste and bulky refuse disposed of from households show a declining trend over the period under consideration; over the last 10 years, both have been at an almost constant level. Low-waste consumption, the reuse of second-hand goods, and polluter-pays waste collection and charging systems all contribute to this. Because of the Corona pandemic, there was more household waste in 2020 and 2021 than in previous years. During this time, some household waste segregation took place, and items that were no longer needed were cleared out and disposed of during the lock-down.

Municipal waste

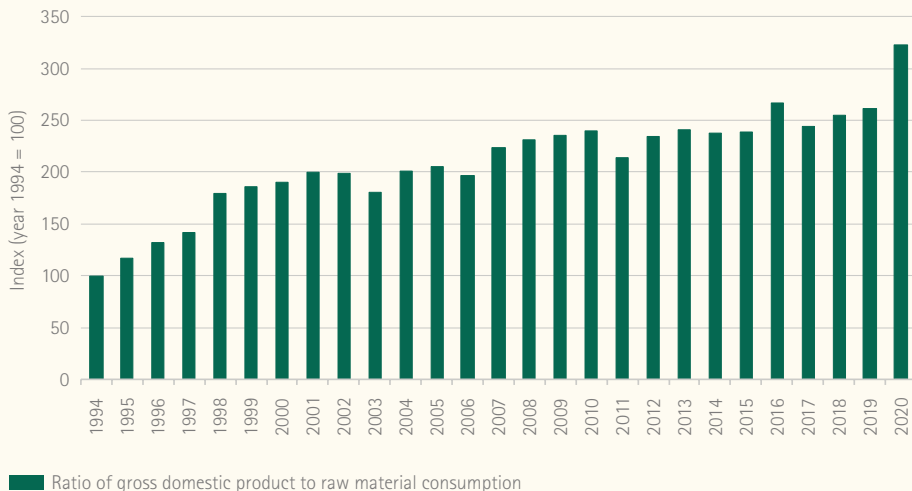


Source: Saxon State Office for the Environment, Agriculture and Geology, Municipal waste balance 2021

Raw material productivity

Raw material productivity represents the ratio of gross domestic product to raw material consumption as an index. The increase in raw material productivity is anchored as a goal in the sustainability strategy of Saxony and forms a key figure for the efficiency of environmental use. The increase in the value in 2020 is due to the decrease in abiotic raw material extraction and raw material import. The Free State of Saxony adopted a new raw materials strategy in 2022. This sets the strategic framework for future raw materials policy in the form of goals, guidelines, and priorities for action. In addition to the development and use of domestic raw material sources through mining, the recycling of raw materials and the use of renewable raw materials will be intensified.

Raw material productivity



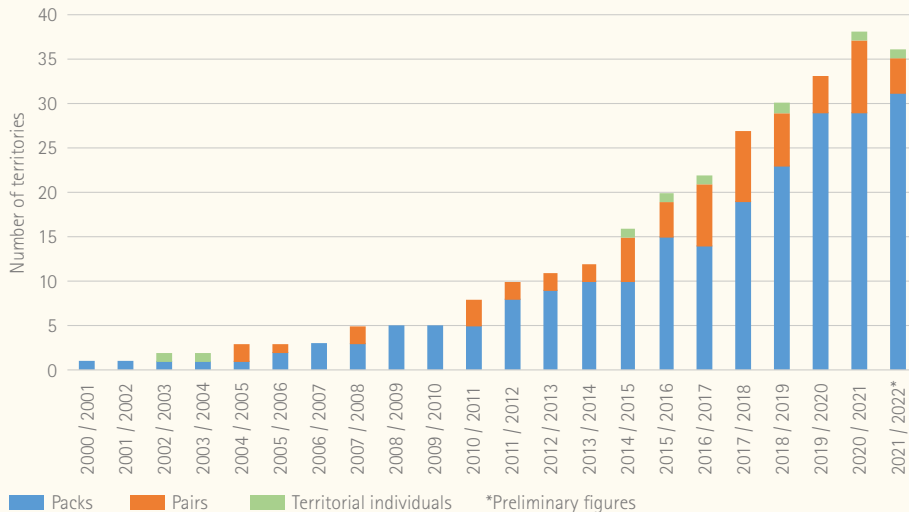
Source: Environmental-economic accounts of the Federal States

Wolf occurrence in Saxony

With the detection of the first wolf pack on the Saxon military training area Upper Lusatia in 2000, free-living wolves were born and raised in Germany for the first time in 150 years. In the following years, the wolves that migrated from the east or which were born in Germany colonised new territories and founded more packs. In the monitoring year 2021/2022, 31 packs, four pairs, and one territorial individual were detected in the Free State of Saxony.

In addition to wolf monitoring, kill assessment, herd protection advice, and environmental education on the subject of wolves are centrally bundled at the Wolf Unit of the LfULG. It is thus the central point of contact for citizens, owners of farm animals, and media representatives in Saxony.

Development of confirmed wolf territories in Saxony since 2000



Source: Saxon State Office for the Environment, Agriculture and Geology

The topics of the brochure on the internet:



www.umwelt.sachsen.de



www.landwirtschaft.sachsen.de



www.geologie.sachsen.de

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