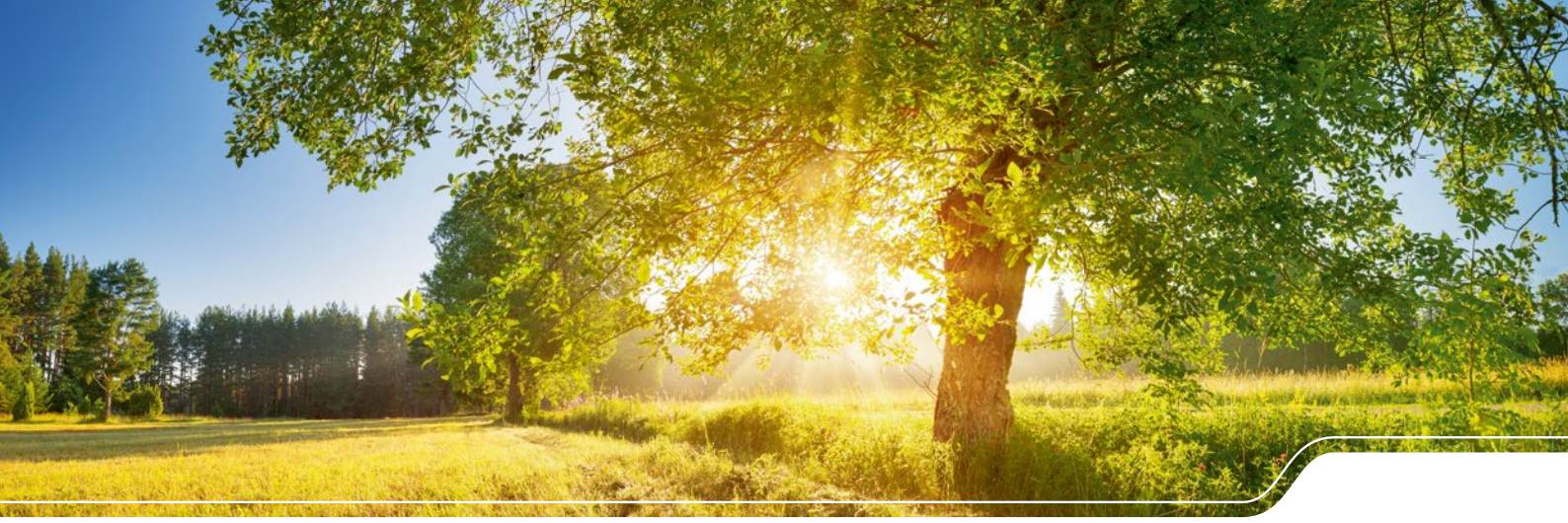


Environmental data

2022

LANDESAMT FÜR UMWELT,
LANDWIRTSCHAFT
UND GEOLOGIE

Freistaat
SACHSEN

Contents

Foreword

The Environmental Data brochure has been published annually since 2010 and provides information on important Saxon environmental topics such as climate, nature conservation, forest condition, air as well as water and groundwater and their developments.

This year, the theme of nature conservation is given special consideration.

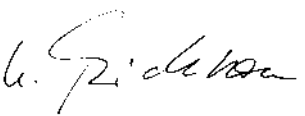
The populations of most forest birds have been increasing steadily for the past 10 years, whereas many species of agricultural birds have been declining. For them, more measures are needed to counteract habitat loss. So far, 26 invasive plant and animal species on the Union list have been detected in Saxony. To stop the spread of invasive species, such species must not be planted or kept. The number of wolf packs in Saxony is also increasing. It is evident that the wolf population has become denser and is spreading spatially in Saxony overall.

For centuries, watercourses have been intensively used, fortified, straightened or relocated to make room for fields and settlements. As before, only a few water bodies achieve good ecological status. The restoration of the watercourse continuum, e.g. by means of fish ladders, thus serves the protection of fish species in particular.

Saxon forests are particularly affected by the consequences of climate change, as drought, extreme weather conditions and pest infestations pose a variety of challenges for agriculture and forestry as well as for water management. In order to adapt to climate change, it is necessary to convert pure coniferous forests in particular into climate-stable, species-rich and structurally efficient mixed forests with a high proportion of deciduous trees.

The graphs and descriptions show that there have been positive developments in many environmental areas, but also that further efforts are needed to be able to meet the high requirements in terms of nature, environmental and climate protection.

Current and further information on the topic of the environment can be found online at:
www.umwelt.sachsen.de.



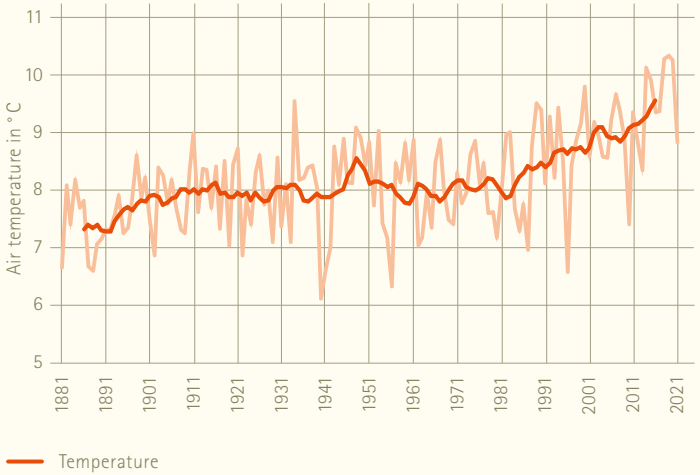
Norbert Eichkorn
President of the Saxon State Office
for Environment and Geology

Development of climate conditions

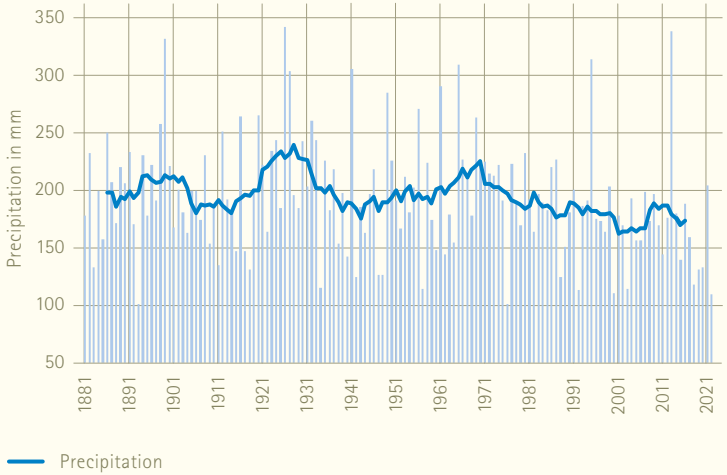
The diagrams show the annual average values of air temperature and precipitation totals during growing season I (April – June) in the Free State of Saxony from 1881 to 2021. The 11-year moving average provides a better representation of long-term development because it is more independent of individual years. A suitable representation of climate change can be seen in the temporal development of air temperature. Higher temperatures lead to a prolongation of the growing seasons, among other things, 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, and since the end of the 1980s/beginning of the 1990s there has been a conspicuous accumulation of the warmest years in Saxony. 2020 is among the warmest years since 1881, at 10.3 degrees Celsius. The seven warmest years since measurements began have been recorded since the turn of the millennium.

Precipitation is very heterogeneous in its spatio-temporal occurrence compared to temperature. A decrease in rainfall in growing season I slows down the growth process of plants and increases 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. Saxon farmers can adapt to changing conditions with improved water management. Measures range from the choice of varieties and crop type to adapted methods of soil cultivation and fertilisation, to the irrigation of certain crops and crop rotations.

Annual average temperature in Saxony, 1881 – 2021
(eleven-year moving average)



Precipitation during growing season I (April to June) in Saxony, 1881 – 2022 (eleven-year moving average)

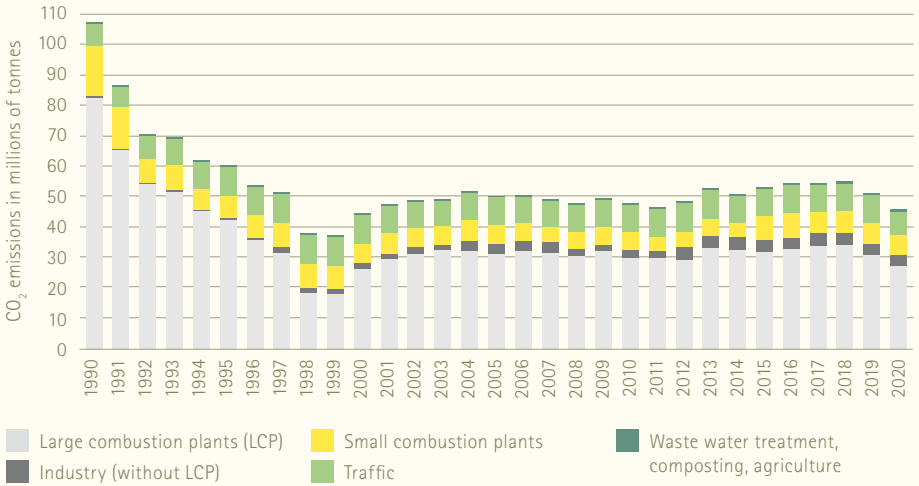


Source: Saxon State Office for Environment, Agriculture and Geology, German Weather Service (DWD)

Greenhouse gases

Carbon dioxide emissions account for over 90 % of total greenhouse gases, which accelerate climate change by accumulating in the atmosphere. Large combustion plants (large industrial plants that generate electricity and heat) 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 settled down at a stable level. In addition to Corona, the decline in 2019 and 2020 is also due to shutdown measures at the Lippendorf lignite-fired power plant.

Development of CO_2 emissions in Saxony from 1990 to 2020

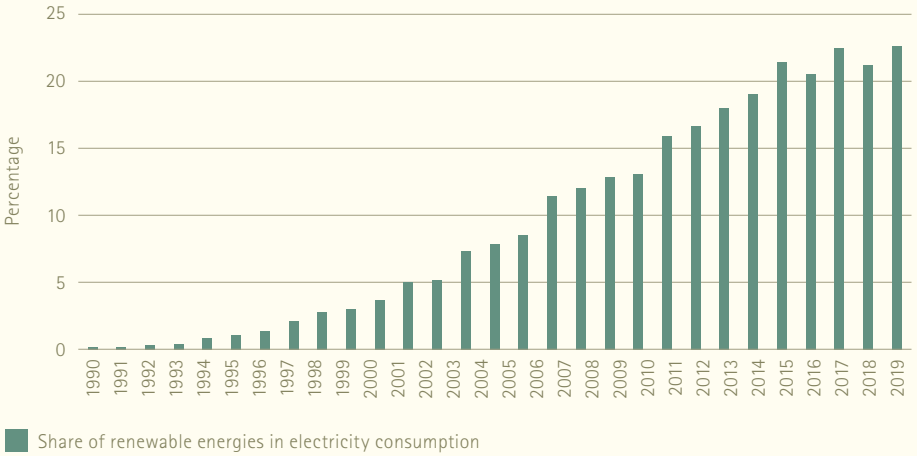


Source: Emissions Register, Saxon State Office for Environment, Agriculture and Geology

Share of renewable energies in electricity consumption

With the Energy and Climate Programme (EKP) 2021, the Saxon state government has set its energy and climate policy goals, including an additional annual generation from renewable energies of four terawatt hours (TWh) by 2024. The share of renewable energies in (gross) electricity consumption shown here is made up of net electricity generation, the exchange balance across national borders, the power plants' own consumption and grid losses. Progress has been made since the mid-1990s. The existence and the expansion potential of individual energy sources in Saxony differ. Wind power has the largest share, followed by photovoltaics and biomass.

Renewable energies

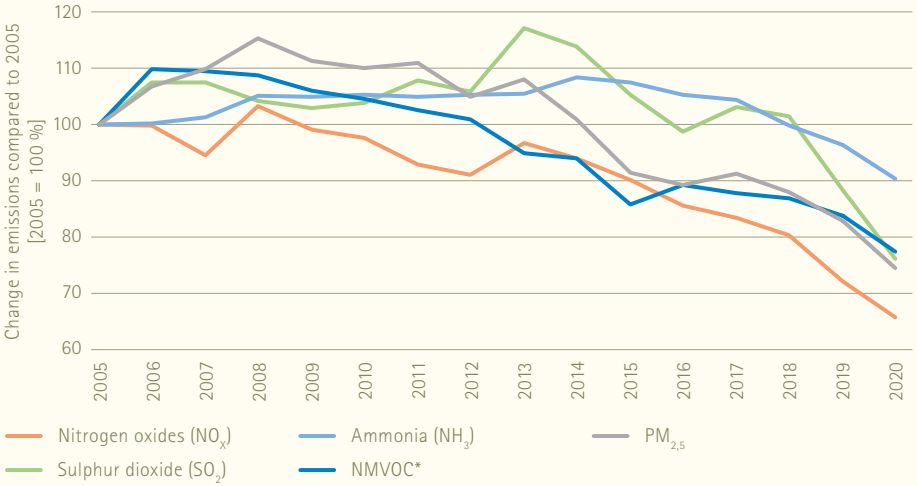


Source: State Working Group on Energy Balances

Air pollutants

Air pollutants can trigger a variety of negative effects on humans and the environment. From 1990 to 2000, the emissions of air pollutants in the Free State of Saxony reduced considerably (not shown). This is mainly due to the economic restructuring in East Germany during the 1990s. Since 2000 and 2005 respectively, the base year of the Ordinance on National Emission Reduction Commitments (43. BImSchV), the reductions achieved are lower. Emissions in 2020 reduced between 10% for ammonia and 34% for nitrogen oxides compared to 2005 levels.

Emissions of air pollutants in Saxony according to 43. BImSchV



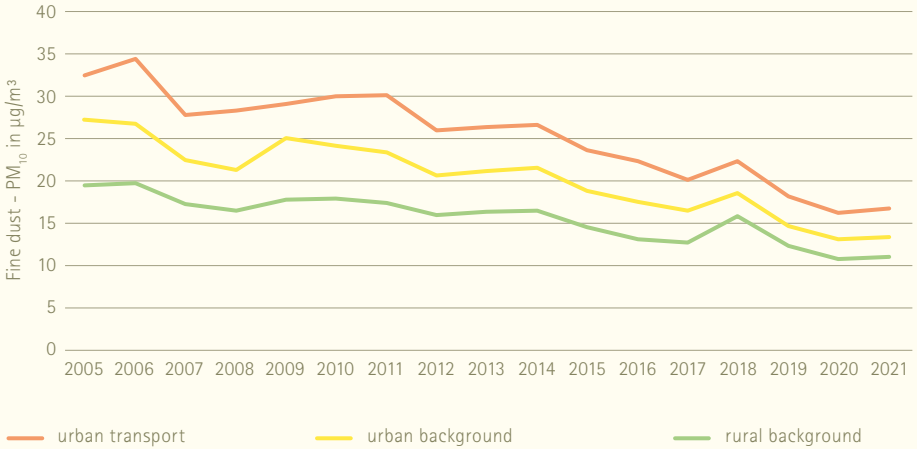
* NMVOC = volatile organic compounds without methane.
NO_x and NMVOC emissions from agriculture according to the balancing framework of the 43. BImSchV are not taken into account.

Source: Emissions Register, Saxon State Office for Environment, Agriculture and Geology

Fine dust

The most important sources of particulate matter are combustion processes and road traffic. Because fine dust particles in the atmosphere can be transported over long distances, the measured concentrations are not only caused by Saxon sources. Meteorological conditions strongly influence fine dust concentrations and are also the cause of inter-annual fluctuations. The data on the area-related annual mean values show a decline in concentrations in recent years.

Area-related annual mean values of PM_{10} concentration in Saxony

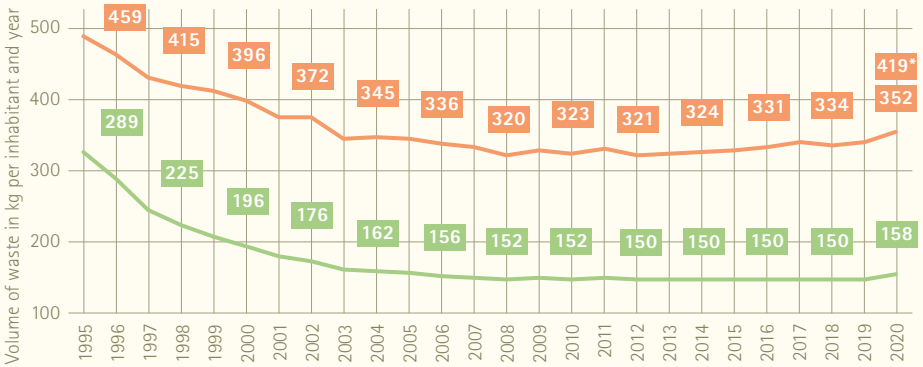


Source: Saxon State Office for Environment, Agriculture and Geology

Municipal waste

The amount of municipal waste from households indirectly shows the development of the prevention of waste from households. The amount of municipal waste as well as the amount of household and bulky waste disposed of from households show a downward trend over the period under consideration; in the last ten years, both have been at a nearly consistent level. Contributing to this: low-waste consumption, reuse of second-hand goods and waste collection and waste charging systems based on usage. The increase in per capita revenue in 2020 is due to a methodological change. The quantities accounted for by the public authorities as well as non-profit and commercial collection quantities are taken into account.

Waste generation from households



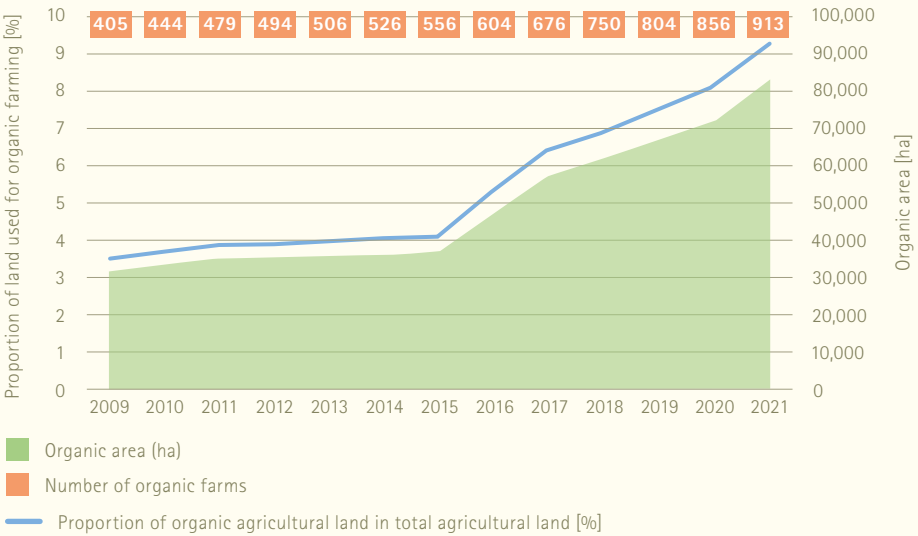
* Municipal waste, total according to new methodology

Source: Municipal waste balance 2020, Saxon State Office for the Environment, Agriculture and Geology

Organic farming

Since 1994, the share of organically farmed agricultural land has risen steadily from less than one percent. In the years since 2015, there has been a significant jump upwards. There are several possible reasons for this: The increases in the eco-premium from 2016 and the higher eco-conversion premium from 2017. Producer prices for non-organic products were sometimes extremely volatile during this period. In addition, more and more consumers are buying organic products. Behind this is the trend among the population to buy food that is largely free of undesirable residues and associated with animal husbandry that stands for more animal welfare. Following this trend, producers in Saxony saw an entrepreneurial perspective in the growth market "organic".

Organic farming in Saxony

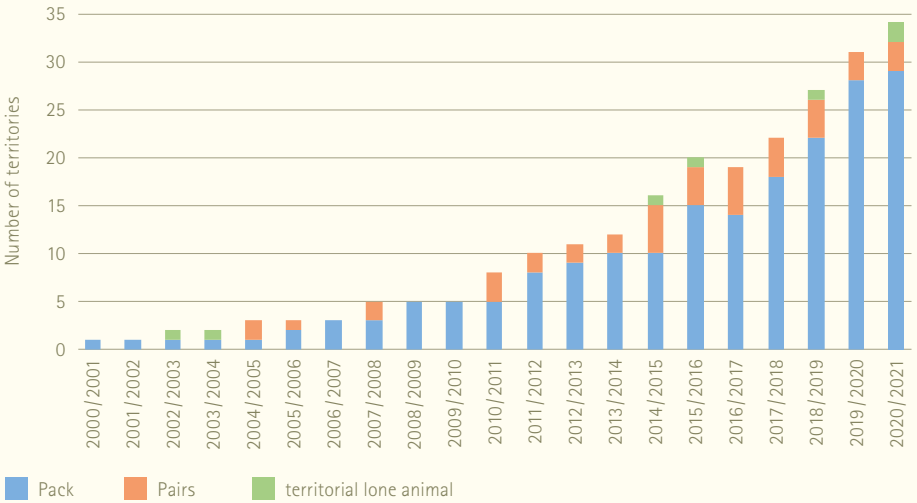


Source: Notification of private organic inspection bodies, Saxon State Office for the Environment, Agriculture and Geology

Wolf occurrence in Saxony

With the discovery of the first wolf pack in the Saxon military training area Oberlausitz in 2000, free-living wolves were born and raised in Germany for the first time in 150 years. In the following years, wolves migrating from the east or born in Germany colonised new territories and established more packs. In the monitoring year 2020/2021, a total of 29 packs, three pairs and two territorial individuals were detected in the Free State. In addition to wolf monitoring, kill assessment, herd protection advice and environmental education on the subject of wolves are all available centrally from 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



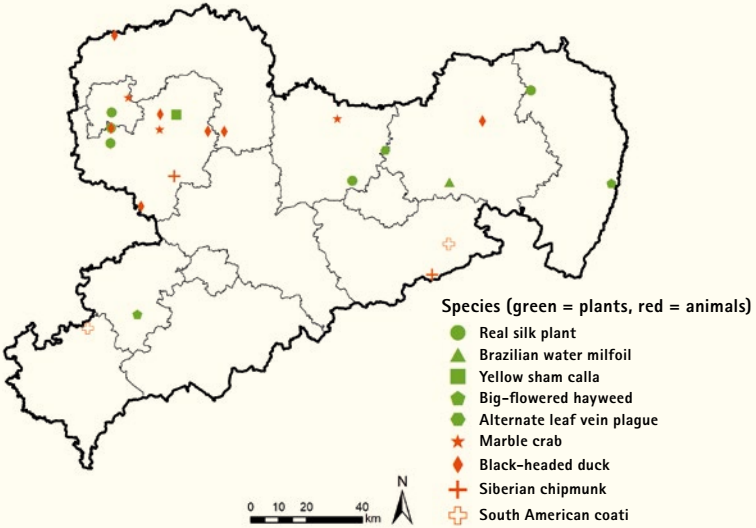
Source: Wolf Unit, Saxon State Office for the Environment, Agriculture and Geology

Invasive species

Invasive species have been introduced by humans and can negatively affect their environment. The EU lists 66 such animal and plant species that are subject to strict bans. 26 have been detected in Saxony so far. Species that have not yet appeared in Saxony, or have appeared only sporadically, are under observation, as removal is still efficiently possible here. In addition, there is a close exchange with the responsible authorities in order to be able to react quickly to new detections, such as the discovery of the marbled crayfish in the Leipzig district in 2017.

In order to stop the spread of invasive species, such species must not be planted or kept and plants must only be disposed of in the residual waste. You can find more information here: **https://www.natur.sachsen.de/neobiota-20822.html**

Locations of invasive alien species that have been detected as isolated findings in Saxony in the last 25 years

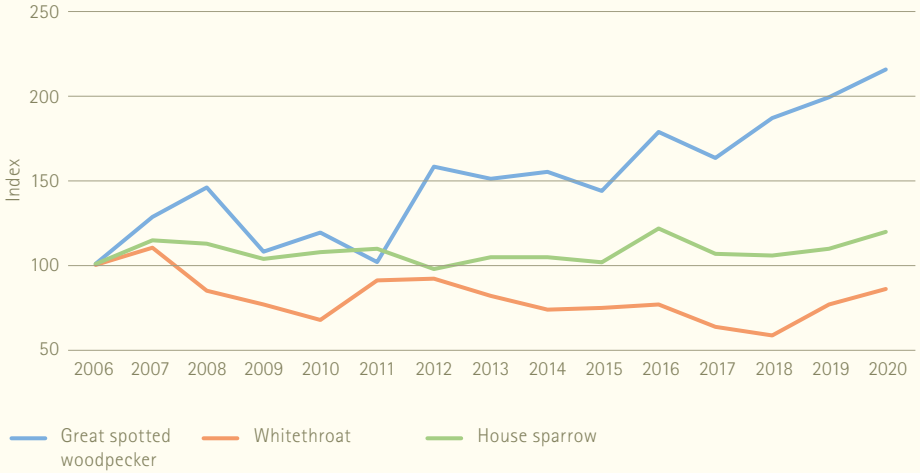


Source: Saxon State Office for Environment, Agriculture and Geology

Common breeding bird species

The populations of common breeding birds are determined annually on more than 100 sample plots in Saxony. The data allow the impact of different land uses on bird life to be assessed. Among other things, the programme is a basis for indicators on biodiversity and sustainability in corresponding federal strategies. The populations of most forest birds have been growing steadily for ten years, as shown here by the great spotted woodpecker. In contrast, the populations of many species in agricultural areas are becoming smaller. This particularly affects migratory birds that winter in Africa, such as the whitethroat. For them, more measures are needed to counteract habitat loss. In urban areas there are increases and decreases as well as stable populations, e.g. of the house sparrow. Home and garden owners can support these species directly.

Population trends of three common breeding bird species in Saxony

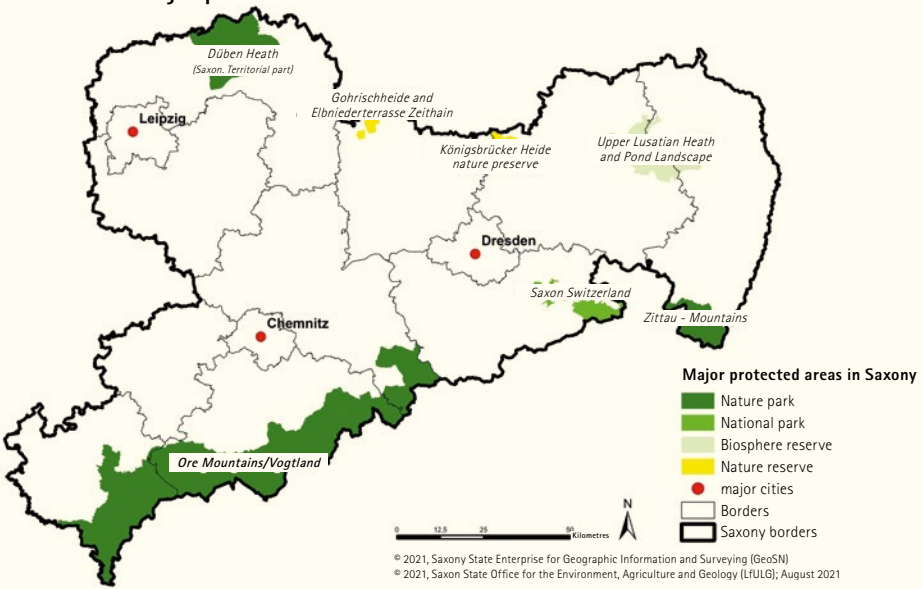


Source: Saxon Bird Sanctuary Neschwitz in the State Operating Company for Environment and Agriculture

Location of major protected areas

The map shows Saxony's major protected areas (national park, nature park and biosphere reserve) and two large nature reserves with state-protected area management. These areas are characterised by the fact that they have the character of a nature reserve or landscape conservation area over a large area. Depending on the category, these areas can be used differently for tourism or commercial purposes. The major protected areas are intended to protect and develop near-natural landscapes or diverse cultural landscapes. This is linked to the preservation of species and biotope diversity.

Location of major protected areas

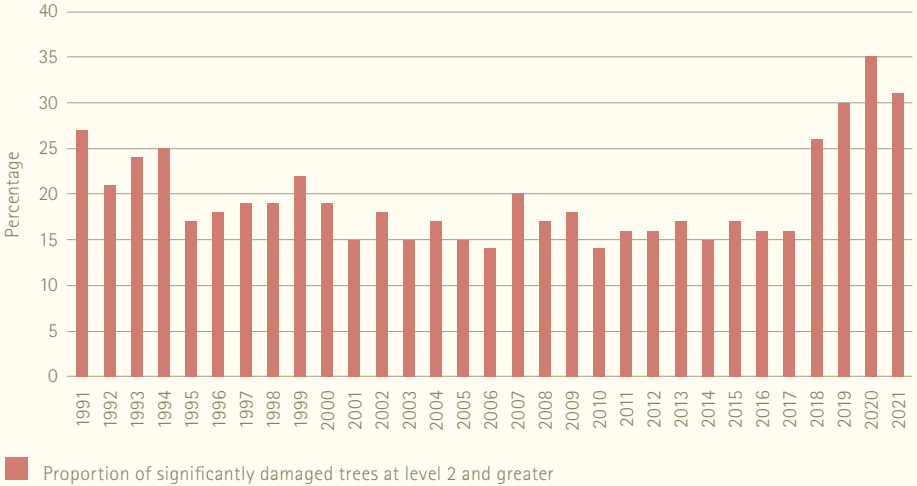


Source: Saxon State Enterprise for Geographic Information and Surveying (GeoSN), Saxon State Office for Environment, Agriculture and Geology

Forest condition

The proportion of significantly 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 due to the decrease in sulphur dioxide emissions. Since then, the fluctuations in the values have been more strongly caused by weather and biotic damage factors. They continue to be at too high a level. In the years 2018 to 2021, 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 very sharp increase in the proportion of significantly damaged trees from 16 percent in 2017 to 35 and 31 percent in 2020 and 2021 respectively.

Forest condition



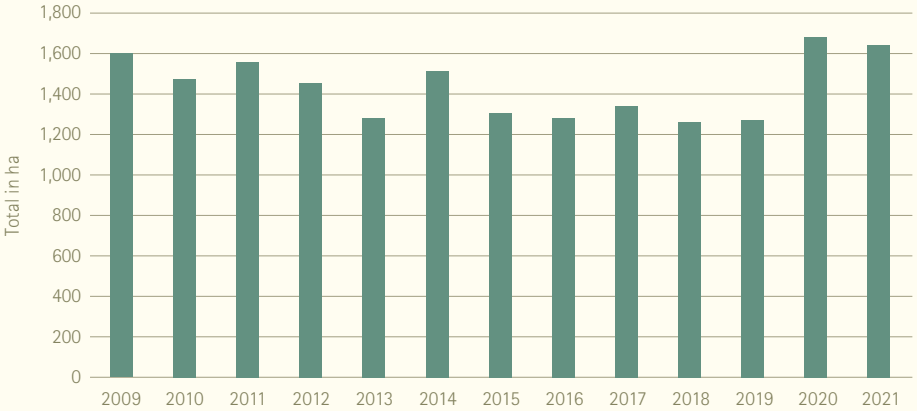
Source: Saxon State Ministry for Energy, Climate Protection, Environment and Agriculture, Forest Condition Reports of Saxony; Saxony Forest State Enterprise – SBS

Development of the forest conversion area

In order to adapt to climate change, it is necessary to convert pure coniferous forests in particular into climate-stable, species-rich and structurally efficient mixed forests with a high proportion of deciduous trees. 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 (PKW). The documented forest conversion area only represents the minimum value. The forest conversion areas in the federal forest or the non-subsidised forest conversion in the PKW as well as areas that develop towards mixed forest due to natural regeneration or succession are not recorded.

Development of the forest conversion area

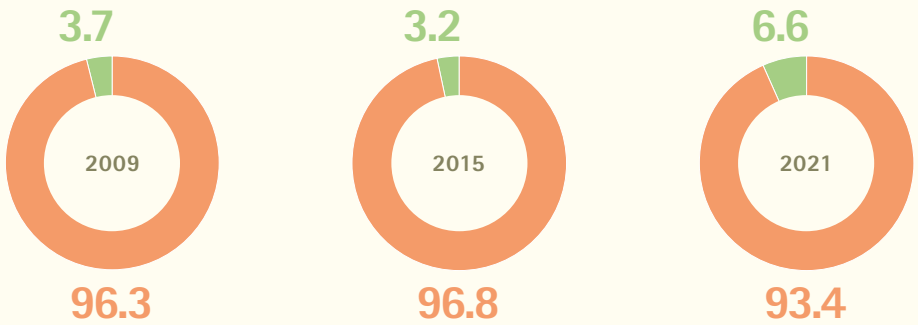


Source: Saxon State Ministry for Energy, Climate Protection, Environment and Agriculture, Saxony Forest State Enterprise – SBS

Ecological status of running waters

One goal in European water protection is good ecological status. This depends above all on the water biology: Fish fauna, invertebrates, aquatic plants and algae. Good status is achieved when the species communities deviate only slightly from their natural state. For centuries, watercourses have been intensively used, fortified, straightened or relocated to make room for fields and settlements. In addition, there are harmful substance inputs, e.g. from wastewater and mining. This is reflected negatively in the assessment of ecological status. As before, only a few water bodies achieve good ecological status. Although the assessment has improved slightly since 2009, it is not likely that all waters will reach the targets in the foreseeable future.

Ecological status of running waters

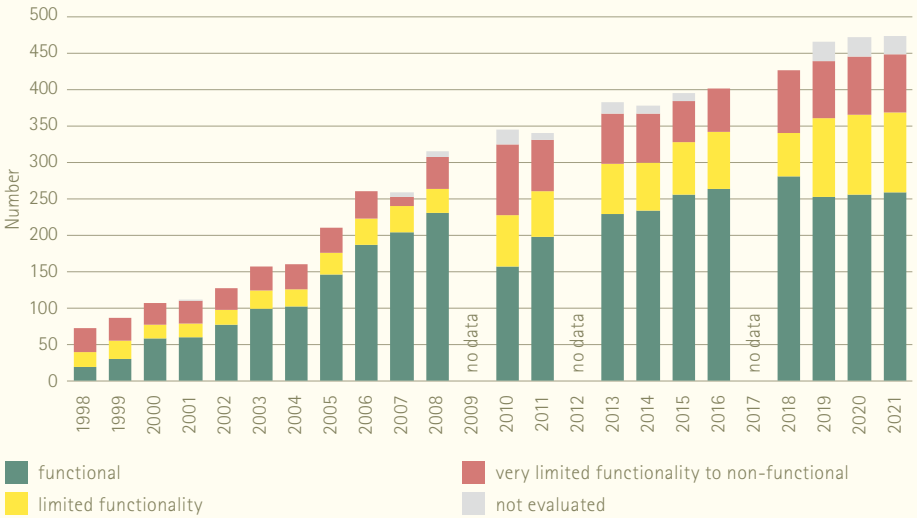


Source: Saxon State Office for Environment, Agriculture and Geology

Fish ladders

Spawning grounds, feeding grounds or wintering grounds can be many kilometres apart for fish, and even several thousand kilometres apart for long-distance migrants. Transverse structures, such as weirs, prevent the unrestricted migration of fish between these habitats. The restoration of the watercourse continuum thus primarily serves the protection of fish species. The European Water Framework Directive also calls for ensuring the continuity of flowing waters. At many weirs in Saxony, the upstream migration of fish has been restored through the construction of fish ladders. However, the number of functioning plants has been stagnating for several years. The reason for this is the expiry of funding programmes that provided financial support for the construction of fish ladders.

Fish ladders in Saxony



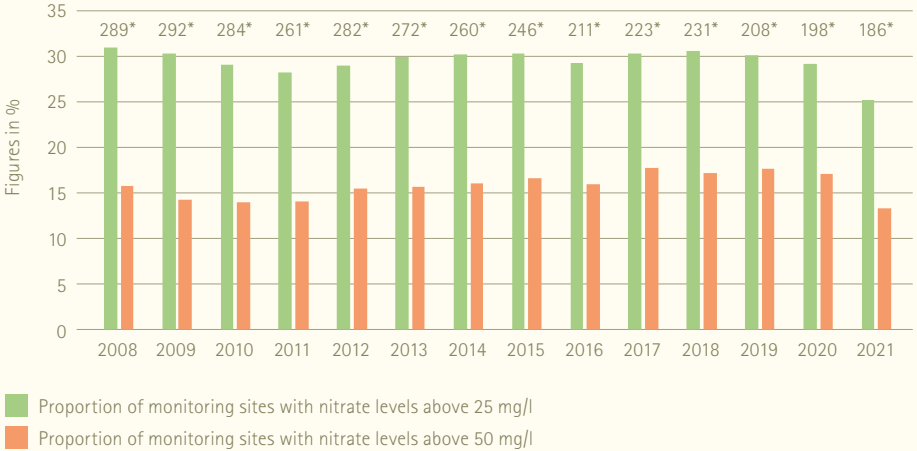
Source: Transverse Structure Database, Saxon State Office for the Environment, Agriculture and Geology

Nitrate in groundwater

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

The figure shows the proportions of monitoring sites in the overview groundwater quality monitoring network where the threshold is exceeded by more than 25 mg/l nitrate (value of concern under the EC Nitrate Directive) or more 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 where the threshold is exceeded increase slightly. From 2020 onwards, there is a downward trend in exceeding the threshold values for nitrate in groundwater.

Nitrate levels in groundwater – UEB monitoring network



* Number of measuring points

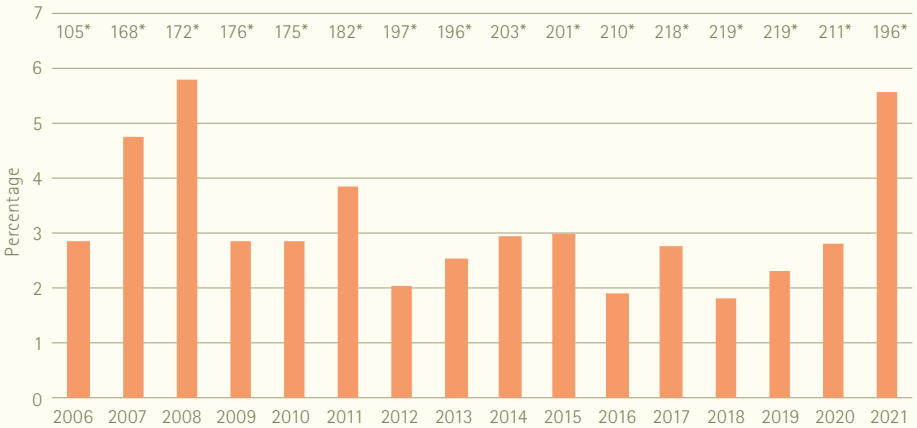
Source: Saxon State Office for Environment, Agriculture and Geology

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.

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 percentage of monitoring sites with levels of plant protection product active substances or relevant metabolites above 0.1 µg/l ranged between 1.8 and 5.8 % in the years 2006 to 2021.

Plant protection products in groundwater – UEB monitoring network



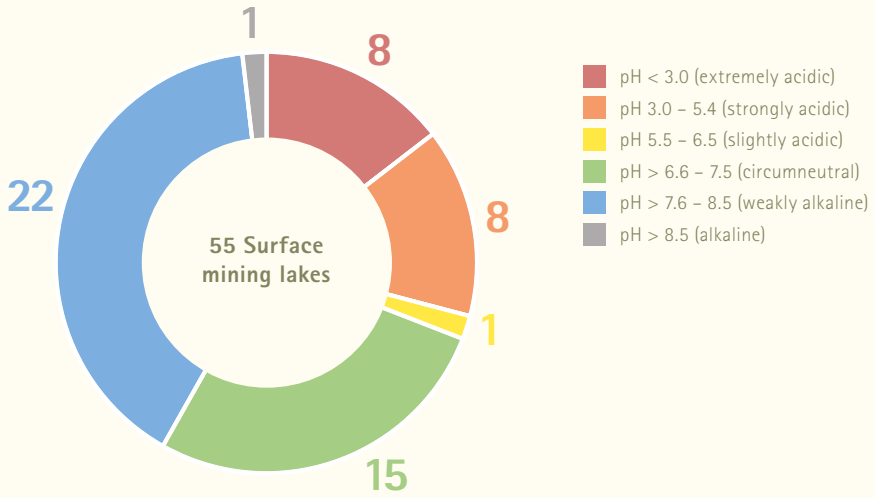
* Number of measuring points

Source: Saxon State Office for Environment, Agriculture and Geology

Degree of acidification in mining lakes

Lignite has been mined in Saxony for more than 150 years. The redevelopment of the land that has been taken up is a particular challenge. The remaining holes of the opencast mines are flooded and residual opencast lakes are created. They often show acid, iron and/or sulphate contamination as a result of previous pyrite weathering. Overall, however, there is a tendency towards the development of better lake water qualities. Of 55 opencast mining lakes with a water surface area of more than ten ha, about two thirds had a neutral or weakly alkaline status and about one third had a weakly to extremely acidic status at the end of 2021.

Degree of acidification in mining lakes



Source: Saxon State Office for the Environment, Agriculture and Geology/ Lausitzer und Mitteldeutsche Bergbau-Verwaltungsgesellschaft mbH

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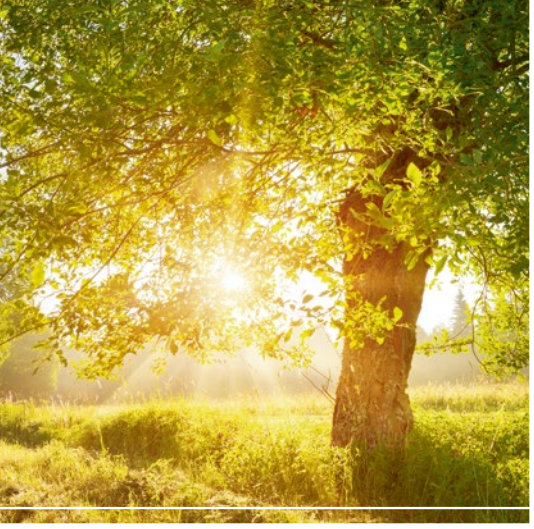
www.geologie.sachsen.de



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