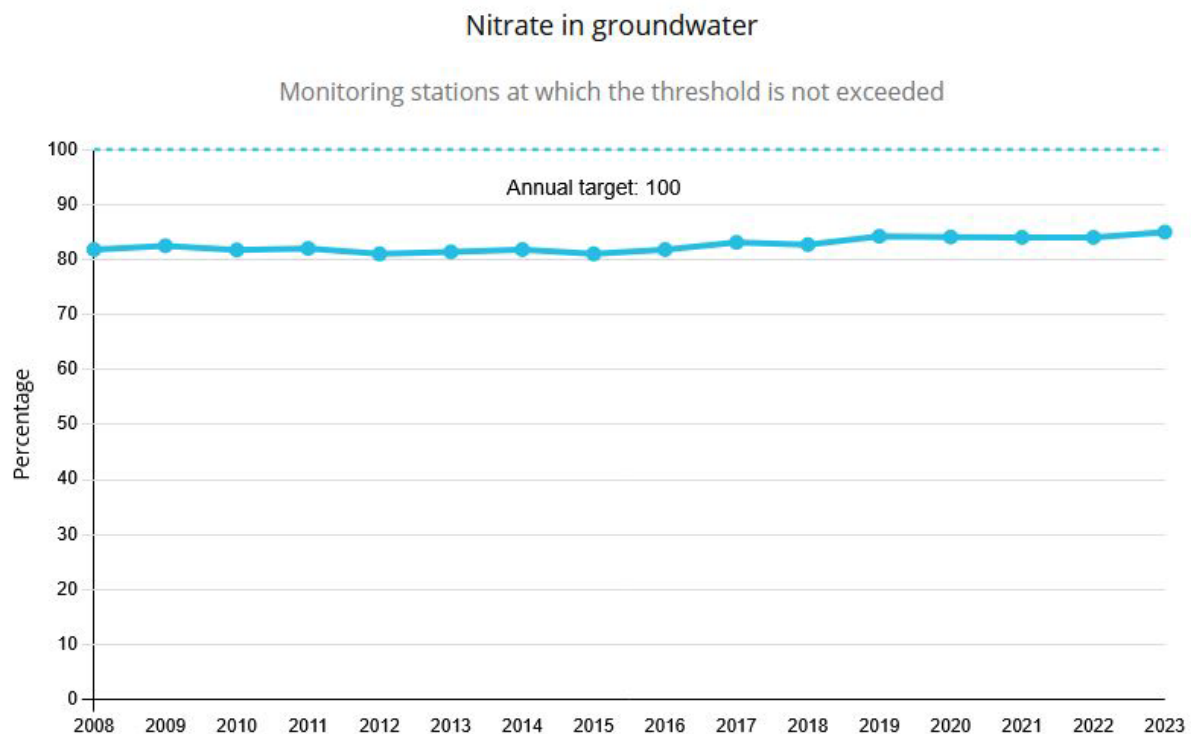




Water quality – Reducing the pollution of water with substances

6.1.b Nitrate in groundwater



Data source(s):

German Environment Agency and Länder Initiative on Core Indicators based on data from the German Working Group on Water Issues of the Länder and the Federal Government

Definition

The indicator shows the proportion of monitoring stations (in %) at which the limit value of 50 milligrams per litre of nitrate in groundwater is complied with on an annual average.

Intention

Groundwater is an essential element of the ecosystem. It is part of the water cycle and fulfils important ecological functions. Groundwater is also Germany's most important drinking water resource. However, elevated nitrate levels impair the ecology of water bodies.

Target

Compliance with the nitrate threshold value of 50 milligrams per litre at all monitoring points by 2030

Content and progress

Nitrate (NO_3) are nitrogen compounds that occur naturally in the soil at certain concentrations but also enter the environment through anthropogenic sources. The nitrate content in groundwater is recorded by the Länder for reporting to the European Environment Agency (EEA) on the state of groundwater in Germany. The basis for this is the so-called



EEA monitoring network, which consists of specifically selected monitoring stations. This network comprises approximately 1,200 representative monitoring stations. The data are compiled by the German Environment Agency (UBA) based on information provided by the Federal/State Working Group on Water (LAWA).

This indicator shows the proportion of total monitoring stations at which the prescribed threshold value was not exceeded. Naturally occurring nitrate in the soil contributes between 0 and a maximum of 10 milligrams per litre to the overall concentration in groundwater. Concentrations between 10 and 25 milligrams per litre indicate a low to moderate level of pollution. Values between 25 and 50 milligrams per litre reflect significant groundwater contamination. If the threshold of 50 milligrams per litre – as stipulated in the Groundwater Ordinance and forming the basis of this indicator – is exceeded, the groundwater is considered chemically impaired and unsuitable for drinking water use without treatment.

Like indicator 6.1.a on phosphorus concentrations in surface waters, this indicator does not provide information on the degree to which the threshold value is exceeded or undercut. For example, nitrate pollution at individual monitoring stations may have decreased significantly – but if concentrations still exceed the threshold of 50 milligrams per litre, this improvement is not reflected in the indicator. Conversely, increasing nitrate concentrations that remain below the threshold are also not taken into account. When interpreting the results, it must also be considered that measures to reduce nitrate pollution often take time to have an effect, as percolating water can take several years to reach the groundwater.

In 2023, the threshold of a maximum of 50 milligrams of nitrate per litre was met at 85.0% of all monitoring stations. Since 2008, the proportion of sites meeting this threshold has remained largely unchanged. As such, the politically defined objective of achieving compliance with the threshold at all monitoring stations has not been met – nor is there any discernible trend towards meeting this goal. At 18.0% of the monitoring stations, nitrate concentrations ranged between 25 and 50 milligrams per litre. Although this refers to values below the threshold, it nonetheless indicates an elevated level of pollution. This proportion has also remained largely stable over the years.

Groundwater contamination with nitrate primarily results from the leaching of nitrate from various nitrogen-containing fertilisers. These include organic fertilisers such as slurry and manure, as well as mineral fertilisers, which are particularly used in intensive arable farming. In recent years, digestate – a by-product of biogas production – has also increasingly been used as fertiliser in agriculture. In all these cases, fertilisation that is not tailored to the actual nutrient demand of crops can lead to elevated nitrate concentrations in groundwater. Consequently, there is a link between the development of the nitrogen surplus in agriculture (indicator 2.1.a) and nitrate contamination of groundwater.

To assess the specific impact of agricultural practices on nitrate pollution in water bodies, separate nitrate reporting to the European Union (EU) is conducted. For this purpose, those monitoring stations within the EEA network whose catchment areas are predominantly used for agricultural purposes are selected. As a result, nitrate concentrations in this specific network are higher than the average value of indicator 6.1.b.

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Type of target

Constant target for each year

Assessment

The proportion of monitoring points at which the nitrate threshold in groundwater is met should reach 100% each year.

According to the target formulation, the politically defined target was again not met in 2023. However, as the six-year average trend of the indicator points in the desired direction, indicator 6.1.b is assessed as cloud for 2023.

