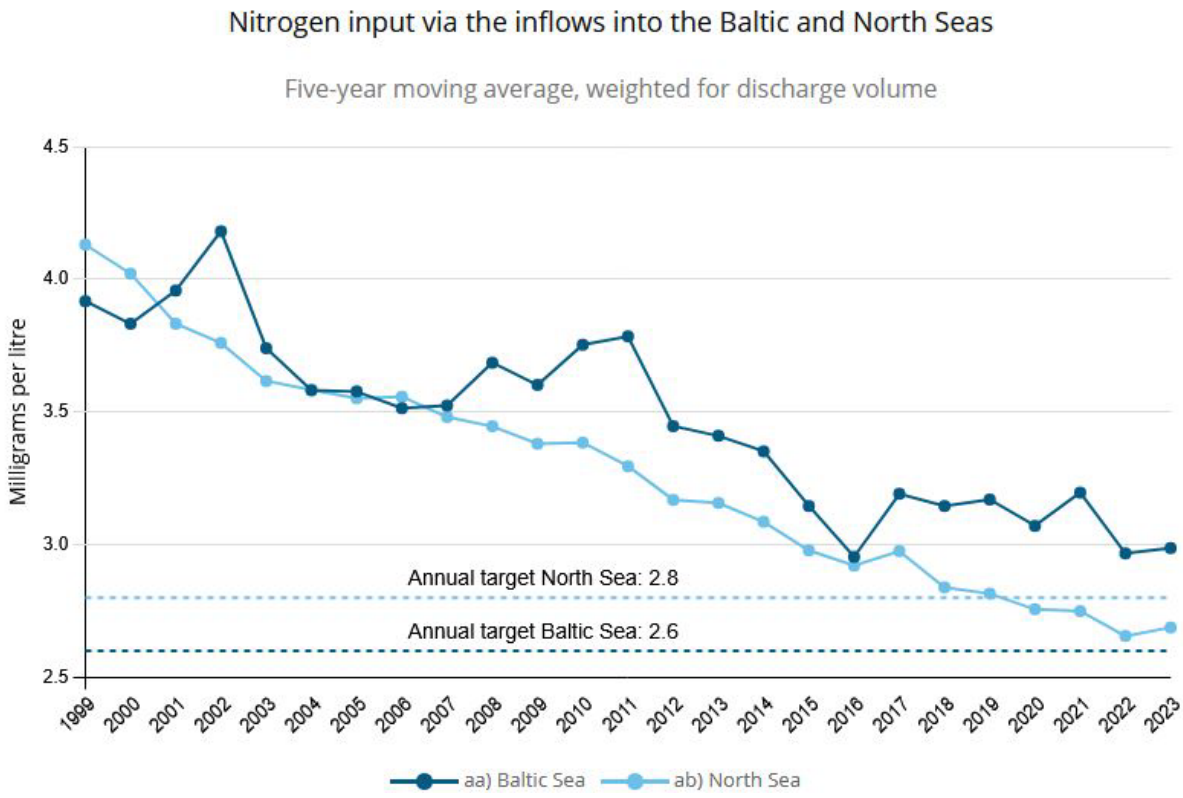
Protecting the oceans – *Protecting and sustainably using oceans and marine resources*

14.1.a Nitrogen input in coastal and marine waters – Nitrogen input via the inflows into the Baltic and North Seas



Data source(s):
German Environment Agency according to the Federal States and River Basin Communities

Definition
The indicators represent the five-year moving average of discharge-weighted nitrogen concentrations in milligrams (mg) of nitrogen per litre (l) of water discharged from rivers into the North Sea (14.1.ab)[1] and Baltic Sea (14.1.aa)[2].

Intention
High concentrations of nitrogen in the oceans can lead to eutrophication effects such as oxygen deficiency and thus to a loss of biodiversity and the destruction of fish migration areas. The management objectives of the Surface Waters Ordinance (OGewV 2016) agreed as part of the implementation of the EU Water Framework Directive (WFD 2000/60/EC) and the objectives of the EU Marine Strategy Framework Directive (MSFD 2008/56/EC) and the

[1] Eider, Elbe, Ems, Weser, Rhein, Treene, Aarlau, Bongsieler Kanal and Miele.
[2] Peene, Trave, Warnow, Langballigau, Füsinger Au, Koseler Au, Schwentine, Kossau, Goddesdorfer Au, Oldenburger Graben, Aalbeck, Schwartau, Lippingau, Hagener Au, Barthe, Duvenbaek, Hellbach, Maurine, Recknitz, Ryck, Stepenitz, Uecker, Wallensteingraben and Zarow.

Baltic Sea Action Plan should apply to the input of nitrogen into the Baltic Sea and North Sea via tributaries.

Targets

14.1.aa: Adherence to good quality in accordance with the Ordinance for the Protection of Surface Waters (annual averages for total nitrogen in rivers flowing into the Baltic Sea may not exceed 2.6 milligrams per litre)

14.1.ab: Adherence to good quality in accordance with the Ordinance for the Protection of Surface Waters (annual averages for total nitrogen in rivers flowing into the North Sea may not exceed 2.8 milligrams per litre)

Content and progress

The indicators are based on measurement data on nitrogen concentrations and water discharge volumes from both small and large inflows of the North and Baltic Seas. The data are compiled by the German Environment Agency (UBA), incorporating information provided by the Länder and river basin communities. Smaller rivers that do not flow directly into the North or Baltic Sea, but first discharge into larger rivers, are also taken into account. Measurement points are selected so that the final monitoring station before the confluence is included in the evaluation in order to avoid double counting. Additionally, the Rhine is considered, even though it does not discharge into the sea within Germany. The relevant values are taken at the monitoring station in Bimmen, a district of Kleve, where the Rhine leaves German territory.

Nitrogen concentrations in individual rivers are averaged using flow-weighted means, so that rivers with high discharge volumes have a greater influence on the overall average than those with lower discharge. To prevent individual extreme events such as floods or droughts – which can result in particularly high or low nitrogen inputs – from distorting long-term trends, the results are presented as a moving five-year average. A major cause of nitrogen input into the North and Baltic Seas via inflows is nitrogen surplus in agriculture, as recorded in indicator 2.1.a. In addition to nitrogen, phosphorus also contributes to eutrophication. Phosphorus loads in rivers are covered separately in indicator 6.1.a.

Since the beginning of the time series, the flow-weighted nitrogen concentration of all inflows to the North and Baltic Seas has shown a declining trend. This decrease is more pronounced for the North Sea tributaries than for those discharging into the Baltic Sea. The average concentration of nitrogen in the North Sea inflows between 2019 and 2023 was 2.7 mg/l, and thus for the fourth time in a row below the politically defined target value of 2.8 mg/l. In contrast, the Baltic Sea inflows recorded an average concentration of 3.0 mg/l over the same period – significantly exceeding the upper limit of 2.6 mg/l.

In contrast to the aggregated indicator 14.1.a Nitrogen input via tributaries into the North and Baltic Seas, achieving good ecological status under the Ordinance on the Protection of Surface Waters (OGewV) requires each individual river to meet its respective management target. This goal is currently not met for either the North or Baltic Sea tributaries.

Among the major Baltic Sea inflows, only the Warnow achieved the management target of 2.6 mg/l with an average of 2.15 mg/l over the 2019-2023 period. The Peene (2.80 mg/l) and Trave (3.56 mg/l) each exceeded the target value. Smaller Baltic Sea inflows showed,

on average, significantly higher nitrogen concentrations in the same period – with values reaching up to 6.2 mg/l (Duvenbaek), in some cases several times above the target value. Overall, only about one fifth of these smaller rivers meet the target. Among the North Sea inflows, only the Rhine (2.5 mg/l) and the Bongsieler Kanal (2.6 mg/l) achieved the management target of 2.8 mg/l between 2019 and 2023, making a key contribution to keeping the flow-weighted average below the politically defined threshold.

Among the major North Sea inflows, the Weser (3.5 mg/l) and Ems (4.0 mg/l) recorded the highest nitrogen concentrations. The smaller North Sea inflows had five-year averages ranging from 2.6 mg/l (Bongsieler Kanal) to 3.5 mg/l (Aarlau).

Type of targets
14.1.aa: Constant target for each year
14.1.ab: Constant target for each year

Assessment
14.1.aa: The nitrogen input via inflows into the Baltic Sea should not exceed 2.6 milligrams per litre per year, based on a five-year moving average weighted by discharge.

According to the target formulation, indicator 14.1.aa is assessed as cloud for 2023, as the politically defined annual threshold was exceeded in 2023, although the six-year average trend indicates development in the desired direction.

14.1.ab: The nitrogen input via inflows into the North Sea should not exceed 2.8 milligrams per litre per year, based on a five-year moving average weighted by discharge.

Indicator 14.1.ab is assessed as sun for 2023, as the politically defined annual threshold was met in 2023 and the six-year average trend indicates development in the desired direction.

14.1.aa: 

14.1.ab: