European Environment Agency

Indicator Fact Sheet

(WEU7) Source apportionment and loads (riverine and direct) of nutrients to coastal waters

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Indicator code / ID	WEU7
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Key messages

☺ Discharges of both phosphorus and nitrogen from all quantified sources to the North Sea and Baltic Sea have decreased since the 1980s.

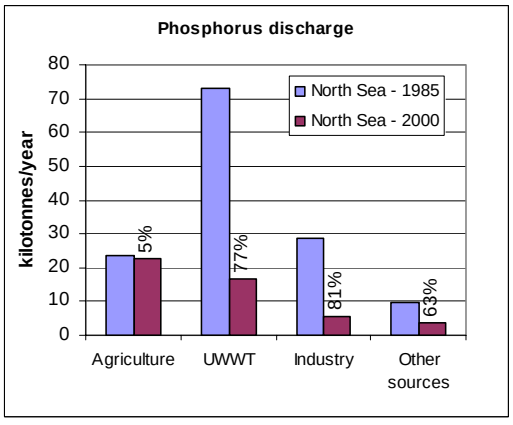
● Agriculture is now the major source of nitrogen and phosphorus discharges into the North Sea, whereas for the Baltic Sea agriculture is the main source of nitrogen pollution and urban wastewater the main source of phosphorus pollution.

● Data for the Black Sea are less comprehensive than for the Baltic and North Sea, but indicate that riverine discharges are the largest sources of nitrogen and phosphorus.

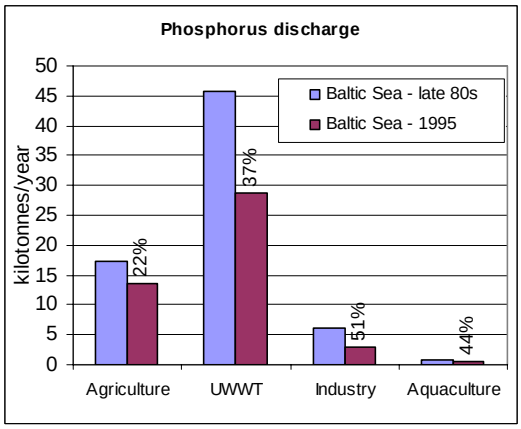
● Comprehensive data is also not available for the Mediterranean but all coastal cities discharge their (treated or untreated) sewage to the sea and only 4 % have tertiary treatment, indicating that the nutrient input from this source maybe high. Agriculture is also intensive in the region and 80 rivers have been identified as contributing significantly to the pollution of the Mediterranean (EEA 1999).

Figure 1: Source apportionment of nitrogen and phosphorus discharges to Europe's Seas and percentage reduction

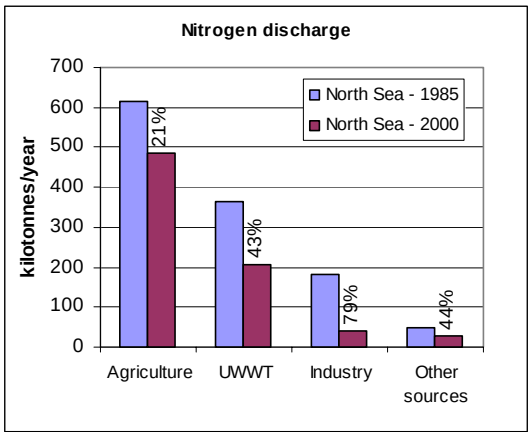
a) North Sea – Phosphorus



b) Baltic Sea - Phosphorus

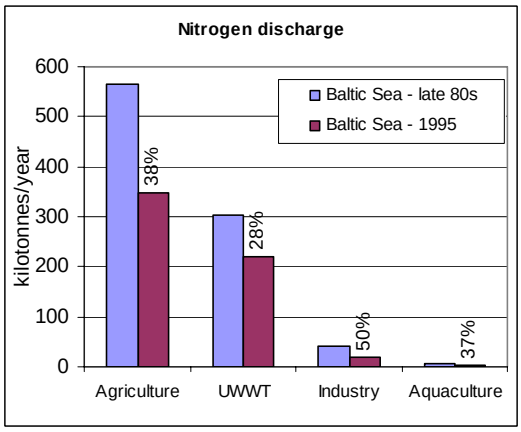


c) North Sea – Nitrogen



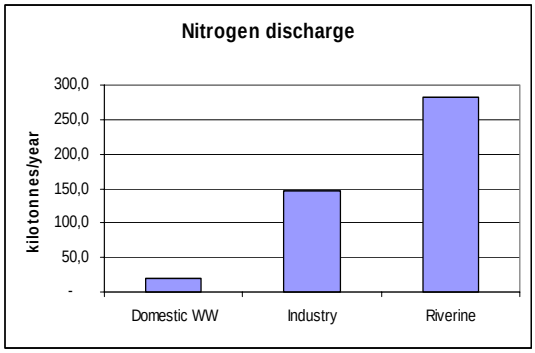
Source: North Sea Progress Report 2002
Note: Urban waste water treatment (UWWT)

d) Baltic Sea – Nitrogen



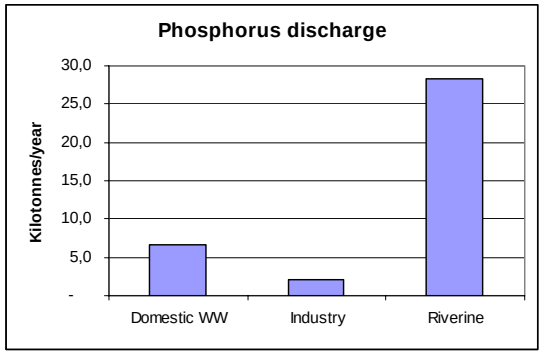
Source: Finnish Environment Institute – Lääne et al 2002.

e) Black Sea – Nitrogen in 1996



Source: Black Environmental Programme 1998

f) Black Sea - Phosphorus in 1996



Sources: OSPAR, HELCOM, Black Sea Commission

Results and assessment

Policy relevance:

There are a number of regional targets for the reduction of nutrient inputs to seas. There are also EU Directives (e.g. Water Framework Directive, Nitrates Directive and Urban Wastewater Treatment Directive) that relate to input of nutrients to seas.

Policy context:

Measures to reduce the input of anthropogenic nutrients and protect the marine environment are being taken as a result of various initiatives at all levels (global, regional conventions and Ministers Conferences, European, national), including the UN Global Programme of Action for the Protection of the Marine environment against Land-Based Activities, Mediterranean Action Plan (MAP), Helsinki Convention 1992, OSPAR Convention 1998, Black Sea Convention.

The HELCOM Ministerial Meeting in 1988 set a strategic goal of a 50 percent reduction in nutrient loads into the Baltic Sea by 1995. By 2000 the reduction target for phosphorus had in general been achieved but had not been for nitrogen (HELCOM 2003).

In terms of the North Sea the target is a substantial reduction for the input of N and P to those areas where such inputs are likely to cause pollution (eutrophication problem areas). At the 5th North Sea Ministerial Conference (5NMC) it was concluded that six of the nine North Sea States concerned had achieved a 50% reduction of the input of phosphorus to surface waters between 1985-2000 but none had reached the 50% reduction target for nitrogen inputs (5NMC Progress Report, 2002.)

The target of input of nitrogen and phosphorus cannot be assessed with the available total load (direct and rivers) as such from OSPAR because of the non-standard methods of calculation before 1990, not comparable with the calculations after 1990.

Environmental context:

There is a complex relationship between riverine and direct discharges of nitrogen and phosphorus and the concentration of nutrients in coastal waters, estuaries, fjords and lagoons, which in turn affect the biological state.

Due to incompleteness and lack of comparability of the older data, the best data sets available at the moment are OSPAR data for the period 1990-2000 and the 1995 data of HELCOM for the sum of riverine inputs and direct discharges.

The Baltic Sea, being the second largest brackish water area in the world, is the sea most vulnerable to eutrophication. Almost all coastal areas are affected.

The 1995 loads of the EU Baltic countries are not comparable with former figures so no complete picture is obtained.

Assessment:

There were significant reductions in phosphorus discharges to the North Sea from urban wastewater treatment works (UWWT), industry and other sources between 1985 and 2000. The reduction from agriculture has been less marked and this was also the largest source of discharges in 2000. Nitrogen discharges to the North Sea have decreased significantly from all four sources between 1985 and 2000 with agriculture being the major source in 2000. However, some countries, such as Norway, Sweden and UK, reported increases in riverine discharges (and direct discharges for the UK) of nitrogen to the North Sea between 1985 and 2000 whereas the other states reported reductions (North Sea Progress report 2002).

Even though the data for the Baltic Sea are less recent (late 1980s to 1995) they give a similar picture for the North Sea with significant reductions in discharges of nitrogen and phosphorus from agriculture, UWWT, industry and aquaculture. In 1995, the major source of phosphorus and nitrogen to the Baltic Sea was UWWT and agriculture, respectively. Regarding point sources, the 50 % HELCOM reduction target was achieved for phosphorus by almost all the Baltic Sea countries, while most countries did not reach the target for nitrogen (HELCOM 2000, http://www.vyh.fi/eng/orginfo/publica/electro/fe524/fe524.htm).

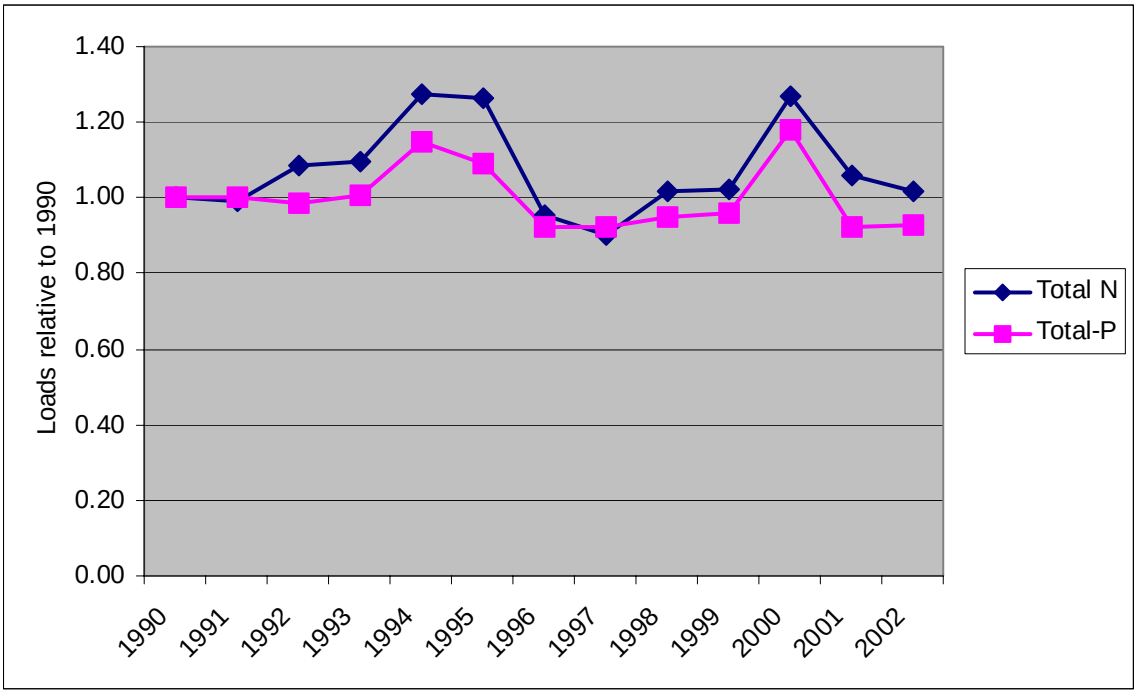
Information relating to the Black Sea is less comprehensive in terms of source apportionment and how loads have changed with time. In 1996, the most significant sources of phosphorus and nitrogen to the Black Sea were riverine inputs. The major rivers in the Black Sea catchment are the Danube, Dnieper, Don, Southern Bug, and Kuban covering an area of around 2 million km^2 and receiving wastewater from more than 100 million people, heavy industries and agriculture areas. The Danube contributes about 65 % of the total nitrogen and phosphorus discharges from all sources.

Sub-indicator: Riverine inputs and direct discharges of total nitrogen and total phosphorus to the OSPAR maritime area

Key message

😐 The total discharges of nitrogen and phosphorus from rivers and direct point sources to OSPAR conventional seas were largely unchanged during the 1990s and early 2000s.

Figure 2: Riverine inputs and direct discharges of total nitrogen and total phosphorus to the OSPAR maritime area



Notes: The loads are relative to loads in 1990.
Sources: OSPAR RID data

Assessment of the sub-indicator

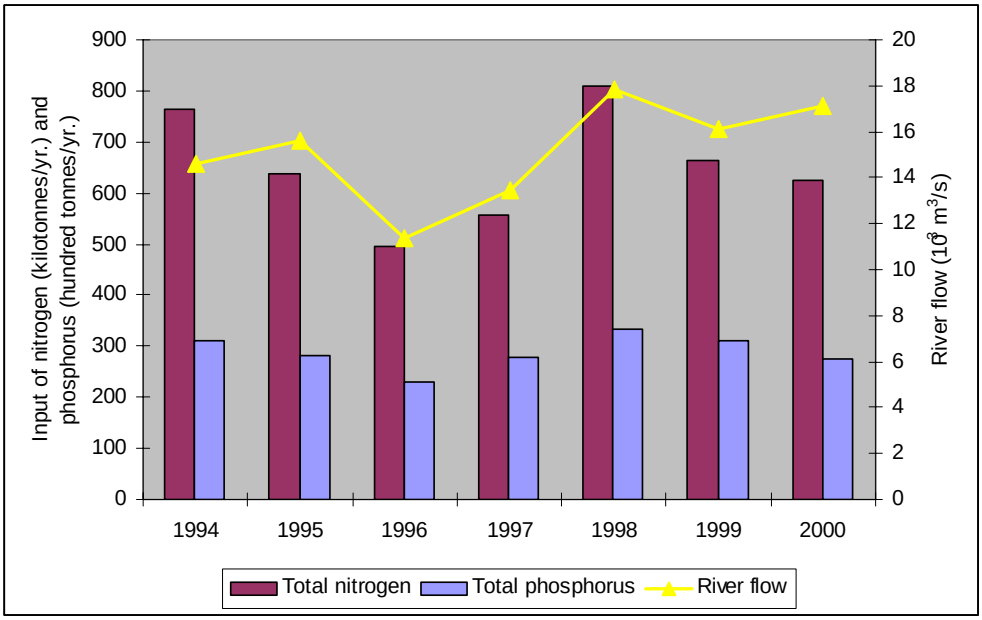
The reductions in discharge of N and P between 1985 and 2000, assessed from a source oriented point of view using HARP guidelines, are not yet reflected in results from monitoring of direct point sources and riverine discharges.

Sub-indicator: Riverine inputs of total nitrogen and total phosphorus to the Baltic Sea

Key message

😐 The discharges of nitrogen and phosphorus from rivers to the Baltic Sea were largely unchanged during the 1990s and generally followed variations in freshwater run-off.

Figure 3: Riverine inputs of total nitrogen and total phosphorus to the Baltic Sea



Source HELCOM (2003)

Assessment of the sub-indicator

As for the OSPAR maritime area, even though there have been reductions in the discharges from the various sources of nitrogen and phosphorus between the late 1980s and 2000, these have not necessarily been reflected in the in riverine inputs into the Baltic Sea. This is because nutrients remain in farmland soils for long periods and are only gradually released through leaching and groundwater transport into rivers and thereby in the sea.

References

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OSPAR Draft overview tables for the RID 2002 Data Report. INPUT 2004 INPUT 04/3/Info.3-E. http://www.ospar.org

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OSPAR: Data report on the Comprehensive Study of Riverine Inputs and Direct Discharges (RID) in 2001. http://www.ospar.org

OSPAR (1998) Summary report of the Comprehensive Study of Riverine Inputs and Direct Discharges (RID) in 1990 to 1995. http://www.ospar.org

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Data

WEU7_RID_1990_2002.xls

WEU7_Baltic_N_P.xls

Meta data

Web presentation information

1. Abstract / description / teaser:

Describes discharges of phosphorus and nitrogen from quantified sources (riverine and direct) to the North Sea, Baltic Sea and Black Sea.

2. Policy issue / question:

Are discharges of organic substances and nutrients decreasing?

3. EEA dissemination themes:

Coasts and seas

4. DPSIR:

P

Technical information

5. Data source:
   OSPAR, HELCOM, Black Sea Commission
6. Description of data:
   Annual loads of N and P by country.
7. Geographical coverage:
   EU, Accession countries
8. Temporal coverage:
   1990-2000. More scattered data before 1990.
9. Methodology and frequency of data collection:
   Yearly delivered RID data from OSPAR member states (in principle) to OSPAR secretariat. Periodic Pollution Load Compilations undertaken by Baltic Sea countries and reported to HELCOM secretariat.
10. Methodology of data manipulation, including making 'early estimates':

Load calculations follow agreed OSPAR protocol. Consistent yearly time series created for each country by filling in data gaps through extrapolation from existing reported data. Periodic assessment of loads to the Baltic by HELCOM.

Quality information

11. Strength and weakness (at data level):
    OSPAR RID is yearly updated. There are gaps for significant contributors to total discharges such as France and Spain; HELCOM PLC is regularly updated; MED has no data. Black Sea – ad hoc information compilation
12. Reliability, accuracy, robustness, uncertainty (at data level):
    Very different between Marine areas. Time series relatively weak.
13. Overall scoring (give 1 to 3 points: 1=no major problems, 3=major reservations):

Relevancy: 1

Accuracy: 2

Comparability over time: 2

Comparability over space: 3

Further work required

Need for better data on the load to the Mediterranean and the Black Sea.