



## Indicator Fact Sheet

### (WHS7) Loads of hazardous substances to coastal waters

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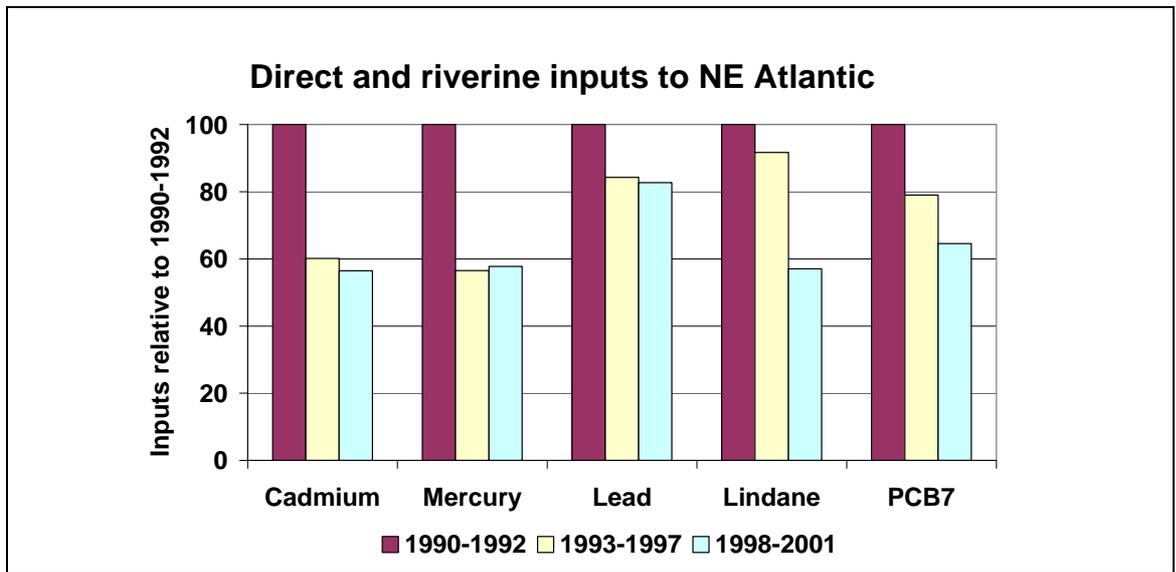
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#### Key Message

☺ Direct and riverine inputs of cadmium, mercury, lead, lindane and PCB into the North-East Atlantic have decreased in relation to 1990-1992 loads, showing the effect of pollution abatement policies.

**Figure 1. Direct and riverine inputs of selected metals and organic substances in the north-east Atlantic Ocean.**



**Notes:** It should be noted that the lack of consistent or reliable data from the marine conventions or EEA countries inhibits adequate assessment of concentrations and trends of hazardous substances in European marine water. Aggregated data do not necessarily convey the uncertainty these problems cause. No data before 1990 for direct and riverine inputs or after 1995 for atmospheric inputs sufficient data from other sea regions. The contribution from Spain 2000 has been adjusted.

**Source:** Data from Ospar.



## Results and assessment

### Policy relevance:

The objective of indicators is to convey the levels and trends of hazardous substances of inputs to European seas. The observed load of hazardous substances may be detrimental to marine ecosystems.

### Policy context:

The main policy for the control of pollution in EU waters is the Dangerous Substances Directive (76/464/EEC). This will be taken over by the Water Framework Directive (2000/60/EC) once the latter becomes fully implemented in 2015. Remedial actions are currently being directed to comply with the Water Framework Directive. The aim of Water Framework Directive is to achieve zero, near zero or background concentrations, depending on the substance, in the marine environment through abatement actions on inputs. The aim is to be achieved by 2020. Goals similar to the Water Framework Directive have also been outlined by Oskar, Helcom and North Sea conferences. Similar targets have not been formulated for the Mediterranean Sea or the Black Sea.

The Dangerous Substance Directive and Water Framework Directive have a priority list of 33 substances, both naturally occurring and synthetic (2455/2001/EC). The list includes cadmium, mercury, lead and lindane but not DDT and PCB. All six of these hazardous substances are considered in this fact sheet. They are also on the list of 15 chemicals for priority action for the Oskar Marine Convention (Oskar 1998a). Within the framework of Helcom DDT and PCB are both on their list of priority substances and are banned substances according to Annex I, Part 2 of the 1992 Helsinki Convention (Helcom 1992b). With regard to cadmium, lead, mercury, PCB as well as other hazardous substances, numerous Helcom Recommendations have been adopted. Parties to the Convention for the protection of Mediterranean Sea against pollution have identified substances or groups of substances whose dumping or land-based discharges are prohibited or limited (Barcelona Convention and protocols). Parties to the Convention on the Protection of the Black Sea against Pollution have identified similar groups of substances and have protocols to reduce pollution by these harmful substances.

Besides those mentioned above, EU legislation relevant to cadmium relate to waste management (concerns disposal of batteries – Directives 91/157/EEC, 93/86/EEC and 98/101/EC) and limit values for discharges (Directive 83/513/EEC). EU legislation relevant to mercury relate to waste water directives (e.g. Directives 91/689/EEC and 94/67/EEC) and discharge directives (82/176/EEC, 84/156/EEC and 88/347/EEC). EU-legislation relevant to lead relate to directives on discharges (e.g. Directive 96/61/EC), use in paints (Directive 76/769/EEC), concentration in gasoline (Directive 85/210/EEC), and hazardous waste treatment (Directives 89/369/EEC and 94/67/EC). Lead in air is regulated through a directive on air quality (e.g. Directive 82/844/EEC). Water quality limits and quality objectives for discharges of DDT are regulated by the Council Directive 86/280/EEC. Water quality limits and quality objectives for discharges of hexachlorocyclohexane (including lindane) are primarily regulated by the Dangerous Substances Directive for general restrictions on emissions and Council Directive 84/491/EEC. Lindane is included on List I of Dangerous Substances Directive. The use of Lindane is also regulated through the EU Pesticide Directive 91/414/EEC. The disposal of PCB is primarily regulated by: general restrictions on emissions (dangerous substances directive 76/464/EEC), the Council Directive 96/59/EC (disposal of polychlorinated biphenyls and polychlorinated terphenyls). Limiting releases to water is e.g. the Water Framework Directive. In addition, Council Directive 85/467/EEC bans the marketing and use of PCBs.

### Environmental context:

Cadmium, lead and mercury are found at low concentrations in the earth's crust and occurs naturally in seawater. DDT, lindane and PCB are synthetic substances that are not found naturally in the environment. Human activities have caused a general mobilisation of these hazardous substances in aquatic and terrestrial environments. Many marine organisms



accumulate these substances even in areas remote from point sources. The substances are not needed for any organism (they are not essential) and are toxic. In humans long-term consumption of contaminated seafoods can be detrimental. The main sources are from general waste/disposal, burning of fossil fuels and industrial activities (NSC, 2002), including mining and production. EEA has recently published a more thorough description of their sources and dangers to the environment (EEA 2003a).

#### Assessment:

Cadmium, mercury, lead, DDT, lindane and PCB are the subject of this fact sheet. The metals and lindane are on the Dangerous Substances Directive list of 33 priority substances. The average sum of 1990-1992 direct and riverine inputs to the north-east Atlantic of cadmium (about 101 tonnes), mercury (34 tonnes) and lead (1739 tonnes) was reduced to 60, 56 and 84%, respectively for the period 1993-1997 and remained about the same for the 1998-2001 period (Figure 1). There have been significant reductions of emissions to air for these metals (71, 82 and 75%, respectively) between 1985 and 1999 from some North Sea countries (EEA 2003b). According to Helcom (2002i) the atmospheric input of cadmium and lead to the Baltic Sea has decreased about 4% between 1996 and 2000 and mercury 14% (Helcom 2002i).

The sum of direct and riverine inputs of lindane (1786 tonnes in 1990) and PCB (3097 tonnes) in the north-east Atlantic was reduced to 92 and 79%, respectively for the 1993-1997 period, and 57 and 65% respectively for the 1998-2001 period (Figure 1). There is no data for the input of DDT the sea regions considered. Lindane emissions to the Baltic have decreased by almost two orders of magnitude between 1990-1998, but deposition has only decreased by 14% probably due to atmospheric input from elsewhere (Helcom 2002i).

These results indicate that abatement measures have had a positive effect initially (1993-1997) for the reduction of cadmium, mercury, lead, lindane and PCB inputs to the north-east Atlantic and Baltic Sea. Further reduction in emissions following this period (1998-2001) is not readily apparent for the metals. Insufficient input information is available for the Mediterranean and the Black Seas.

The possible impact these inputs have on concentrations and trends in biota are discussed in the EEA fact sheet on concentration of hazardous substances in European Seas (EEA 2003c).

#### **Data**

Spreadsheet: WHS7\_Region-180903-inputs.xls

#### **References**

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- 76/464/EEC. Directive 76/464/EEC - Water pollution by discharges of certain dangerous substances [Dangerous Substances Directive]. [http://www.europa.eu.int/comm/environment/water/water-dangersub/index\\_en.html](http://www.europa.eu.int/comm/environment/water/water-dangersub/index_en.html)
- 76/769/EEC Council Directive 76/769/EEC of 27 July 1976 on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations
- 82/176/EEC. Council Directive 82/176/EEC of 22 March 1982 on limit values and quality objectives for mercury discharges by the chlor-alkali electrolysis industry.
- 82/844/EEC Commission Regulation (EEC) No 844/82 of 13 April 1982 amending Regulation (EEC) No 427/81 authorising Greece to suspend the entire customs duties applicable on imports of beef and veal products



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- 84/491/EEC Council Directive 84/491/EEC of 9 October 1984 on limit values and quality objectives for discharges of hexachlorocyclohexane.
- 85/210/EEC Council Directive 85/210/EEC of 20 March 1985 on the approximation of the laws of the Member States concerning the lead content of petrol.
- 85/467/EEC Council Directive 85/467/EEC of 1 October 1985 amending for the sixth time (PCBs/PCTs) Directive 76/769/EEC on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations.
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- 88/347/EEC. Council Directive of 88/347/EEC of 16 June 1988 amending Annex II to Directive 86/280/EEC on limit values and quality objectives for discharges of certain dangerous substances included in List I of the Annex to Directive 76/464/EEC.
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- 93/86/EEC Commission Directive 91/86/EEC of 4 October 1993 on amendments to Council Directive 91/157/EEC of 18 March 1991 on batteries and accumulators containing certain dangerous substances.
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Ospar, 1999. Report on assessment of trends in the concentrations of certain metals, PAHs and other organic compounds in the tissues of various fish species and blue mussels: Ospar Ad Hoc Working Group on Monitoring 1998. 44 pp + appendices (cf. p.10)

TemaNord, 1994, Harmonisering av bestämmelser om främmande ämnen i livsmedel, TemaNord 1994:509. 71 pp.

## Meta data

### Web presentation information

#### 1. Abstract / description / teaser:

Indicates direct and riverine inputs of heavy metals and organic chemicals into the North-East Atlantic.

#### 2. Policy issue / question:

Are direct and riverine loads to seas decreasing?

#### 3. EEA dissemination themes:

Coasts and seas

#### 4. DPSIR:

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### Technical information

#### 5. Data source:

*Riverine input and direct discharges.* Only Ospar data for the north-east Atlantic was sufficient to be included in this fact sheet. Other data sources were Helcom (data prior to 1996) member EU states monitoring results from the North East Atlantic and Baltic Sea reported from individual countries to ICES data centre. No input data and time series are available for the Mediterranean (EEA/UNEP 1999). Some data was provided by the Black Sea Commission.

#### 6. Description of data:

Generally, annual high and low estimates of inputs were provided to Ospar from member states. Input calculations follow agreed Ospar protocols. Ospar input data are available for the period 1990-2001. Reliable data on inputs before 1990 are not available. Georeferenced data were not available to create accurate maps of inputs. Only information from Romania could give some indication of the loads to the Black sea (BCR 2002) but this was insufficient for a general assessment.

#### 7. Geographical coverage:

Input data include the North-East Atlantic (Table 1).

#### 8. Temporal coverage:

Ospar has direct and riverine input data for the period 1990-2001. Helcom has input data only for 1995 and was not used in this fact sheet edition. Data on atmospheric deposition in the North Sea after 1987-1995 were not available for this report. The Black Sea data covers the years 1993-1999 but is incomplete.

#### 9. Methodology and frequency of data collection:

Methods have been reported in more detail (EEA 2003a). Generally the unaggregated submitted data were based on annual measurements.

#### 10. Methodology of data manipulation:

Methods have been reported in more detail (EEA 2003a). Average annual estimates of inputs were calculated from the disaggregated data in the database. Apparent time trends may be influenced by changes in monitoring program or reporting practice over time or changes in detection limits.



Quality of information

See also a more detailed evaluation by EEA (2003a).

11. Strength and weakness (at data level):  
There is a general need for consistent or reliable data with greater geographical coverage to enhance adequate assessment inputs. Only Ospar input data from the north-east Atlantic was sufficient for this exercise.
12. Reliability, accuracy, robustness, uncertainty (at data level):  
Input data covers a relatively short period with comparable data. Measurement of inputs and concentrations in biota are not co-ordinated. There are also large spatial and temporal gaps.
13. Overall scoring (from 1-3: 1= no major problems, 3 = major reservations):  
Relevancy: 1  
Accuracy: 2  
Comparability over time: 2  
Comparability over space: 3

**Further work required**

Updating the EEA/ETC-WTR WATERBASE-Transitional/Coastal/Marine with consistent and reliable data that is spatially and temporally representative will greatly improve assessments of the levels and trends of hazardous substances in European Seas.

See also a more detailed evaluation by EEA (2003).