

## **Nutrients in the Convention area**

*Inputs of Nutrients into the Convention area*

*Implementation of  
PARCOM Recommendations 88/2 and 89/4*



**OSPAR Commission**  
**2003**

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. It has been ratified by Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom and approved by the European Community and Spain.

*La Convention pour la protection du milieu marin de l'Atlantique du nord-est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. La Convention a été ratifiée par l'Allemagne, la Belgique, le Danemark, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède et la Suisse et approuvée par la Communauté européenne et l'Espagne.*

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## SUMMARY

Based on data from 1985 and 2000, Belgium, Denmark, Germany, the Netherlands, Norway and Switzerland have all reached the 50% reduction target on phosphorus between 1985 and 2000 from sources in areas draining into their nationally defined problem areas. Sweden's discharges/losses of phosphorus were reduced by about 34% between 1985 and 2000. Based on measures taken before 1985, Sweden is considered to have reached this target. The report from France was insufficient to allow an assessment of its progress towards achieving the 50% reduction target.

Based on data from 1985 and 2000, no OSPAR Contracting Party committed to the 50% reduction in nutrient inputs has reached the 50% reduction target on nitrogen losses/discharges from sources in areas draining into defined problem areas. Germany and Denmark reached a reduction of 38–43% respectively. The report from France was insufficient to allow an assessment of its progress towards achieving the 50% reduction target.

Although France has had problem areas with regard to eutrophication since 1990, no proper implementation report of PARCOM Recommendation 88/2 has been submitted to date. Ireland and the UK have in 2002 through the Comprehensive Procedure identified problem areas with regard to eutrophication, but not yet submitted any report in respect of these recently identified areas. Iceland has, to date, not reported on any identified problem area with regard to eutrophication. Luxembourg has not accepted PARCOM Recommendation 88/2.

Compared with the situation in 1995, which was the year for the reduction target to be reached according to PARCOM Recommendation 88/2, Belgium have not reduced their nitrogen discharges/losses any further. The additional reductions in losses/discharges at source in the other countries vary from 6% in Sweden to 19% in Denmark. France reported a 19% reduction in discharges/losses of nitrogen in the period 1985-1996, but no information is provided for the year 2000.

Compared with the situation in 1995, which was the year for the reduction target to be reached according to PARCOM Recommendation 88/2, Sweden has decreased its phosphorus discharges/losses at source with 11% between 1995 and 2000. In Denmark there has been no further reductions, whereas the additional reductions in losses/discharges in the other countries vary from 4% in Germany to 14% in the Netherlands and Norway. France reported a 26% reduction in discharges/losses of nitrogen in the period 1985-1995, but no information is provided for the year 2000.

Aquaculture has become a more significant source for nitrogen and especially phosphorus in some North Sea countries since 1985. Denmark, Norway and the UK all have important aquaculture activities. However, nearly all Norwegian aquaculture plants are located outside the Norwegian problem area with regard to eutrophication.

As a consequence of the reduction of inputs from point sources between 1985 and 2000 the relative share of the total anthropogenic nitrogen inputs from diffuse sources increased. The most important diffuse source for nitrogen is agriculture (mainly drainage and leaching via groundwater). The reported reductions achieved per sector indicate that the overall reduction target for nitrogen inputs has not been reached mainly because the reductions expected from agriculture, and for some countries also wastewater, have only partially been achieved.

Only two Contracting Parties have indicated when the 50% reduction target for nitrogen will be met. The Netherlands indicated a qualified 2010 date and Sweden indicated that the commitment will be fulfilled within one generation (2020). The inability to reach the 50% reduction target for nitrogen is primarily because the measures to reduce the diffuse losses from the agriculture sector are progressing much slower than expected, and because the measures in many cases are either inadequate or inadequately implemented. However, the time lag between the implementation of the measures and the decrease of inputs into the sea, which is due to slow groundwater transport of nitrogen, should also be taken into account. Reported data does not support any further analysis of these aspects.

The assessment of the 50% reduction targets on nutrients is based on data of discharges/losses at source. That means that no assessment of the 50% reduction targets has been made on the reduction of nutrient inputs to the sea, but quantitative data is presented for some countries.

The general picture is that diffuse sources, of which agriculture constitutes the largest portion, are the largest single source of nutrient discharge/loss at source. Nevertheless, discharges from sewage treatment works and sewerage also represent a large source in many areas.

## 1. INTRODUCTION

In 1988 PARCOM Contracting Parties agreed to:

- take effective national steps in order to reduce nutrient inputs into areas where these inputs are likely, directly or indirectly, to cause pollution;
- aim to achieve a substantial reduction (of the order of 50%) in inputs of phosphorus and nitrogen into these areas between 1985 and 1995, or earlier if possible;
- prepare through the Working Group on Nutrients for discussion by the Commission:
  - (i) an overview of those regions within the Convention area where inputs of nutrients are likely, directly or indirectly, to cause pollution;<sup>1</sup>
  - (ii) assessments of the action plans prepared by Contracting Parties who signed the Declaration of the Second International Conference on the Protection of the North Sea;
  - (iii) co-ordinated programmes and measures for the reduction of inputs of nutrients to the regions identified from municipal treatment plants, agriculture, fish farming, industry, combustion plants and vehicles;
  - (iv) a list of contact points which should be used for immediate notification of such incidents as abnormal algal blooms;
- encourage specific R & D programmes to promote the development of techniques for reducing discharges of nutrients from all sources.

These commitments were reiterated at the 3NSC in 1990, at the Oslo and Paris Commissions Ministerial Meeting in 1992, IMM 93, 4NSC (at which the deadline was postponed from 1995 to ‘as soon as possible’) and latest at the 5NSC in 2002. No such official postponement has been made within the OSPAR framework.

Ministers at the 3NSC (1987), IMM (93) and 4NSC (1995) asked for harmonised reporting systems and procedures for nutrients, as did Ministers at the Oslo and Paris Commissions Ministerial meeting in 1992. Thus began the development of the HARP Guidelines.

The background to the request for harmonised reporting was, *inter alia*, that the Ministerial Declaration of 1987 and PARCOM Recommendation 88/2 do not, for example, explicitly specify whether the reduction targets are related to nutrient inputs to the sea or to discharges/losses at source, and do not provide guidance as to the calculation methods to be applied. The results were that:

- there were different practices among OSPAR Contracting Parties concerning reporting on discharges and losses of nutrients to freshwater systems and marine waters;
- the reports were generally based on ‘national interpretation’ on how elements such as sampling frequency, calculation methods and the sources to be taken into account should be considered;
- there was considerable uncertainty related to the calculations of the nutrient inputs, in particular with regard to the 1985 input figures, but also with regard to current nutrient inputs; and
- the calculation methods and the sources to be taken into account when reporting on inputs/discharges/losses of nutrients were, to varying degrees, left to the discretion of each country within the relevant international organisations where reporting took place.

The HARP system should, in theory, enable the assessment of both discharge/losses at source and the input to the sea. The national reports on nutrients received in the preparations for the 5NSC were mostly based on the HARP system, but the completeness of information vary between countries. For the purpose of increased

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<sup>1</sup> The implementation of the Common Procedure for the Identification of the Eutrophication Status of the Maritime Area has resulted in an additional number of Contracting Parties that now have identified problem areas with regard to eutrophication and hence are committed to PARCOM Recommendation 88/2 (c.f. table 1).

comparability between OSPAR Contracting Parties' figures (*i.e.* the most comprehensive data basis), the 50% reduction targets have been assessed in the light of discharges/losses of nutrients at source as very few OSPAR Contracting Parties have provided sufficient information to allow an assessment of the inputs into the sea.

Both OSPAR and the Committee of North Sea Senior Officials (CONSSO) agreed that the reporting on discharges/losses and inputs of nitrogen and phosphorus to the 5NSC<sup>2</sup> should be based on the HARP Guidelines (as adopted on a trial basis by OSPAR 2000). This is both with regard to the recommended quantification methodologies applied and the reporting formats. It should be noted that emissions to air are not a part of the reporting requirement, but the deposition of nitrogen on inland surface waters is included. This should allow:

- harmonised, transparent and comparable reporting;
- reporting on both the Load Orientated Approach and the Source Orientated Approach;
- more reliable quantification and reporting;
- quantification and reporting on a catchment basis, and which is thus in line with the EC Water Framework Directive.

The OSPAR Strategy to Combat Eutrophication calls for a wide range of quantification and assessments of nutrient discharges, losses and inputs and their links to already implemented and planned measures, such as:

“3.4.c. the setting of intermediate targets, in order to work towards attaining such objectives. Such targets should be combined with an indication of the size of further nutrient reduction required, estimated on the basis of an evaluation of the situation that is expected following the implementation of agreed measures, and possible means to achieve these reductions.

3.5.b. in all areas from which nutrient inputs are likely, directly or indirectly, to contribute to inputs into problem areas with regard to eutrophication the following additional requirements:

- (i) the implementation by Contracting Parties concerned of:
  - PARCOM Recommendation 88/2 on the Reduction in Inputs of Nutrients to the Paris Convention Area”;
  - PARCOM Recommendation 89/4 on a Co-ordinated Programme for the Reduction of Nutrients;
  - PARCOM Recommendation 92/7 on the Reduction of Nutrient Inputs from Agriculture into Areas where these Inputs are likely, directly or indirectly, to cause pollution;
  - any further OSPAR instruments updating these Recommendations”.

The OSPAR Action Plan 1998-2003 states, *inter alia*:

“5.2.2. Development and implementation of measures to combat eutrophication

30. The Commission will, as a matter of priority:

- a. review the implementation of, and reporting on PARCOM Recommendation 88/2 on the Reduction in Inputs of Nutrients to the Paris Convention Area”.

There are several issues in PARCOM Recommendation 88/2 that have given rise to discrepancies in Contracting Parties reporting, such as:

- does the recommendation concern anthropogenic nutrient load and/or total nutrient load?
- does the recommendation comprise discharges, losses and inputs of nutrients to marine waters and/or to surface waters?

However, the most difficult issue has been the differences in quantification methods and the type and number of sources taken into account in the quantification process.

There are indications that significant uncertainties are related to reference figures from 1985. It is not clear to which extent there exist national procedures to update 1985 figures in balance with improved reporting from the various sectors. The use of normalised figures or specific year figures vary among countries, which also add difficulties to the interpretation of the results obtained.

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<sup>2</sup> and therefore also the report on the implementation of PARCOM Recommendation 88/2.

## 2. DATA SUBMISSION

Contracting Parties' commitment to the 50% reduction target for nutrients (Table 1) has not been revised over the years. In 1997, OSPAR adopted a Common Procedure for the Identification of the Eutrophication Status of the Maritime Area (OSPAR 1997). The purpose of this procedure is to characterise the maritime area in terms of problem areas, potential problem areas and non-problem areas with regard to eutrophication. The results of applying this procedure may identify new problem areas, and potential problem areas, in which the inputs of nitrogen and phosphorus cause nutrient enrichment of the marine environment followed by reduced environmental quality. These results are expected to become available in 2002 and will be presented to OSPAR 2003. The results may require that an additional number of Contracting Parties will be committed to PARCOM Recommendation 88/2.

**Table 1** Overview of countries' current situation as regards marine problem areas with regard to eutrophication

<b>Countries with marine problem areas with regard to eutrophication</b>	<b>Countries without marine coastline in the maritime area, but which have accepted PARCOM Recommendation 88/2<sup>3,4</sup></b>	<b>Countries which to date have not identified any marine problem areas with regard to eutrophication</b>
Belgium, Denmark, France <sup>5</sup> , Germany, the Netherlands, Norway, Sweden, Ireland, and the UK	Finland and Switzerland	Iceland

This report draws on the submissions of information on nutrient discharges/losses made by North Sea States prior to the Progress Report developed for the Fifth International Conference on the Protection of the North Sea (March 2002).

All Contracting Parties were asked to fill in the OSPAR reporting format for Recommendation 88/2, but only a few did. The missing forms have been completed by the lead country on the basis of submitted data. All figures on discharges/losses of nutrients at source to surface waters are related to anthropogenic discharges/losses. Nutrient emissions to air have not been taken into account.

Although some OSPAR Contracting Parties have reported on a catchment-by-catchment basis according to the HARP Guidelines, the data in this Implementation Report are presented as the totals per country. This because the 50% reduction targets are related to a country's defined problem area (and are not catchment specific) and because of the complexity and comprehensiveness of presenting data from all catchments reported on.

The HARP Guidelines distinguish between two types of data:

- a. data on nutrient discharges/losses at source; and
- b. data on the riverine load at the monitoring point closest to the river mouth.

HARP comprises two quantification approaches, namely:

- a. the quantification of the nitrogen and phosphorus discharges/losses at source (Source Oriented Approach); and
- b. the quantification of the nitrogen and phosphorus inputs at river mouths, including the direct nitrogen and phosphorus discharges/diffuse losses into the sea (Load Oriented Approach).

<sup>3</sup> e.g. to achieve the 50% reduction target for nitrogen and phosphorus, as it is the case for countries with marine problem areas with regard to eutrophication.

<sup>4</sup> Luxembourg has not accepted PARCOM Recommendation 88/2.

<sup>5</sup> No implementation report submitted.

### 3. NUTRIENT DISCHARGES AND LOSSES AT SOURCE

#### 3.1 Diffuse losses at source

Diffuse losses at source mainly represent losses from agricultural activities, but the contribution from paved areas and direct atmospheric deposition onto water bodies may be significant in some catchments.

The estimated reductions in phosphorus losses from diffuse sources for the period 1985 to 2000 varied between 4% in Germany and 33% in Sweden (Table 2). The phosphorus losses from diffuse sources in Denmark increased by 65% in the same period. The figures on nitrogen losses from diffuse sources varied between a reduction of 36% in Sweden to an increase of 15% in Belgium.

**Table 2** Nutrient losses (tonnes) from diffuse anthropogenic sources and the reductions achieved

Country	N-1985	N-2000	Reduction (%)	P-1985	P-2000	Reduction (%)
Belgium	39580	45560	-15	2470	2313	6
Denmark	59600	38167	36	600	987	-65
France	NI	NI	NI	NI	NI	NI
Germany	364200	304300	16	13507	12943	4
Netherlands	99380	80864	19	4820	4210	13
Norway	16992	13554	20	454	326	28
Sweden	17660	14400	18	390	260	33
Switzerland	14490	11881 <sup>2)</sup>	18	361	207 <sup>2)</sup>	43

- : increase      NI: no information

<sup>2)</sup> 2001 data.

In all OSPAR Contracting Parties that have reported, the losses from diffuse anthropogenic sources (mainly agriculture sector) represented the most important source of nitrogen losses in 2000, between 47% in Switzerland and 89% in Denmark of the total losses/discharges in 2000. For phosphorus, the losses from diffuse sources represented the most important source of phosphorus losses for all countries (40% of the total discharges/losses in Sweden, 61% in Denmark), except for Belgium and Switzerland where the discharges from wastewater treatment plants were larger.

#### 3.2 Discharges from sewage treatment works, sewerage and households not connected to public sewerage

In many OSPAR Contracting Parties the treatment capacity for municipal wastewater increased significantly between 1985 and 2000. This is a result of an increase in the number of treatment plants, and/or of an increase in the capacity at existing treatment plants.

The estimated reductions in losses from wastewater treatment plants for the period 1985 to 2000 vary between 40% in Sweden and 89% in Denmark for the phosphorus inputs, and between 4% in Belgium and 80% in Denmark for nitrogen (Table 3).

The discharges from sewage treatment works and sewerage was an important source of nitrogen discharges/losses in 2000 in most OSPAR Contracting Parties that have reported, between 25% of the anthropogenic discharges/losses in Germany and 50% in Switzerland, but only 5% in Denmark. It was also an important source of phosphorus discharges in most countries; it was the most important source in Belgium and Switzerland where it represented 58% and 79% respectively of the total discharges/losses of phosphorus in 2000.

**Table 3** Nutrient discharges (tonnes) from sewage treatment works and sewerage

Country	N-1985	N-2000	Reduction (%)	P-1985	P-2000	Reduction (%)	Remarks
<b>Belgium</b>	31960	30614	4	9870	4319	56	Includes households not connected
<b>Denmark</b>	10000	1981	80	1900	207	89	
<b>France</b>	NI	NI	NI	NI	NI	NI	
<b>Germany</b>	245500	119700	51	46858	8139	83	
<b>Netherlands</b>	38410	28959	25	10800	2846	74	
<b>Norway</b>	10510	6688	36	964	134	86	
<b>Sweden</b>	9200	5450	41	262	157	40	
<b>Switzerland</b>	18000	12300	32	2300	900	61	

NI: No information.

The proportion of the nitrogen and phosphorus discharges of sewage from households not connected to public sewerage compared to the total discharges of sewage from wastewater treatment plants and households, represented a relatively high figure for Germany<sup>1</sup>, Norway and Sweden in 2000 (see Table 4).

**Table 4** Nutrient losses (tonnes) from households not connected to public sewerage

Country	N-1985	N-2000	Reduction (%)	P-1985	P-2000	Reduction (%)
<b>Belgium</b>	<sup>1)</sup>	1350		<sup>1)</sup>	204	
<b>Denmark</b>	NI	1254		NI	288	
<b>France</b>	NI	NI	NI	NI	NI	NI
<b>Germany</b>	31800	20700 <sup>2)</sup>	35	6854	2832	59
<b>Netherlands</b>	8481	601	93	1773	64	96
<b>Norway</b>	1779	1299	27	271	121	55
<b>Sweden</b>	3288	1995	39	216	143	34
<b>Switzerland</b>	1000	100	90	250	10	96

NI: No information.

- 1) The 1985 nutrient losses from households not connected to public sewerage are included in the figures on discharges from sewage treatment works and sewerage (c.f. Table 3).
- 2) The discharges comprises not only households not connected to public sewerage, but also discharges from combined sewer overflows, separate sewers and sewers without Waste Water Treatment Plants.

### 3.3 Industry

The estimated reductions in losses from industrial plants in the period 1985 to 2000 vary between 25% in Sweden and 99% in Denmark for the phosphorus inputs, and between 20% in Switzerland and 85% in Denmark for nitrogen (Table 5).

**Table 5** Discharges of nutrients (tonnes) from industries not connected to municipal sewerage systems

Country	N-1985	N-2000	Reduction (%)	P-1985	P-2000	Reduction (%)	Remarks
<b>Belgium</b>	29280	5728	80	5460	797	85	The data cover all industries
<b>Denmark</b>	3200	484	85	3100	38	99	
<b>France</b>	NI	NI	NI	NI	NI	NI	
<b>Germany</b>	122200	25100	79	6146	1104	82	
<b>Netherlands</b>	19529	3990	80	13422	1755	87	
<b>Norway</b>	5796	1562	73	164	102	38	
<b>Sweden</b>	1169	855	27	118	88	25	
<b>Switzerland</b>	1000	800	20	153	20	87	

NI: no information.

<sup>1</sup> The discharges comprise not only households not connected to public sewerage, but also discharges from combined sewer overflows, separate sewers and sewers without Waste Water Treatment Plants.

The discharges from industrial plants represented, in the year 2000, less than 6% of the total nitrogen discharges in all OSPAR Contracting Parties that have reported. The contribution from the industrial sector in the Netherlands to the total Dutch phosphorus discharges/losses represented about 20% in 2000, Norway 15% , whereas for Belgium, Denmark, Germany, Sweden and Switzerland the contribution was less than 8% of the total discharges/losses in 2000.

Table 6A shows discharges/losses from the various sources of phosphorus and nitrogen in OSPAR Contracting Parties in 2000, whereas Table 6B shows the reductions achieved by OSPAR Contracting Parties per sector in the period 1985 to 2000.

**Table 6A** Losses and discharges of nutrients (tonnes) per country and anthropogenic source in 2000

	Diffuse losses		Sewage treatment works, sewerage <sup>1)</sup>		House-holds not connected <sup>2)</sup>		Industry <sup>3)</sup>		Aquaculture	
	N	P	N	P	N	P	N	P	N	P
<b>Belgium</b>	45560	2313	30614	4319	1350	204	5728	797	84	14
<b>Denmark</b>	38167	987	1981	207	1254	288	484	38	1106	85
<b>France</b>	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
<b>Germany</b>	304300	12943	119700	8139	20700	2832	25100	1104	0	0
<b>Netherlands</b>	80864	4210	28959	2846	601	64	3990	1755	0	0
<b>Norway</b>	13554	326	6688	134	1299	121	1562	102	49	10
<b>Sweden</b>	14500	260	5450	157	1995	143	855	88	62	9
<b>Switzerland</b>	11881 <sup>4)</sup>	207 <sup>4)</sup>	12300	900	100	10	800	20	30	3

<sup>1)</sup> Includes discharges of nitrogen and phosphorus by combined sewer systems, by separate sewer systems, by systems that are not connected to wastewater treatment plants and households within the agglomeration which are not connected to a public sewer system, but that are expected to be connected in the near future.

<sup>2)</sup> Households not connected to public sewage systems include both scattered dwellings and households within urban areas that are not likely to be connected in the near future (five to ten years).

<sup>3)</sup> Concerns industrial plants with direct discharges of nitrogen and phosphorus from production water into surface waters.

<sup>4)</sup> 2001 data.

**Table 6B** Achieved percentage reductions of nutrients per source at source between 1985 and 2000 by OSPAR Contracting Parties in areas draining into their defined problem areas with regard to eutrophication

	Diffuse losses		Sewage treatment works, sewerage <sup>1)</sup>		Households not connected <sup>2)</sup>		Industry <sup>3)</sup>	
	N	P	N	P	N	P	N	P
<b>Belgium</b>	-15	6	4 <sup>4)</sup>	26 <sup>4)</sup>			80	85
<b>Denmark</b>	36	-65	80	89	<sup>5)</sup>	<sup>5)</sup>	85	99
<b>France</b>	NI	NI	NI	NI	NI	NI	NI	NI
<b>Germany</b>	16	4	51	83	35	59	79	82
<b>Netherlands</b>	19	13	25	74	93	96	80	87
<b>Norway</b>	20	28	36	86	27	55	73	38
<b>Sweden</b>	18	33	14	36	39	34	27	25
<b>Switzerland</b>	18	43	32	61	90	96	20	87

-: increase. NI: no information.

<sup>1)</sup> Includes discharges of N and P by combined sewer systems, by separate sewer systems, by systems that are not connected to wastewater treatment plants and households within the agglomeration which are not connected to a public sewer system, but that are expected to be connected in the year future.

<sup>2)</sup> Households not connected to public sewage systems include both scattered dwellings and households within urban areas that are not connected in the near future (5–10 years).

<sup>3)</sup> Concerns industrial plants with direct discharges of nitrogen and phosphorus from production water into surface waters.

<sup>4)</sup> Data covering all households.

<sup>5)</sup> No information for 1985.

### 3.4 Aquaculture

The aquaculture industry has an insignificant discharge of nutrients into the presently defined problem areas with regard to eutrophication. In Denmark, the discharges of nitrogen and phosphorus represented about 1 and 5% respectively of the total discharges/losses in 2000. (Tables 6A and 7). The discharges from Norwegian aquaculture plants in the area that Norway has identified as a problem area with regard to eutrophication were insignificant (1% or less) (Tables 6B and 7) compared to the rest of the Norwegian coastline.

Most of the Norwegian aquaculture plants are located in marine non-problem areas on the Norwegian west coast. The contribution of nutrients from the Norwegian aquaculture sector from the southernmost part of Norway (Lindesnes), along the Norwegian west coast up to 62° N, represented 44% and 76% of the total discharges/losses in that area for nitrogen and phosphorus respectively.

UK also has substantial aquaculture plants, especially in Scottish waters, which is outside identified problem areas. However, there is no report from UK on discharges from aquaculture plants.

In Germany the discharges from aquaculture plants are zero both for marine and fresh waters.

In the Netherlands all aquaculture discharge that take place are connected to sewer systems. NL has no direct discharges from aquaculture plants to fresh and/or marine waters so zero input is reported.

**Table 7** Nutrient discharges (tonnes) from aquaculture plants into defined problem areas

Country	N-1985	N-2000	Reduction (%)	P-1985	P-2000	Reduction (%)
Belgium	<sup>1)</sup>	84		<sup>1)</sup>	14	
Denmark	45	45	0	5	5	0
France	NI	NI		NI	NI	
Germany	0	0		0	0	
Netherlands	0	0		0	0	
Norway	2	49	Increase	0,3	10	Increase
Sweden	76	62	18	10	9	10
Switzerland	<sup>2)</sup>	30		<sup>2)</sup>	3	

NI: no information.

<sup>1)</sup> Considered to be negligible in 1985.

<sup>2)</sup> No data for 1985 available.

### 3.5 Reductions achieved per country at source towards the 50% reduction targets

Although France has identified problem areas with regard to eutrophication since 1990, no proper implementation report of PARCOM Recommendation 88/2 has been submitted to date. Ireland and the UK have identified problem areas with regard to eutrophication (for the first time) through the Common Procedure, but not yet submitted any report. Iceland has, to date, not reported on any identified problem area with regard to eutrophication. Luxembourg has not accepted PARCOM Recommendation 88/2.

Based on data from 1985 and 2000, Belgium, Denmark, Germany, the Netherlands, Norway and Switzerland have all reached the 50% reduction target on phosphorus between 1985 and 2000 from sources in areas draining into their nationally defined problem areas. Sweden's discharges/losses of phosphorus were reduced by about 34% between 1985 and 2000. However, Sweden is considered to have reached the 50% target for phosphorus as measures (e.g. chemical precipitation) were in place at all major municipal sewage treatment plants already before the base year 1985. The report from France was insufficient to allow an assessment of its progress towards achieving the 50% reduction target (c.f. Table 8).

**Table 8** Discharges/losses (tonnes) from anthropogenic sources in 1985 and 2000 and the reductions achieved

North Sea State	No. catchments	Catchment area (km <sup>2</sup> )	Discharges/losses of N		Reduction (%) for N	Discharges/losses of P		Reduction (%) for P
			1985	2000		1985	2000	
<b>Belgium</b>	4	30518	100820	81902	19	17800	7429	58
<b>Denmark<sup>1)</sup></b>	12	27763	75151	42991	43	5875	1605	73
<b>France</b>	8	64741	NI	NI		NI	NI	
<b>Germany</b>	246	264112	763700	469800	38	73365	25018	66
<b>Netherlands</b>	4	37181	165800	114414	31	30615	8875	71
<b>Norway</b>	5	98990	35077	23152	34	1853	693	62
<b>Sweden</b>	41	76495	31410	22770	28	995	655	34
<b>Switzerland</b>	1	9500	34490	25111	27	3064	1140	63

NI: no information.

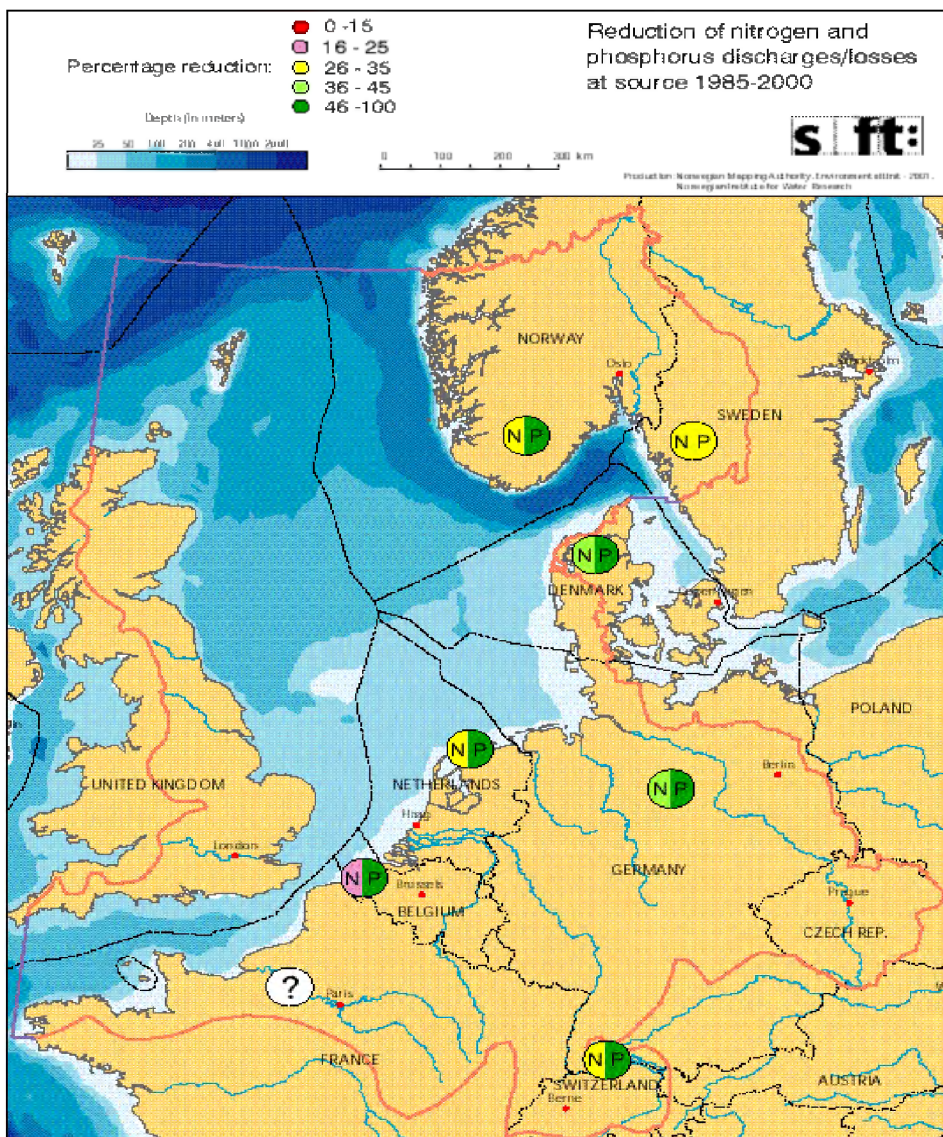
1) The data for 1985 are extracted from the 1998 OSPAR report on the implementation of PARCOM Recommendation 88/2.

Based on data from 1985 and 2000, no OSPAR Contracting Party committed to the 50% reduction in nutrient inputs has reached the 50% reduction target on nitrogen losses/discharges from sources in areas draining into defined problem areas. Germany and Denmark reached a reduction of 38–43% respectively. The report from France was insufficient to allow an assessment of its progress towards achieving the 50% reduction target.

The general picture is that diffuse sources, of which agriculture constitutes the largest portion, represent the largest single source of nutrient discharges/losses at source. The losses of nitrogen and phosphorus from diffuse sources in the year 2000 represented 64% and 46% respectively of the total discharges/losses from all OSPAR Contracting Parties that have reported. Discharges from sewage treatment works and sewerage also represented a large source in many areas. The discharges of nitrogen and phosphorus from sewage treatment works and sewerage represented, in the year 2000, 26 and 36% respectively of the total discharges/losses from all OSPAR Contracting Parties that have reported.

The reported achieved reductions per sector show that the overall reduction target for nitrogen inputs has not been reached mainly because the reductions expected from agricultural activities, and for some countries also wastewater, have only partially been achieved. The reduction target for phosphorus has been met by most countries due to a high percentage reduction for the wastewater and industrial sectors, whereas the measures implemented within the agriculture sector have contributed to a limited extent.

For some catchments, losses of nitrogen to a large extent enter surface waters via groundwater. Due to a long residence time in the groundwater in some catchments (e.g. up to 30 years is reported for the river Elbe), it may take several years before the achieved reductions of nutrient discharges/losses at source are reflected in a decrease in the inputs into the sea.



**Figure 1** Reductions of nitrogen and phosphorus achieved between 1985 and 2000

All OSPAR Contracting Parties committed to the 50% reduction target have reported on discharges/losses of nutrients in 1999/2000 according to the HARP Guidelines. The structure of the 1985 data on discharges/losses of nutrients in four of these countries (Germany, the Netherlands, Norway and Switzerland) also allowed them to report according to the HARP Guidelines for 1985. For Belgium, in addition to the HARP exercise, parallel work was carried out in order to produce year 2000 figures, separately covering diffuse sources, all industrial sectors and all households, which allows coherent calculations of the reductions achieved between 1985 and 2000.

#### 4. NUTRIENT INPUTS INTO THE SEA

Two methods can be distinguished to estimate the nutrient inputs to the sea.

- The use of the HARP Guidelines to quantify and report on the individual components of nitrogen and phosphorus discharges/losses to inland surface waters allows the aggregation of the discharges/losses of nitrogen and phosphorus in each catchment. By taking account, where appropriate, of nitrogen and phosphorus retention processes in river systems and background

losses of nitrogen and phosphorus, the inputs to the sea can be derived from the data on discharges and losses at source.

- II. Nutrient inputs to the sea can also be estimated via the measurement of riverine loads at downstream monitoring points accompanied by estimates of the discharges/losses from unmonitored areas below the monitoring point, as described in HARP Guideline 7 (Quantification and reporting of the monitored riverine load of nitrogen and phosphorous, including water flow normalisation procedures).

Nitrogen and phosphorus retention in river systems represents the link, which allows a comparison between discharges/losses at source and measured riverine loads. HARP Guideline 9 (Quantification and reporting of the retention of nitrogen and phosphorous in river catchments) deals with the quantification of retention.

#### 4.1 Introduction to riverine data

A riverine input is the load conveyed by a river at a point of entry to the maritime area, which is usually at a point of freshwater unidirectional flow immediately upstream of tidal influence, but may be in the tidal zone of a river. The riverine loads reported represent the loads coming from the whole of the river catchment areas. In the case of inter-national rivers, loads from upstream countries are ascribed to the most downstream countries.

The riverine discharges to the landward ends of estuaries and direct discharges to estuaries and coastal waters are combined to give estimates of the gross input of each substance to the maritime area (Load Orientated Approach). It is not feasible at the present time to estimate how much of these inputs are retained within estuaries and near-shore areas and how much passes into the open sea.

Input data for substances carried to the maritime area by rivers and direct discharges are important in that they provide one of the key links between the sources of substances of concern and their presence and effects in the maritime area. The comparison of riverine and source data can give an indication of the effectiveness of the measures implemented and assist in the interpretation of monitoring data, such as those collected under the Nutrient Monitoring and the RID programmes.

The Quality Status Report 2000 for the Greater North Sea (OSPAR 2000) presented data on riverine inputs and direct discharges to the Greater North Sea between 1990 and 1996. Direct inputs decreased for nitrogen and phosphorus, while river inputs increased for nitrogen and phosphorus until 1995, before decreasing in 1996. A major part of the nutrient inputs from point and diffuse sources within a catchment area enter the Maritime Area via rivers. They account for 65–80% of the total nitrogen inputs and for 80–85% of the total phosphorus inputs.

#### 4.2 Nutrient inputs to the sea estimated by measured riverine loads

Belgium, Denmark, Germany, the Netherlands, Norway and Sweden have provided information on measured riverine loads, as described in method 2 above. Belgium, Germany and the Netherlands do not base their assessment of the achievement of the 50% reduction target on this information.

Table 9 provides an overall summary of reductions achieved in inputs of nutrients to the sea for the UK as a whole and for the Thames catchment respectively, by using method number 2 above.

**Table 9** Reductions 1985–1999 in UK inputs of nutrients for the UK as a whole and for the River Thames Catchment

Catchment Area	1985 Input N	1985 Input P	1999 Input N	1999 Input P	Reduction N	Reduction P
	(kt/yr)	(kt/yr)	(kt/yr)	(kt/yr)	(%)	(%)
<b>All UK</b>	319 <sup>1)</sup>	58,4	355	33	-11	43
<b>Thames</b>	40,5	10,9	29,0*	6,0*	28	45

<sup>1)</sup> This 1985 baseline figure reported to the 3NSC appears to be an underestimate, so the indicated increase will be a worst case. The 'All UK' data for 1990 to 1999 indicate no underlying change in inputs of nitrogen.

Table 10 shows the riverine inputs of nutrients for all OSPAR Contracting Parties except Switzerland, which has no coastline. In order to assess any temporal change in inputs or to make international comparisons it is necessary to consider the whole time series of input and flow data and the variability of inputs.

For UK the figures for 1999 in Table 10 are flow-adjusted. For the other Contracting Parties the figures are not flow adjusted. This means Table 10 cannot be used for comparison between the countries.

**Table 10** Riverine inputs (tonnes) of nitrogen and phosphorus

	N		P		Riverine flow	
	1985	2000	1985	2000	1985	2000
<b>Belgium<sup>1)</sup></b>	NI	58352	NI	4170	NI	16022
<b>Denmark<sup>2)</sup></b>	60220	47039	2376	1267	24821	34264
<b>France<sup>3)</sup></b>	142969	40343	16604	11867	43000	NI
<b>Germany<sup>4)</sup></b>	247410	199250	16560	8350	86096	117479
<b>Netherlands<sup>5)</sup></b>	455000	372860	43300	24250	NI	NI
<b>Norway</b>	20972	23160	643	1035	NI	227773
<b>Sweden</b>	39524	42702	880	935	87030	111815
<b>Switzerland</b>	NA	NA	NA	NA	NA	NA
<b>UK<sup>6)</sup></b>	319000	355000	58400	33000	92600	308806 <sup>7)</sup>

NA: not applicable. NI: no information.

<sup>1)</sup> Only applicable to the basin referred to as 'Scheldt'.

<sup>2)</sup> Data for 1991 and 2000.

<sup>3)</sup> Data for 1990 and 1999.

<sup>4)</sup> Data from the transboundary river Elbe (which has no tributaries below the monitoring point), Weser, Ems and Eider.

<sup>5)</sup> Data from three transboundary rivers : Meuse, Rhine and Scheldt. The data include loads from countries upstream.

<sup>6)</sup> Riverine and direct inputs, which represent some 90% of total UK inputs; 1985 and flow adjusted 1999 data. Phosphorus as orthophosphate. Also, refer to Table 9.

<sup>7)</sup> Riverine flow data only (does not include direct discharges flow rate).

### 4.3 Inputs to the sea derived from source data and retention

Only Denmark and Norway have provided sufficient information to allow an estimate of the nutrient inputs to the sea by using nutrient discharges/losses at source and the retention in the water bodies.

## 5. CHANGE IN SITUATION BETWEEN 1995 AND 2000

Tables 11 and 12 show the reductions in discharges/losses of nitrogen in 1985-1995 and 1985-2000. Compared with the situation in 1995, which is the reference year for the reduction target to be reached according to PARCOM Recommendation 88/2, Belgium has not reduced their nitrogen discharges/losses any further. The additional reductions in losses/discharges in the other countries vary from 6% in Sweden to 19% in Denmark. France reported a 19% reduction in discharges/losses of nitrogen in the period 1985-1996, but no information is provided for the year 2000.

Compared with the situation in 1995, which is the reference year for the reduction target to be reached according to PARCOM Recommendation 88/2, Sweden has decreased its phosphorus discharges/losses with 11% between 1995 and 2000. In Denmark there has been no further reductions, whereas the additional reductions in losses/discharges in the other countries vary from 4% in Germany to 14% in the Netherlands and Norway. France reported a 26% reduction in discharges/losses of nitrogen in the period 1985-1995, but no information is provided for the year 2000.

**Table 11** Percentage reductions in discharges/losses of nitrogen between 1985-1995 and 1985-2000

Country	OSPAR 2001 report 1985-1995 - A	OSPAR 2003 report 1985- 2000 - B	Further reductions between 1995- 2000
Belgium	19	19	0
Denmark	24	43	19
France	NI	NI	NI
Germany	26	38	12
The Netherlands	10	19	9
Norway	20	34	14
Sweden	22	28	6
Switzerland	19	27	8
UK	12	-10 (1985-1996)	-22

**Table 12** Percentage reductions in discharges/losses of phosphorus in 1985-1995 and 1985-2000

Country	OSPAR 2001 report 1985-1995 - A	OSPAR 2002 report 1985- 2000 - B	Further reductions 1995-2000
Belgium	>45	58	<13
Denmark	72	73	1
France	26	NI	NI
Germany	62	66	4
The Netherlands	57	71	14
Norway	48	62	14
Sweden	23	34	-11
Switzerland	>54	63	<9
UK	54	NI	

## 6. CONCLUSIONS

Based on data from 1985 and 2000, Belgium, Denmark, Germany, the Netherlands, Norway and Switzerland have all reached the 50% reduction target on phosphorus between 1985 and 2000 from sources in areas draining into their nationally defined problem areas. Sweden's discharges/losses of phosphorus were reduced by about 34% between 1985 and 2000. Based on measures taken before 1985, Sweden is considered to have reached this target. The report from France was insufficient to allow an assessment of its progress towards achieving the 50% reduction target.

Based on data from 1985 and 2000, no OSPAR Contracting Party committed to the 50% reduction in nutrient inputs has reached the 50% reduction target on nitrogen losses/discharges from sources in areas draining into defined problem areas. Germany and Denmark reached a reduction of 38–43% respectively. The report from France was insufficient to allow an assessment of its progress towards achieving the 50% reduction target.

As a consequence of the reduction of inputs from point sources between 1985 and 2000 the relative share of the total anthropogenic nitrogen inputs from diffuse sources increased. The most important diffuse source for nitrogen is agriculture (mainly drainage and leaching via groundwater). The reported reductions achieved per sector indicate that the overall reduction target for nitrogen inputs has not been reached mainly because the reductions expected from agriculture, and for some countries also wastewater, have only partially been achieved.

Only two Contracting Parties have indicated when the 50% reduction target for nitrogen will be met. The Netherlands indicated a qualified 2010 date and Sweden indicated that the commitment will be fulfilled within one generation (2020). The inability to reach the 50% reduction target for nitrogen is primarily because the measures to reduce the diffuse losses from the agriculture sector are progressing much slower than expected, and because the measures in many cases are either inadequate or inadequately implemented. However, the time lag between the implementation of the measures and the decrease of inputs into the sea, which is due to slow groundwater transport of nitrogen, should also be taken into account. Reported data does not support any further analysis of these aspects.

## **7. CONSIDERATIONS AND EXISTING RELATED COMMITMENTS**

### **7.1 Atmospheric deposition on water bodies**

Atmospheric deposition of oxidised or reduced nitrogen compounds is considerable throughout Europe and may represent a significant source of the total input of nutrients to surface water systems. It should be taken into account in any eutrophication assessment involving quantitative source related data. There is a need to link modelling of atmospheric emissions/deposition with catchment related estimates including modelling of marine areas. This is clearly shown in the integrated assessment and management principles of the Water Framework Directive and is a prerequisite to implementing an ecosystem approach for the maritime area and its catchments.

Within the context of marine conventions and waterborne pollution, atmospheric deposition of nitrogen has often been considered as a part of the background loss of nitrogen, and is therefore not linked to its original sources. The modelling concepts used within the framework of the Convention on Long-Range Transboundary Air Pollution (LRTAP) enable the identification of the different diffuse sources of nitrogen (*e.g.* agriculture, industry and traffic). The task of keeping track of these sources in estimating diffuse losses of nitrogen from agriculture and other sources has not been given priority in relation to waterborne pollution. Subsequently it is still a scientific challenge to take account of this when quantifying nutrient losses from diffuse sources.

OSPAR's Strategy to Combat Eutrophication foresees developments toward improved quantitative links between the effects and the sources for nutrient inputs. In respect of the atmospheric inputs of nutrients, the HARP Guidelines only take account of nitrogen deposition on inland water bodies, which is needed for the quantification of nutrient inputs into surface waters at source. Information about atmospheric nitrogen emissions by CPs (incl. their contribution to sea areas) and atmospheric nitrogen deposition on the marine area are missing. This information should be collected on the basis of data available in the EMEP and OSPAR (CAMP) framework.

The OSPAR Strategy to Combat Eutrophication states that any further OSPAR measures should be complemented, as appropriate, by steps by the competent international bodies for the reduction of atmospheric emission of nitrogen. While presently, there is no particular focus on measures related to atmospheric deposition within OSPAR, it is sufficient for OSPAR to assess from time to time the progress made within other international forums (EU, UN/ECE). Furthermore, due to the implementation of measures within for example the EU, considerable reductions of NO<sub>x</sub> emissions from traffic are expected to be achieved in most OSPAR Contracting Parties within the next 15 years. OSPAR has therefore agreed that there is currently neither need nor scope for OSPAR to address nitrogen emissions from traffic.

### **7.2 Conclusions**

There is a need for an overview and evaluation of atmospheric emissions of nitrogen by CPs and their contribution to the pollution of sea areas and of nitrogen deposition on fresh and marine waters in order to assess:

- the effectiveness of agreed international measures that could contribute to achieving the year 2010 objective of the OSPAR Strategy to Combat Eutrophication; and
- whether there is a need for any additional measures.

These data should be compiled in close cooperation with EMEP and the relevant OSPAR working groups.

## **8. REFERENCES**

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## **ANNEX 1: IMPLEMENTATION REPORTS FROM BELGIUM, DENMARK, GERMANY, THE NETHERLANDS, NORWAY, SWEDEN AND SWITZERLAND**

The reduction of 50% of the nutrient load (i.e. inputs) to Convention Waters concern nutrients from human activities (the anthropogenic load) and nutrients both discharged to water and emitted to air should be taken into account. However, discharges to water and emissions to air are not additive and should be reported separately. For the purpose of this report, the background losses of nutrients are defined in draft HARP Guideline 6.

## Implementation reporting from BELGIUM for PARCOM Recommendation 88/2

### 1. Surface waters - Maritime Area - catchments

Country: Belgium	Please answer yes or no to the following questions
Is your country committed to the 50% reduction target?	Yes
If yes, Are the figures given based on:	
1. Nutrient discharges/losses into surface waters:	Yes
2. Nutrient inputs to the Maritime Area:	No
Are the national reporting procedures based on a catchment area approach?	Yes

### 2. Nitrogen loads

Discharges/losses into water (GL=HARP Guideline) from:	Tonnes Nitrogen			% reduction in nitrogen discharges/losses between	
	1985	1995	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2)*	0	0	84	*	*
Industry (GL 3) **	29280	18000	5728	39	80
Sewage Treatment (GL 4) ***	31960	28250	30614	12	4
Not Connected Households (GL 5)					
<b>Point Sources Total</b>	<b>61240</b>	<b>46250</b>	<b>36426</b>	<b>24</b>	<b>41</b>
Agriculture (GL 6)	39580	<35350	45560	11	- 15
Atmospheric deposition on fresh water systems (GL 6)					
Natural Background Losses (GL 6)					
<b>Diffuse Sources Total (GL 6)</b>	<b>39580</b>	<b>&lt;35350</b>	<b>45560</b>	<b>11</b>	<b>- 15</b>
<b>GRAND TOTAL</b>	<b>100820</b>	<b>&lt;81600</b>	<b>81902</b>	<b>19</b>	<b>19</b>

\* Figures were considered negligible in 1985 and 1995. Therefore the 2000 figure is not taken into account in the totals (in conformity with the procedure used for the Fifth North Sea Conference reporting).

\*\* Figures concerning ALL industries.

\*\*\* Figures covering ONLY households.

### 3. Phosphorus loads

Discharges/losses into water (GL=HARP Guideline) from:	Tonnes Phosphorus			% reduction in phosphorus discharges/losses between	
	1985	1995	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2) *	0	0	14	*	*
Industry (GL 3) **	5460	3370	797	38	85
Sewage Treatment (GL 4) ***	9870	4810	4319	51	56
Not Connected Households (GL 5)					
<b>Point Sources Total</b>	<b>15330</b>	<b>8180</b>	<b>5130</b>	<b>47</b>	<b>67</b>
Agriculture (GL 6)	2470	<1680	2313	32	6
Atmospheric deposition on fresh water systems (GL 6)					
Natural Background Losses (GL 6)					
<b>Diffuse Sources Total (GL 6)</b>	<b>2470</b>	<b>&lt;1680</b>	<b>2313</b>	<b>32</b>	<b>6</b>
<b>GRAND TOTAL</b>	<b>17800</b>	<b>&lt;9860</b>	<b>7429</b>	<b>45</b>	<b>58</b>

\* Figures were considered negligible in 85 and 95. Therefore the 2000 figure is not taken into account in the totals (in conformity with the procedure used for the Fifth North Sea Conference reporting).

\*\* Figures concerning ALL industries.

\*\*\* Figures covering ONLY households.

## Implementation reporting from DENMARK for PARCOM Recommendation 88/2

### 1. Surface waters - Maritime Area - catchments

Country: Denmark	Please answer yes or no to the following questions
Is your country committed to the 50% reduction target?	Yes
If yes, Are the figures given based on:	
1. Nutrient discharges/losses into surface waters:	Yes
2. Nutrient inputs to the Maritime Area:	No
Are the national reporting procedures based on a catchment area approach?	Yes

### 2. Nitrogen loads

Discharges/losses into water (GL=HARP Guideline) from:	Tonnes Nitrogen			% reduction in nitrogen discharges/losses between	
	1985	1995	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2)	2351*	NI	1106*	NI	53
Industry (GL 3)	3200	NI	484	NI	85
Sewage Treatment (GL 4)	10000	NI	1981	NI	80
Not Connected Households (GL 5)	NI	NI	1254	NI	NI
<b>Point Sources Total</b>	<b>15551</b>	<b>0</b>	<b>4825</b>	<b>0</b>	<b>69</b>
Agriculture (GL 6)	59600	NI	38167	NI	36
Atmospheric deposition on fresh water systems (GL 6)					
Natural Background Losses (GL 6)					
<b>Diffuse Sources Total (GL 6)</b>	<b>59600</b>	<b>NI</b>	<b>38167</b>	<b>NI</b>	<b>36</b>
<b>GRAND TOTAL</b>	<b>75151</b>	<b>NI</b>	<b>42992</b>	<b>NI</b>	<b>43</b>

### 3. Phosphorus loads

Discharges/losses into water (GL=HARP-Guideline) from:	Tonnes Phosphorus			% reduction in phosphorus discharges/losses between	
	1985	1995	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2)	275*	NI	85*	NI	69
Industry (GL 3)	3100	NI	38	NI	99
Sewage Treatment (GL 4)	1900	NI	207	NI	89
Not Connected Households (GL 5)	NI	NI	288	NI	NI
<b>Point Sources Total</b>	<b>5275</b>	<b>NI</b>	<b>618</b>	<b>0</b>	<b>88</b>
Agriculture (GL 6)	600	NI	987	NI	- 65
Atmospheric deposition on fresh water systems (GL 6)					
Natural Background Losses (GL 6)					
<b>Diffuse Sources Total (GL 6)</b>	<b>600</b>	<b>NI</b>	<b>987</b>	<b>NI</b>	<b>- 65</b>
<b>GRAND TOTAL</b>	<b>5875</b>	<b>NI</b>	<b>1605</b>	<b>NI</b>	<b>73</b>

\* Figures for both freshwater and marine aquaculture for the whole of Denmark. Table 7 shows marine figures to the OSPAR area only.

## Implementation reporting from GERMANY for PARCOM Recommendation 88/2

### 1. Surface waters - Maritime Area - catchments

Country: Germany	Please answer yes or no to the following questions
Is your country committed to the 50% reduction target?	Yes
If yes, Are the figures given based on:	
1. Nutrient discharges/losses into surface waters:	Yes
2. Nutrient inputs to the Maritime Area:	No
Are the national reporting procedures based on a catchment area approach?	Yes

### 2. Nitrogen loads

Discharges/losses into water (GL=HARP-Guideline) from:	Tonnes Nitrogen			% reduction in nitrogen discharges/losses between	
	1985	1995	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2)*	0	0	0	-	-
Industry (GL 3)	122200	25100	25100	79	79
Sewage Treatment (GL 4)	245500	166300	119700	32	51
Not Connected Households (GL 5)	31800	20900	20700	34	35
<b>Point Sources Total</b>	<b>399500</b>	<b>212300</b>	<b>165500</b>	<b>47</b>	<b>59</b>
Agriculture (GL 6)	354400	317200	297000	10	16
Atmospheric deposition on fresh water systems (GL 6)	9800	7300	7300	26	26
Natural Background Losses (GL 6)	74600	74600	74600	-	-
<b>Diffuse Sources Total (GL 6)</b>	<b>438800</b>	<b>399100</b>	<b>378900</b>	<b>11**</b>	<b>16**</b>
<b>GRAND TOTAL</b>	<b>838300</b>	<b>611400</b>	<b>544400</b>	<b>30**</b>	<b>38**</b>

\*: No discharge to marine waters, no information for freshwater.

\*\* : Calculations based on anthropogenic load only.

### 3. Phosphorus loads

Discharges/losses into water (GL=HARP-Guideline) from:	Tonnes Phosphorus			% reduction in phosphorus discharges/losses between	
	1985	1995	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2)*	0	0	0	-	-
Industry (GL 3)	6146	1104	1104	82	82
Sewage Treatment (GL 4)	46858	9242	8139	80	83
Not Connected Households (GL 5)	6854	2842	2832	59	59
<b>Point Sources Total</b>	<b>59858</b>	<b>13188</b>	<b>12075</b>	<b>78</b>	<b>80</b>
Agriculture (GL 6)	13283	13171	12785	1	4
Atmospheric deposition on fresh water systems (GL 6)	224	158	158	29	29
Natural Background Losses (GL 6)	2400	2400	2400	-	-
<b>Diffuse Sources Total (GL 6)</b>	<b>15907</b>	<b>15729</b>	<b>15343</b>	<b>1**</b>	<b>4**</b>
<b>GRAND TOTAL</b>	<b>75765</b>	<b>28917</b>	<b>27418</b>	<b>64**</b>	<b>66**</b>

\*: No discharge to marine waters, no information for freshwater.

\*\* : Calculations based on anthropogenic load only.

## Implementation reporting from THE NETHERLANDS for PARCOM Recommendation 88/2

### 1. Surface waters - Maritime Area - catchments

Country: The Netherlands	Please answer yes or no to the following questions
Is your country committed to the 50% reduction target? If yes, Are the figures given based on: 1. Nutrient discharges/losses into surface waters: 2. Nutrient inputs to the Maritime Area: Are the national reporting procedures based on a catchment area approach?	Yes  Yes No The Dutch emission inventory procedures have been adjusted to a catchment area approach, so the data stored in information systems are detailed enough to report on the catchments of Rhine, Meuse, Scheldt and Ems. However, for OSPAR measures we normally report for The Netherlands as a whole, as all the catchments finally end up in the North Sea. Moreover, the reduction target (and the related measures) is applicable for the whole area.

### 2. Nitrogen loads

Discharges/losses into water (GL=HARP-Guideline) from:	Tonnes Nitrogen			% reduction in nitrogen discharges/losses between	
	1985	1995	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2)	0		0		
Industry (GL 3)	19529		3990		80
Sewage Treatment (GL 4)	38410		28959		25
Not Connected Households (GL 5)	8481		601		93
<b>Point Sources Total</b>	<b>66420</b>		<b>33550</b>		<b>50</b>
Agriculture (GL 6) <sup>6</sup>	76380		75600		-1
Atmospheric deposition on fresh water systems (GL 6)	23000		5264		77
Natural Background Losses (GL 6) <sup>7</sup>					
<b>Diffuse Sources Total (GL 6)</b>	<b>99380</b>		<b>80864</b>		<b>19</b>
<b>GRAND TOTAL</b>	<b>165800</b>		<b>114414</b>		<b>31</b>

<sup>6</sup> The agriculture data include two types of discharges: Estimations for leaching/run-off; these include background loads not originating from agriculture, i.e. leaching out of peat, atmospheric deposition; a distinction in anthropogenic and non-anthropogenic cannot be made). Direct discharges due to loss of fertiliser to ditches and drainage water from greenhouses.

<sup>7</sup> The figures on agriculture comprise the (natural) background losses of nutrients.

### 3. Phosphorus loads

Discharges/losses into water (GL=HARP-Guideline) from:	Tonnes Phosphorus			% reduction in phosphorus discharges/losses between	
	1985	1995	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2)	0		0		
Industry (GL 3)	13422		1755		87
Sewage Treatment (GL 4)	10800		2846		74
Not Connected Households (GL 5)	1773		64		96
<b>Point Sources Total</b>	<b>25995</b>		<b>4665</b>		<b>82</b>
Agriculture (GL 6) <sup>8</sup>	4820		4210		13
Atmospheric deposition on fresh water systems (GL 6)	0		0		
Natural Background Losses (GL 6) <sup>9</sup>					
<b>Diffuse Sources Total (GL 6)</b>	<b>4820</b>		<b>4210</b>		<b>13</b>
<b>GRAND TOTAL</b>	<b>30615</b>		<b>8875</b>		<b>71</b>

<sup>8</sup> The agriculture data include two types of discharges: Estimations for leaching/run-off; these include background loads not originating from agriculture, i.e. leaching out of peat; a distinction in anthropogenic and non-anthropogenic cannot be made and direct discharges due to loss of fertiliser to ditches and drainage water from greenhouses.

<sup>9</sup> The figures on agriculture comprise the (natural) background losses of nutrients.

## Implementation reporting from NORWAY for PARCOM Recommendation 88/2

### 1. Surface waters - Maritime Area - catchments

Country: Norway	Please answer yes or no to the following questions
Is your country committed to the 50% reduction target?	Yes
If yes, Are the figures given based on:	
1. Nutrient discharges/losses into surface waters:	Yes
2. Nutrient inputs to the Maritime Area:	No
Are the national reporting procedures based on a catchment area approach?	Yes

### 2. Nitrogen loads

Discharges/losses into water (GL=HARP-Guideline) from:	Tonnes Nitrogen			% reduction in nitrogen discharges/losses between	
	1985	1995	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2)	2	NI	49	NI	Increased
Industry (GL 3)	5796	NI	1562	NI	73
Sewage Treatment (GL 4)	10510	NI	6688	NI	36
Not Connected Households (GL 5)	1779	NI	1299	NI	27
<b>Point Sources Total</b>	<b>18085</b>	<b>NI</b>	<b>9598</b>	<b>NI</b>	<b>47</b>
Agriculture (GL 6)	16992	NI	13554	NI	21
Atmospheric deposition on fresh water systems (GL 6)					
Natural Background Losses (GL 6)					
<b>Diffuse Sources Total (GL 6)</b>	<b>16992</b>	<b>NI</b>	<b>13554</b>	<b>NI</b>	<b>21</b>
<b>GRAND TOTAL</b>	<b>35077</b>	<b>NI</b>	<b>23152</b>	<b>NI</b>	<b>34</b>

### 3. Phosphorus loads

Discharges/losses into water (GL=HARP-Guideline) from:	Tonnes Phosphorus			% reduction in phosphorus discharges/losses between	
	1985	1995	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2)	0.3	NI	10	NI	Increase
Industry (GL 3)	164	NI	102	NI	38
Sewage Treatment (GL 4)	964	NI	134	NI	86
Not Connected Households (GL 5)	271	NI	121	NI	55
<b>Point Sources Total</b>	<b>1399</b>	<b>NI</b>	<b>367</b>	<b>0</b>	<b>74</b>
Agriculture (GL 6)	454	NI	326	NI	28
Atmospheric deposition on fresh water systems (GL 6)					
Natural Background Losses (GL 6)					
<b>Diffuse Sources Total (GL 6)</b>		<b>NI</b>		<b>NI</b>	
<b>GRAND TOTAL</b>	<b>1853</b>	<b>NI</b>	<b>693</b>	<b>NI</b>	<b>62</b>

## Implementation reporting from SWEDEN for PARCOM Recommendation 88/2

### 1. Surface waters - Maritime Area - catchments

Country: Sweden	Please answer yes or no to the following questions
Is your country committed to the 50% reduction target?	Yes
If yes, Are the figures given based on:	
1. Nutrient discharges/losses into surface waters:	Yes
2. Nutrient inputs to the Maritime Area:	Yes
Are the national reporting procedures based on a catchment area approach?	Yes

### 2. Nitrogen loads

Discharges/losses into water (GL=HARP-Guideline) from:	Tonnes Nitrogen			% reduction in nitrogen discharges/losses between	
	1985	1995	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2)	76	64	62	16	19
Industry (GL 3)	1 170	980	855	16	27
Sewage Treatment (GL 4)	9 200	6 800	5 450	26	41
Not Connected Households (GL 5)	3 300	2 800	2 000	15	39
<b>Point Sources Total</b>	<b>13 750</b>	<b>10 640</b>	<b>8 370</b>	<b>23</b>	<b>39</b>
Agriculture (GL 6)	12 100	9 100	9 000	25	26
Atmospheric deposition on fresh water systems (GL 6)	5 560	4 900	5 400	12	3
Natural Background Losses (GL 6)	11 500	11 500	11 500	0	0
<b>Diffuse Sources Total (GL 6)</b>	<b>29 160</b>	<b>25 500</b>	<b>25 900</b>		
<b>GRAND TOTAL</b>	<b>42910</b>	<b>36 140</b>	<b>34 270</b>	<b>22**</b>	<b>28**</b>

\*\* : Calculations based on anthropogenic load only.

### 3. Phosphorus loads

Discharges/losses into water (GL=HARP-Guideline) from:	Tonnes Phosphorus			% reduction in phosphorus discharges/losses between	
	1985	1995	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2)	10	9	9	10	10
Industry (GL 3)	118	95	88	19	25
Sewage Treatment (GL 4)	262	190	157	28	40
Not Connected Households (GL 5)	216	200	143	7	34
<b>Point Sources Total</b>	<b>605</b>	<b>495</b>	<b>395</b>	<b>18</b>	<b>48</b>
Agriculture (GL 6)	390	270	260	31	33
Atmospheric deposition on fresh water systems (GL 6)	see below	see below	**		**
Natural Background Losses (GL 6)	510	510	510	0	0
<b>Diffuse Sources Total (GL 6)</b>	<b>900</b>	<b>780</b>	<b>770</b>	<b>13</b>	<b>14</b>
<b>GRAND TOTAL</b>	<b>1 505</b>	<b>1 275</b>	<b>1 165</b>	<b>23 <sup>1)</sup></b>	<b>34 <sup>1)</sup></b>

\*\* : Combined figures.

1) Calculations based on anthropogenic load only.

## Implementation reporting from SWITZERLAND for PARCOM Recommendation 88/2

### 1. Surface waters - Maritime Area - catchments

Country: Switzerland	Please answer yes or no to the following questions
Is your country committed to the 50% reduction target?	Yes
If yes, Are the figures given based on:	
1. Nutrient discharges/losses into surface waters:	Yes
2. Nutrient inputs to the Maritime Area:	No
Are the national reporting procedures based on a catchment area approach?	Yes

### 2. Nitrogen loads

Discharges/losses into water (GL=HARP-Guideline) from:	Tonnes Nitrogen			% reduction in nitrogen discharges/losses between	
	1985	1995**	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2)	NI*	30	30	NI	NI
Industry (GL 3)	1000	<1000	800	NI	20
Sewage Treatment (GL 4)	18000	14300	12300	21	32
Not Connected Households (GL 5)	1000	100	100	90	90
<b>Point Sources Total</b>	<b>20000</b>	<b>&lt;15430</b>	<b>13230</b>	<b>NI</b>	<b>34</b>
Agriculture (GL 6) and Atmospheric deposition on fresh water systems (GL 6)	14490	13173	***11881	9	18
Natural Background Losses (GL 6)					
<b>Diffuse Sources Total (GL 6)</b>	<b>14490</b>	<b>13173</b>	<b>***11881</b>	<b>9</b>	<b>18</b>
<b>GRAND TOTAL</b>	<b>34490</b>	<b>&lt;28603</b>	<b>25111</b>	<b>NI</b>	<b>27</b>

\*: No data is available from 1985.

\*\*: 1996 data.

\*\*\*: 2001 data

### 3. Phosphorus loads per country

Discharges/losses into water (GL=HARP-Guideline) from:	Tonnes Phosphorus			% reduction in phosphorus discharges/losses between	
	1985	1995**	2000	1985 and 1995	1985 and 2000
Aquaculture (GL 2) *	NI	3	3	NI	NI
Industry (GL 3)	153	35	20	77	87
Sewage Treatment (GL 4)	2300	900	900	61	61
Not Connected Households (GL 5)	250	10	10	96	96
<b>Point Sources Total</b>	<b>2703</b>	<b>948</b>	<b>933</b>	<b>65</b>	<b>65</b>
Agriculture (GL 6)	361	236	***207	35	43
Atmospheric deposition on fresh water systems (GL 6)					
Natural Background Losses (GL 6)					
<b>Diffuse Sources Total (GL 6)</b>	<b>361</b>	<b>236</b>	<b>***207</b>	<b>35</b>	<b>43</b>
<b>GRAND TOTAL</b>	<b>3064</b>	<b>1184</b>	<b>1140</b>	<b>61</b>	<b>63</b>

\*: No data is available from 1985.

\*\*: 1996 data.

\*\*\*: 2001 data.

## **ANNEX 2: OVERVIEW OF NATIONAL ACTION PLANS TO ACHIEVE THE 50% REDUCTION TARGET ON NUTRIENTS; PARCOM RECOMMENDATION 89/4**

### **SUMMARY**

This overview of national action plans, as required under PARCOM Recommendation 89/4 on a Co-ordinated Programme for the Reduction of Nutrients, represents an update of the overview established in 1998/1999 and published by OSPAR in 2001.

Based on data from 1985 and 2000, no OSPAR Contracting Party committed to the 50% reduction in nutrient inputs has reached the 50% reduction target on nitrogen losses/discharges from sources in areas draining into defined problem areas. Germany and Denmark achieved a reduction of 38 and 43% respectively. The report from France was insufficient to allow an assessment of its progress towards achieving the 50% reduction target.

Based on data from 1985 and 2000, Belgium, Denmark, Germany, the Netherlands, Norway and Switzerland have all reached the 50% reduction target on phosphorus between 1985 and 2000 from sources in areas draining into their nationally defined problem areas. Sweden's discharges/losses of phosphorus were reduced by about 34% between 1985 and 2000. Based on measures taken before the base year 1985, Sweden is considered to have reached the 50% reduction target for phosphorus. The report from France was insufficient to allow an assessment of its progress towards achieving the 50% reduction target.

Among the Contracting Parties that have identified problem areas and committed themselves to reach the 50% reduction target by the year 1995 according to PARCOM Recommendation 88/2, only the Netherlands have indicated when the 50% reduction target for nitrogen can be reached, viz. 2010. This year which concurs with the target date of the Strategy to Combat Eutrophication for obtaining 'no occurrence of eutrophication in marine waters'. Sweden plans to comply with the 1988 commitment within one generation (2020).

Several measures to reduce nitrogen discharges, losses and inputs have been implemented as a follow up of international obligations or national initiatives, but plans how to reach the 50% reduction target seem to be, for several countries, less developed or not revised after 1995.

The national reports should be seen in conjunction with the Strategy to Combat Eutrophication which, *inter alia*, says that the Commission should achieve, by the year 2010, a healthy marine environment where eutrophication does not occur.

### **1. INTRODUCTION**

The OSPAR Action Plan 1998-2003 (cf. OSPAR 98/14/1-(A-B), Annex 38) states, *inter alia*:

#### **“5.2.2 Development and implementation of measures to combat eutrophication**

30. The Commission will, as a matter of priority:

- a. review the implementation of, and reporting on PARCOM Recommendation 88/2 on the Reduction in Inputs of Nutrients to the Paris Convention Area;
- c. review the implementation of, and the reporting on, any national or international measures as adopted by individual Contracting Parties for the reduction of nutrients in discharges and emissions from industry, sewage treatment plants, agriculture and other diffuse sources.

30. The Commission will initiate the following actions in the period up to the year 2000:

- a. evaluation by the year 1999 of the experiences gained and the results achieved with the OSPAR Strategy to Combat Eutrophication (e.g. in the light of the ongoing activities to fulfil the 50% reduction target) by the combined use of information from monitoring, research and modelling against a set of assessment criteria.....”

The OSPAR Strategy to Combat Eutrophication calls for a wide range of quantification and assessments of nutrient discharges, losses and inputs and their links to already implemented and planned measures, such as:

- to achieve by the year 2010 a healthy environment where eutrophication does not occur.
- to achieve, by the year 2000, an evaluation of the situation in the maritime area that is expected following the implementation of agreed measures.
- to achieve by the year 2002 the agreement on any additional programmes and measures deemed necessary to achieve by 2010 a healthy marine environment where eutrophication does not occur, including, as appropriate, further intermediate targets for specific areas and the development of ecological quality objectives.
- priority shall be given to, *inter alia* .....development of appropriate reporting procedure:
  - quantification of the various sources of nutrients (e.g. by sector, sub-catchment, catchment, region, nation and/or other relevant subdivision; and
  - the establishment of the direct link between the various sources of nutrients and any eutrophication problems, and hence the significance of those sources
  - in areas from which nutrient inputs are likely, directly or indirectly, to contribute to inputs into problem areas with regard to eutrophication, *inter alia*, the following requirements should be carried out:
    - the implementation of PARCOM Recommendation 88/2 on the Reduction in Inputs of Nutrients to the Paris Convention Area
    - the implementation of PARCOM Recommendation 89/4 on a Co-ordinated Programme for the Reduction of nutrients
    - the implementation of PARCOM Recommendation 92/7 on the reduction of nutrients inputs from agriculture into areas where these inputs are likely, directly or indirectly, to cause pollution.

The implementation of the above mentioned approaches should provide the answers to the various needs for quantification and assessments of nutrient discharges, losses and inputs and their links to already implemented and planned measures in the Strategy to Combat Eutrophication.

Annex 3 lists the information provided by Contracting Parties on their national implementation of PARCOM Recommendation 89/4.

## **2. WHEN AND HOW WILL THE 50% REDUCTION TARGET ON NITROGEN BE REACHED?**

Table 1 provides an overview of the various countries' considerations as to when they expect to reach the 50% reduction target on nutrients.

**Table 1:** Information about when the 50% reduction target on nitrogen will be reached

Country	Date for reaching the 50% reduction target on nitrogen
Belgium	No date given. A 19% reduction, between 1985 and 1995, for Nitrogen was achieved and reported accordingly to the Fifth North Sea Conference. The deadlines foreseen in the Nitrates Directive (91/676/EEC) and on the Directive on Wastewater (91/271/EEC) are, by definition, applicable. The operation of the Brussels North WWTP, by 2006, will have a strong mitigating impact on the nutrient pollution.
Denmark	No date given. Since the mid 1980s, a number of action plans and strategies have been adopted by the Danish Parliament. The existing measures and targets under the Action Plan on the Aquatic Environment I and the Action Plan for Sustainable Agriculture were re-evaluated in 1998 in connection with the preparation of the Action Plan on the Aquatic Environment II. Not all the measures in the Action Plan on the Aquatic Environment II will have taken full effect by 2003. The Action Plan on the Aquatic Environment II also encompasses regional measures. An Action Plan III on the Aquatic Environment is on the programme of the Danish Government. It is planned for negotiation in 2003.
France	No information.
Germany	No date given. It is intended to reach the agreed reduction target for nitrogen by a set of measures in the relevant sectors as listed under item 3. A forecast by when the 50% reduction target will be achieved appears not to be possible since this is to a large extent dependent on the varying residence times of nitrogen in the soils, which may also depend on the amounts of precipitation.
The Netherlands	In the fourth national policy document on water management (1997), it is stated that the nitrogen load on sea and coastal waters will be further reduced. The reduction will be achieved mainly by measures in the agricultural sector. If the present fixed/agreed policy measures will all have been implemented, the overall reduction achieved in 2010 will be 47%. A reduction of about 50% compared to 1985 can be expected to be reached in 2010 if additional measures for the agricultural sector will be implemented. The indicated rather slow process of achieving reductions in the field is due to residual effects of past fertilisation due to soil processes.
Norway	No date given. Norway is committed to reaching the OSPAR 50% reduction target for anthropogenic nitrogen input to the Norwegian coast from the Swedish border to the southernmost part of Norway, Lindesnes. At present Norway focuses on the implementation of the Urban Waste Water Directive and the Nitrates Directive in prioritised catchments draining to the Oslofjord region. Action plans on how/when to reach the 50% reduction target have not been revised since 1995. The inner Oslofjord and Hvaler/Singlefjorden area are defined as Sensitive Areas according to the Urban Waste Water Directive and the land areas draining these areas as Vulnerable Zones according to the Nitrates Directive.
Sweden	Reconstruction of municipal sewage treatment plants and measures taken within the agricultural sector, in combination with the implementation of the WFD that focuses on a good water status in the coastal waters, will result in a reduction in the order of 40% by 2010. The 1988 commitment will be fulfilled within one generation (2020).
Switzerland	No date given.  Between 1994 and 1996 a task force set up by the Head of the Ministry of Home Affairs and the Head of the Ministry of Economics worked out a strategy aimed at solving the environmental problems caused in Switzerland by the emissions of harmful nitrogen compounds. The strategy includes measures in the source sectors agriculture, transport and combustion processes and wastewater treatment. Measures to be taken in agriculture are most cost-effective. Details about measures in the different sectors c.f. Annex 3.  The implementation of the proposed strategy is ongoing. It is expected that with the full implementation of the strategy a further reduction of 20% of the total emissions of nitrogen compounds into the environment can be reached until the end of 2005. In applying the strategy nitrogen inputs into surface waters in the Rhine catchment area can be reduced by about further 15% in the same time frame.  At present it is not possible to indicate the year when it is expected that the 50% reduction target for inputs of Nitrogen into surface waters will be fully achieved.

Among the Contracting Parties that have identified problem areas and committed themselves to reach the 50% reduction target by the year 1995 according to PARCOM Recommendation 88/2, only the Netherlands and Sweden have indicated when the 50% reduction target for nitrogen will be reached, years 2010 and 2020 respectively.

The national reports contain information on various measures that have been implemented, are being implemented or are planned to be implemented due to international obligations or national regulations on the reduction of nutrient discharge, loss and input. The reports contain limited information on the existence of plans designed in order to obtain the 50% reduction, which indicate that plans on how to reach the 50% reduction target are less developed or not revised after 1995.

The information outlined in Table 1 should be seen in conjunction with the Strategy to Combat Eutrophication which, *inter alia*, states that the OSPAR Commission should achieve, by the year 2010, a healthy marine environment where eutrophication does not occur. Furthermore, it should be recalled that Contracting Parties that have identified problem areas, according to PARCOM Recommendation 88/2, committed themselves to reach the 50% reduction target by the year 1995. *It is therefore a matter of concern that no country has to date reached the 50% reduction target, and only the Netherlands have indicated a date when the 50% reduction target for nitrogen will be reached concurring with the target date of the Strategy to Combat Eutrophication for obtaining 'no occurrence of eutrophication in marine waters' (Sweden plans to comply with the 1988 commitment on nitrogen within one generation (2020)).*

From the foregoing it may be appropriate to analyse in the future the link between the necessary reductions in inputs of nutrients and the state of the receiving marine areas (bearing in mind that the Strategy to Combat Eutrophication has a target date of 2010 for obtaining 'no occurrence of eutrophication in marine waters'), as well as and the means for reaching the target.

### 3. MEASURES ON A SECTOR BY SECTOR BASIS

Section 3 of the National Action Plans to reduce nutrient inputs lists the measures, on a sector by sector basis, the respective countries have implemented since 1995 or plan to implement (cf. national reports in Annex 3 for details).

Belgium has implemented or plans to implement measures in all sectors listed, i.e. agriculture, sewage, aquaculture, industry and forestry.

Denmark has implemented or plans to implement measures in all sectors listed, i.e. agriculture, sewage, aquaculture, industry and forestry, and has provided extensive details about these measures.

Germany intends to reach the reductions by implementing specific European Community Directives, Federal Water Act and various national Ordinances on the different sectors. Detailed information about the measures and the relevant sectors is in the national report of Germany.

The Netherlands have provided information about measures within the agriculture industry and sewage sectors. The reduction in nitrogen will be achieved mainly by measures within the agricultural sector.

Norway has provided information about measures within the agriculture, sewage, industry and aquaculture sectors. No further measures are planned within forestry. Most of the measures to be implemented are linked to the agriculture sector.

Sweden has provided overall information about measures to be taken with all sectors. Furthermore, more detailed information has been provided about the measures within the agriculture sector. Report 4801. "Nitrogen from land to sea". Extracts from the main report.

Switzerland has provided information about already implemented and planned measures within all sectors.

#### 4. REASONS FOR NOT ACHIEVING THE 1988 COMMITMENT WITH REGARD TO NITROGEN

Country	Reasons
Belgium	No information
Denmark	The measures taken for the agriculture sector have shown not to be sufficient to meet the reduction target
France	No report
Germany	No information
The Netherlands	Delay in the nitrogen removal programme of sewage treatment plants Difficulties to develop and implement measures in the agricultural sector that result in a rapid reduction
Norway	The agreed reduction target for nitrogen has not been met due to uncertainty about the degree of contamination of the recipient and cost-benefit for meeting the reduction target. Norway will focus, the next few years, on monitoring surveys and the results of the surveys will be basis for further action plans in 2005. The measures for the agriculture sector have not been complete enough to meet the reduction target. Further measures are needed
Sweden	Remaining problems mainly within the agricultural sector.
Switzerland	No information

**ANNEX 3: INFORMATION PROVIDED BY CONTRACTING PARTIES ON THEIR NATIONAL  
IMPLEMENTATION OF PARCOM RECOMMENDATION 89/4**

## BELGIUM

### 1. National action plans to reduce nutrient inputs

Country: Belgium	Please answer yes or no to the following questions
<b>Are the national plans related to:</b> 1. Nutrient inputs to Surface Waters: 2. Nutrient inputs to the Maritime Area: <b>Do national procedures for estimating nutrient discharges take account of:</b> 3. Relevant procedures for calculating the discharges/emissions at source. Background and retention estimations? <b>Are the national procedures based on:</b> 4. A catchment area approach?	Yes Yes, indirectly  Yes Yes (Walloon Region) No (Flanders) It is foreseen in the implementation of the Water Framework Directive and already in place in Flanders.

### 2. Fulfilment of the 1988 commitments

<b>Please describe HOW your country is going to reach the agreed reduction target for Phosphorus, and indicate the year WHEN it is expected that the reduction target for Phosphorus will be achieved:</b> A 58% reduction, between 1985 and 1995, for Phosphorus was achieved and reported accordingly to the Fifth North Sea Conference. Thus, the target is achieved. The operation of the Brussels North WWTP, by 2006, will have a strong mitigating impact on the nutrient pollution.
<b>Please describe HOW your country is going to reach the agreed reduction target for Nitrogen, and indicate the year WHEN it is expected that the reduction target for Nitrogen will be achieved:</b> A 19% reduction, between 1985 and 1995, for Nitrogen was achieved and reported accordingly to the Fifth North Sea Conference. The deadlines foreseen in the Nitrates Directive (91/676/EEC) and on the Directive on Wastewater (91/271/EEC) are, by definition, applicable. The operation of the Brussels North WWTP, by 2006, will have a strong mitigating impact on the nutrient pollution.

### 3. Measures on a sector by sector basis

Sector	Type of measures implemented since 1995 or planned to be implemented
Agriculture	In general for Belgium: Implementation of the European Directive (91/676/EEC) <i>Flanders:</i> <i>Walloon Region:</i> <ul style="list-style-type: none"> <li>- "Arrêté du Gouvernement wallon du 05/05/94 relatif à la protection des eaux contre la pollution par les nitrates à partir des sources agricoles" which defines a code of good agricultural practices. This piece of legislation will be replaced by the end of 2002 by a new one related to the sustainable management of nitrogen in agriculture.</li> <li>- Designation of 4 sensitive areas: "Crétacé de Hesbaye" and "Sables bruxelliens" in 1994, "Sud-Namurois" and "Mouscron-Comines" in 2001 ; designation of a "zone à contraintes environnementales particulières - Pays de Herve" in 2001.</li> <li>- Set up of mandatory action programmes in the sensitive areas and strongly suggested in the remaining of the Region.</li> <li>- Creation of a non-profit organisation (Nitrawal) whose aim is</li> </ul>

Sector	Type of measures implemented since 1995 or planned to be implemented
	<p>to accompany/guide farmers in their steps to protect the water resources from nitrate pollution.</p> <p><i>Brussels:</i> yes (arrêté du 19/11/98 du gouvernement de la RBC relatif à la protection des eaux contre la pollution par les nitrates à part des sources agricoles. (M.B. 29/01/99)</p> <p>There is only a marginal agricultural activity in the region and the legislator extended the scope of this legislation to the management of green areas (espaces verts).</p> <p>A code of good practice and an action programme were prepared.</p> <p>A sensitive zone was defined by the arrêté ministériel du 25 mai 1999.</p>
Sewage	<p>In general for Belgium: Implementation of the European Urban Waste Water Directive (91/271/EEC)</p> <p><i>Flanders:</i> the whole of Flanders was assigned as vulnerable area in 1995. All WWTP&gt;10000 p.e. have nutrient removal.</p> <p><i>Walloon Region:</i></p> <ul style="list-style-type: none"> <li>- designation of the whole of the region as vulnerable area since 17-02-2001.</li> <li>- Tertiary treatment of N &amp; P in all plants &gt; 10000 p.e. built after 1995. The others are being set in conformity with Directive 91/271/EC. In very vulnerable areas, a denitrification-dephosphatation (or other as appropriate) treatment can be envisaged for plants of less than 10 000 p.e.</li> <li>- Controls.</li> <li>- Monitoring of the performances of the plants.</li> <li>- Actions to avoid the dilution of waste waters (e.g. by disconnecting water-proof surfaces and clean /clear water from the sewerage system.</li> </ul> <p><i>Brussels:</i> yes (Arrêté du 23/03/94 from the regional government on the treatment of urban wastewater M.B. 05/05/94)</p> <p>This piece of legislation planned a sewerage and collection system by 31/12/98 but delay occurred and the South station was operational in 2000 and the North will be in 2006.</p> <p>The Senne basin has been designated as vulnerable area. So, only the rules applicable to these zones are mentioned in the legislation.</p> <p>Other provisions of the UWWT Directive are transposed by:</p> <ul style="list-style-type: none"> <li>- ordonnance du 05/06/97 relative aux permis d'environnement, executing the law of 26 March 1971 on the protection of surface water.</li> </ul>
Aquaculture	<p><i>Flanders:</i> not applicable</p> <p><i>Walloon Region:</i> A code of Good practices (voluntary measures) has been published in 1997.</p> <p><i>Brussels:</i> not concerned.</p>
Industry	<p>In general for Belgium: Implementation of the European Urban Waste Water Directive (91/271/EEC) and the IPPC Directive (96/61/EC)</p> <p><i>Flanders:</i> implementation of the Waste Water Directive and the IPPC Directive.</p> <p><i>Walloon Region:</i></p> <ul style="list-style-type: none"> <li>- Dumping authorisations and taxes on industrial waste waters.</li> <li>- Operationalisation of environmental permits.</li> <li>- Implementation of the IPPC Directive and of the related EPER Decision.</li> </ul>

Sector	Type of measures implemented since 1995 or planned to be implemented
	<i>Brussels</i> : IPPC is transposed. Already before IPPC, the region started a control programme on "IPPC enterprises".
Forestry	<i>Flanders</i> : not applicable <i>Walloon Region</i> : Nitrogen fertilisation is forbidden. <i>Brussels</i> : not relevant
Other	<i>Flanders</i> : - <i>Walloon Region</i> : - <i>Brussels</i> : -

#### 4. Main catchment areas

Catchment	Type of measures implemented <sup>2</sup> since 1995 or planned to be implemented <sup>3</sup>
	The catchment approach is foreseen in the Action Plan of the International Commissions for the Protection of the Scheldt and Meuse rivers. The link with the implementation of the European Water Framework Directive will be done through these two river basin Conventions.

#### 5. Coastal areas not included in the catchments

Area/region/catchment	Type of measures implemented since 1995 or planned to be implemented
	The Coastal area, as defined in the Water Framework Directive, will be included together in the river Scheldt Catchment for the purpose of the application of this Directive.

## DENMARK

### 1. National action plans to reduce nutrient inputs

Country: Denmark	Please answer yes or no to the following questions
<b>Are the national plans related to:</b>	
1. Nutrient inputs to surface waters:	Yes
2. Nutrient inputs to the Maritime Area:	Yes
<b>Do national procedures for estimating nutrient discharges take account of:</b>	
3. Relevant procedures for calculating the discharges/emissions at source.	Yes
Background and retention estimations?	Yes
<b>Are the national procedures based on:</b>	
4. A catchment area approach?	Yes

### 2. Fulfilment of the 1988 commitments

<p><b>Please describe HOW your country is going to reach the agreed reduction target for phosphorus, and indicate the year WHEN it is expected that the reduction target for phosphorus will be achieved:</b></p> <p>The reduction target for Phosphorus has been met mostly by establishment of tertiary treatment at most municipal waste water plans</p>
<p><b>Please describe HOW your country is going to reach the agreed reduction target for nitrogen, and indicate the year WHEN it is expected that the reduction target for nitrogen will be achieved:</b></p> <p>Since the mid 1980s, a number of action plans and strategies have been adopted by the Danish Parliament. The action plans include: The NPO (Nitrogen, phosphorus and organic matter) Action Plan (1985); The Action Plan against Pollution of the Danish Aquatic Environment with Nutrients (Action Plan on the Aquatic Environment) (1987); The Action Plan for Sustainable Agriculture (1991); Parts of the Government's 10-Point Program for Protection of the Groundwater and Drinking Water (1994); Follow-up on the Action Plan for Sustainable Agriculture (1996); and The Action Plan on the Aquatic Environment II (1998).</p> <p>The existing measures and targets under the Action Plan on the Aquatic Environment I and the Action Plan for Sustainable Agriculture were re-evaluated in 1998 in connection with the preparation of the Action Plan on the Aquatic Environment II. It was concluded that by the year 2003, the existing measures would reduce nitrogen loads by 89 900 tonnes N yr<sup>-1</sup>. Together with the expected reduction under the Action Plan on the Aquatic Environment II, it was concluded that nitrogen loads would be reduced by 127 000 tonnes N yr<sup>-1</sup> by 2003.</p> <p>Not all the measures in the Action Plan on the Aquatic Environment II will have taken full effect by 2003, however. The Action Plan on the Aquatic Environment II also encompasses so-called regional measures. These represent implementation of the recommendations of the Drinking Water Committee concerning the protection of groundwater resources considered particularly vulnerable to nitrate pollution.</p> <p>An Action Plan III on the Aquatic Environment is on the programme of the Danish Government and is planned to be negotiated in 2003. The parties behind Action Plan I and II have agreed that Action Plan III shall focus on:</p> <ul style="list-style-type: none"> <li>• The nitrogen balance of the Danish agricultural sector, in particular on the magnitude of the losses from Danish agriculture in the mid 80s which is the reference year.</li> <li>• General measures to reduce discharges and losses from the agricultural sector.</li> <li>• Losses of phosphorus from fields, which so far have been excluded from the action plans.</li> <li>• Possibilities to implement regional measures in order to protect specific regional waters.</li> </ul>

### 3. Measures on a sector by sector basis

Sector	Type of measures implemented since 1995 or planned to be implemented
Agriculture	<p>The reduction targets for nitrogen and phosphorus stipulated in the Action Plan on the Aquatic Environment I are an approximate a 50% reduction of nitrogen loads and the elimination of the phosphorus farmyard load to avoid unintended pollution of the aquatic environment. The reduction targets were to be attained by 1993 through the following measures carried out by the agricultural sector: establishment of sufficient capacity to store 9 months of manure production so that manure can be stored until the crop growth season begins, establishment of crop rotation and fertilisation plans to ensure that the nitrogen content of fertiliser is optimally exploited, fields must have green cover during the winter period, manure has to be ploughed in or in some other way deployed into the soil within 12 hours of application, and limits on the amount of livestock manure applied to fields.</p> <p>It soon became clear that it would not be possible to attain the reduction targets by 1993 (Ministry of Agriculture 1991). The measures stipulated in the Action Plan on the Aquatic Environment I was therefore tightened in 1991 in the Action Plan for Sustainable Agriculture. The reduction target was maintained but the time frame was extended to the year 2000. The measures were: fertilisation accounts so that fertiliser application can be documented; more stringent and fixed requirements on utilisation of the nitrogen content of livestock manure; all farms must establish sufficient capacity to store 9 months of manure production; and a ban on the application of liquid manure between harvest time and February except on fields cultivated with winter rape or grass. After the Action Plan for Sustainable Agriculture there have been a number of follow-up plans for reducing the impact of the agricultural sector on the aquatic environment, including the Government's 1994 10-Point Program for Protection of the Groundwater and Drinking Water in Denmark.</p> <p>The need to further tighten the regulation of agricultural loads of nitrogen has become even more necessary because Denmark must comply with the EU Nitrates Directive by the year 2003. The directive restricts the application of livestock manure to 170 kg N hectare<sup>-1</sup> yr<sup>-1</sup>. In the case of some types of farms this is less than the levels currently permitted. Denmark has sought permission to derogate from the 170 kg N hectare<sup>-1</sup> rule on cattle holdings so as to enable the application of up to 230 kg N hectare<sup>-1</sup> yr<sup>-1</sup> on a small number of these holdings.</p> <p>In February 1998, the Danish Parliament adopted several new instruments aimed at achieving the reduction targets stipulated in the Action Plan on the Aquatic Environment I: As a supplement to the Action Plan on the Aquatic Environment I, the Action Plan on the Aquatic Environment II will reduce nitrogen leaching by a further 37 000 tonnes N yr<sup>-1</sup> so as to enable the reduction target of 100 000 tonnes N yr<sup>-1</sup> to be achieved no later than the end of the year 2003 (Table 3.1.2). The following measures have been implemented under the Action Plan on the Aquatic Environment II:</p> <ul style="list-style-type: none"> <li>• re-establishment of 16 000 hectares of wet meadow to help reduce nitrogen leaching to the aquatic environment due to their ability to convert nitrate to N<sub>2</sub>;</li> <li>• agri-environmental measures which includes financial support to farmers willing to cultivate sensitive agricultural areas in a more environmentally sound manner, among other things by using less fertiliser or by completely refraining from cultivating the land. There has hitherto been very little interest in this scheme;</li> <li>• improved fodder utilisation and changes in feeding practice;</li> </ul>

Sector	Type of measures implemented since 1995 or planned to be implemented
	<ul style="list-style-type: none"> <li>• implementation of stricter harmony criteria governing livestock density;</li> <li>• stricter requirements on utilisation of the N content of livestock manure;</li> <li>• converting 170 000 hectares to organic farming; catch crops on a further 6% of a farmer's land; and</li> <li>• reducing the nitrogen norm by 10%, e.g. farmers may now only apply nitrogen in amounts corresponding to 90% of the economically optimal level.</li> </ul> <p>If the measures in the Action Plan on the Aquatic Environment II are implemented as changes in agricultural practice, 20 years of nitrate policy (1985-2003) is likely to result in a 100 000 tonnes N yr<sup>-1</sup> reduction in leaching from agricultural land. Moreover, nitrogen consumption in the form of commercial fertiliser will decrease from c. 400 000 tonnes N yr<sup>-1</sup> in 1985 to c. 200 000 tonnes N yr<sup>-1</sup> in 2003 (Iversen et al. 1998).</p> <p>In connection with the Action Plan on the Aquatic Environment I it was estimated that nitrogen loads could be reduced by a total of 127 000 tonnes N yr<sup>-1</sup> by 1993. The reduction targets were 100 000 tonnes N yr<sup>-1</sup> for the nitrogen load from fields and 27 000 tonnes N yr<sup>-1</sup> for the farmyard load. In the Action Plan for Sustainable Agriculture it was estimated that by the year 2000, the measures stipulated in the Action Plan on the Aquatic Environment I would only have reduced nitrogen loads by 50 000 tonnes N yr<sup>-1</sup> and that further measures were therefore needed to achieve the total reduction of 127 000 tonnes N yr<sup>-1</sup>.</p> <p>The existing measures and targets under the Action Plan on the Aquatic Environment I and the Action Plan for Sustainable Agriculture were re-evaluated in 1998 in connection with the preparation of the Action Plan on the Aquatic Environment II. It was concluded that by the year 2003, the existing measures would reduce nitrogen loads by 89 900 tonnes N yr<sup>-1</sup>. Together with the expected reduction under the Action Plan on the Aquatic Environment II, it was concluded that nitrogen loads would be reduced by 127 000 tonnes N yr<sup>-1</sup> by 2003.</p> <p>Not all the measures in the Action Plan on the Aquatic Environment II will have taken full effect by 2003, however. The Action Plan on the Aquatic Environment II also encompasses so-called regional measures. These represent implementation of the recommendations of the Drinking Water Committee concerning the protection of groundwater resources considered particularly vulnerable to nitrate pollution.</p>
Sewage	<p>Discharges from municipal wastewater treatment plants are regulated by the Environmental Protection Act, the Urban Wastewater Directive and derivative statutory orders and official guidelines.</p> <p>The EU Council Directive 91/271/EEC of 21 May 1991 concerning Urban Wastewater Treatment as amended by Commission Directive 98/15/EU of 27 February 1998 – commonly referred to as the Urban Wastewater Directive – is one of the most important legal documents in the EU legislation on the aquatic environment. The purpose of the directive is to protect the environment against the negative effects associated with the discharge of inadequately treated urban wastewater and discharges of biologically degradable industrial wastewater from enterprises within the food processing industry. According to the directive, wastewater discharges have to be subjected to a level of treatment appropriate to the environment at the place in question and the use to which the recipient water bodies in question are put. Denmark implemented the provisions of the directive in Danish legislation in 1994.</p> <p>The Action Plan on the Aquatic Environment's reduction targets for municipal wastewater treatment plants were adjusted in 1990 on the basis of</p>

Sector	Type of measures implemented since 1995 or planned to be implemented
	<p>the results of the Nation-wide Monitoring Program (Danish EPA, 1990). In the case of nitrogen, annual discharges in treated wastewater are to be reduced from c. 18 000 tonnes N to c. 6 600 tonnes N. Phosphorus discharges are to be reduced from c. 4 470 tonnes P to c. 1 220 tonnes P. The reduction in nitrogen discharges from municipal wastewater treatment plants corresponds to all new or upgraded plants exceeding 5 000 PE and all existing plants exceeding 1 000 PE having to implement biological treatment with nitrogen removal down to an annual average of 8 mg N l<sup>-1</sup>. In 1987 this was considered as low as it is practically possible to reach with biological nitrogen removal. As regards phosphorus, municipal wastewater treatment plants exceeding 5 000 PE have to remove phosphorus down to an annual average of 1,5 mg P l<sup>-1</sup>.</p> <p>The limits 8 mg N/l and 1,5 mg P/l was implemented by a statutory order from 1987. The reduction target for nitrogen of 6 600 tonnes N yr<sup>-1</sup> was achieved in 1996, as was the reduction target for phosphorus of 1 200 tonne P yr<sup>-1</sup>.</p>
Aquaculture	<p><i>Freshwater fish farms:</i> The Ministry of Environment issued the Statutory Order on Freshwater Fish Farms on 5 April 1989 to reduce nutrient loading. It gives guidelines for the county authorities to stipulate the maximal permitted feed consumption at fish farms, minimum requirements as to treatment measures as well as minimum requirements as to utilisation and quality of the feed.</p> <p><i>Mariculture (seawater-based fish farming):</i> In 1987 a moratorium was placed on the establishment of new farms and the expansion of existing farms until 1990 when Statutory Order No. 640 on mariculture was issued. This stipulated general regulations on feed quality and consumption as well as consumption of feed relative to production. In addition, upper limits were placed on nutrient discharges to the surrounding aquatic environment from each individual farm. In 1996 the Danish EPA requested the Counties not to issue any permits for new sea-based or land-based mariculture farms or for extensions of existing farms and were urged to assess whether environmental or operational benefits could be obtained by moving or merging existing farms. In June 2001 the 1996 request was lifted and the Danish EPA published a new strategy to reduce loads of nutrients and organic matter from mariculture. A revision of the existing Statutory Order is being negotiated and is expected to be implemented in 2003.</p>
Industry	<p>The Environmental Protection Act and the EU Directive on Pollution Prevention and Control (IPPC Directive) and derivative statutory orders and official guidelines regulate separate industrial discharges.</p> <p>The IPPC Directive aims at integrated prevention and control of pollution by major industries. The directive specifically regulates the energy industry (power stations and refineries, etc.), production and processing of metals, the mineral industry, the chemical industry, waste management plus a number of other activities such as paper manufacturers, textiles pre-treatment and dyeing, slaughterhouses and dairies, as well as installations for intensive rearing of poultry and pigs exceeding a certain capacity. The IPPC Directive contains measures designed to prevent or, where that is not practicable, to reduce emissions to the air, water and land from the above mentioned activities.</p> <p>Because of the large differences between the individual enterprises and their discharges of wastewater, the Action Plan on the Aquatic Environment I did not stipulate general discharge requirements for industry as for the wastewater treatment plants. Industry was to reduce its discharges through the application of BAT understood as the level of treatment that is technically</p>

Sector	Type of measures implemented since 1995 or planned to be implemented
	attainable and economically viable for the industry in question.
Forestry	One of the measures in Action Plan on the Aquatic Environment II was afforestation in Denmark and planting 20 000 hectares forest before the year 2002.
Other	<p><i>NOx emissions:</i> When the Action Plan on the Aquatic Environment was adopted in 1987, the Danish EPA was instructed to prepare a report containing a specific reduction program for power station NOx emissions. Regulation of NOx emissions in Denmark has concentrated on improved combustion technology and flue gas abatement at power stations (e.g. Statutory Order No. 885 of 18 December 1991 on Limitation of Emissions of Sulphur Dioxide and Nitrogen Oxides from Power Stations), enhanced use of natural gas and renewable energy (e.g. the Government's 1990 Energy Action Plan) as well as implementation of the requirement for catalytic converters on cars (e.g. Ministry of Justice Statutory Order on Detailed Regulations for the Motor Vehicle Design and Equipment from 1990). Under the EEC Convention on Transboundary Air Pollution, Denmark has entered into an international agreement to reduce emissions of NOx by 30% over the period 1986-98. However, the measures needed to meet this goal are inadequate in Europe as regards acidification and eutrophication. In June 1999, the EU Commission therefore issued proposals for two directives on acidification and ozone formation at ground level (Proposal for a Directive on National Emission Limits for Certain Polluting Substances and Proposal for a Directive on the Ozone Content of the Air). These two directives stipulate national limits for emissions of NH3 and NOx. In the case of Denmark, the proposed directives will limit ammonia (NH3) emissions to 71 000 tonnes per year and nitrogen oxide (NOx) emissions to 127 000 tonnes per year from 2010.</p> <p><i>Sparsely build areas:</i> The relative contribution of nutrients from sparsely built up areas has increased over the past 10 years because of the point source reductions from wastewater treatment plants and industry. It is expected that future improvements in the treatment of wastewater from sparsely built-up areas will occur resulting from initiatives in connection with the amendment of the Environmental Protection Act concerning wastewater treatment in rural areas (Ministry of Environment and Energy 1997). According to state instructions to the Counties concerning revision of the Regional Plans in 2001 (Ministry of Environment and Energy 1998), the County has specified the areas in which the treatment of wastewater from properties in rural areas is to be improved, they must stipulate quality objectives for the individual recipient waters in its Regional Plan, identify watercourses and lakes that are vulnerable to pollution, and based on its knowledge of the environmental state and pollution load on the individual recipient waters, has to assign each individual recipient a maximal environmentally permissible level of pollution.</p> <p><i>Stormwater outfalls:</i> Stormwater outfalls are one of the reasons that many watercourses and urban lakes as well as some coastal marine waters fail to meet the agreed quality objectives. Despite the increasing importance there is a lack of knowledge of how to manage stormwater outflows. Ongoing work by the Wastewater Committee under the Danish Engineering Association and the Danish EPA is intended to result in proposals for guidelines that can be incorporated in official EPA guidelines.</p>

**4. Reasons for not achieving the 1988 commitment with regard to nitrogen**

Please indicate the problems encountered:

The measures taken for the agriculture sector have shown not to be sufficient to meet the reduction target.
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**5. Main catchment areas**

Catchment	Type of measures implemented since 1995 or planned to be implemented
	Actions are implemented or planned to be implemented on a national basis (in all catchment areas and regions). In some regions more strict requirements are implemented in order to protect specific surface waters.

**6. Coastal areas not included in the catchments listed**

Area/region/catchment	Type of measures implemented since 1995 or planned to be implemented
	Actions are implemented or planned to be implemented on a national basis (in all catchment areas and regions).

## GERMANY

### 1. National action plans to reduce nutrient inputs

Country: Germany	Please answer yes or no to the following questions
<b>Are the national plans related to:</b> 1. Nutrient inputs to Surface Waters: 2. Nutrient inputs to the Maritime Area:	yes yes (cf. paragraph 1)
<b>Do national procedures for estimating nutrient discharges take account of:</b> 3. Relevant procedures for calculating the discharges/emissions at source. Background and retention estimations?	yes no <sup>2</sup>
<b>Are the national procedures based on:</b> 4. A catchment area approach?	yes

### 2. Fulfilment of the 1988 commitments

<b>Please describe HOW your country is going to reach the agreed reduction target for Phosphorus, and indicate the year WHEN it is expected that the reduction target for Phosphorus will be achieved:</b> Reduction target was reached in 1995 (see Progress Report 5. North Sea Conference).
<b>Please describe HOW your country is going to reach the agreed reduction target for Nitrogen, and indicate the year WHEN it is expected that the reduction target for Nitrogen will be achieved:</b> It is intended to reach the agreed reduction target for nitrogen by a set of measures in the relevant sectors as listed under item 3. A forecast by when the 50% reduction target will be achieved appears not to be possible since this is to a large extent dependent on the varying residence times of nitrogen in the soils, which may also depend on the amounts of precipitation.

### 3. Measures on a sector by sector basis

Sector	Type of measures implemented since 1995 or planned to be implemented
<b>Agriculture</b>	<ul style="list-style-type: none"> <li>• Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources</li> <li>• Fertiliser Ordinance</li> <li>• PARCOM Recommendation 92/7</li> </ul>
<b>Sewage</b>	<ul style="list-style-type: none"> <li>• Implementation of Council Directive 91/271/EEC concerning urban waste water treatment</li> </ul>
<b>Aquaculture</b>	<ul style="list-style-type: none"> <li>• Federal Water Act, § 7a applies</li> </ul>
<b>Industry</b>	<ul style="list-style-type: none"> <li>• Continued implementation of limit values for the discharges of nitrogen and phosphorus in nutrient relevant sectors of industry (food and animal feedstuffs industries, fertiliser production and organic chemistry)</li> </ul>
<b>Forestry</b>	<ul style="list-style-type: none"> <li>• Federal Water Act, § 7a applies</li> </ul>

<sup>2</sup> This is only done in such cases where riverine inputs need to be verified on the basis of discharges/ emissions at source.

Sector	Type of measures implemented since 1995 or planned to be implemented
<b>Other:</b> <b>- Traffic</b>	<ul style="list-style-type: none"> <li>• Council Directive 2001/27/EEC amending Council Directive 91/524/EEC and Directive 88/77/EEC on the approximation of the laws of the Member States relating to the measures to be taken against the emissions of gaseous pollutants from diesel engines for use in vehicles</li> <li>• Directive 2001/116/EC of the European Parliament and of the Council amending Directive 96/69/EC and Directive 70/220/EEC on the approximation of the laws of the Member States relating to measures to be taken against air pollution by emissions from motor vehicles</li> </ul>
<b>- Atmospheric emissions</b>	<ul style="list-style-type: none"> <li>• Council Directive 96/62/EC of September 1996 on Ambient Air Quality Assessment and Management</li> <li>• Council Directive 1999/30/EC of 22 April 2001 Relating to Limit Values for Sulphur Dioxide, Oxides of Nitrogen, Particulate Matter and Lead in Ambient Air</li> <li>• Protocol of 31 October 1988 on the Agreement of 1979 to Transboundary Air Pollution relevant to the combating of NO<sub>x</sub> Emissions or the Transboundary Flux, Novel 1991</li> <li>• Ordinance of Waste Incineration (17.BImSchV)</li> <li>• Ordinance on Large Combustion Plants (13.BImSchV)</li> <li>• Technical Instructions on Air Quality Control (TA Luft) and additional Decisions by the Federal Government/Federal States Pollution Control Committee</li> <li>• CO<sub>2</sub>-Reduction Programme</li> <li>• Ordinance on Small Combustion Installations (1. BImSchV)</li> <li>• Thermal Insulation Ordinance (Wärmeschutz-VO)</li> <li>• Council Directive 2001/80/EC of 23 October 2001 relating to the limitation of pollutant emissions from large combustion plants into the Air</li> </ul>

## THE NETHERLANDS

### 1. National action plans to reduce nutrient inputs

Country: The Netherlands	Please answer yes or no to the following questions
<b>Are the national plans related to:</b> 1. Nutrient discharges/losses into surface waters: 2. Nutrient inputs to the Maritime Area: <b>Do national procedures for estimating nutrient discharges take account of:</b> 3. Relevant procedures for calculating the discharges/emissions at source. Background and retention estimations?	Yes Yes Yes The estimations for leaching/run-off from agriculture include background loads not originating from agriculture (leaching out of peat, atmospheric deposition); the estimations take account of retention processes.
<b>Are the national procedures based on:</b> 4. A catchment area approach?	Yes, the procedures have been and partly still are being adapted to a catchment area approach. However, if the sea is concerned, normally the whole territory is taken into account, as all catchments end up in the sea. Moreover, the reduction target (and the related measures) is applicable for the whole area. Therefore, the tables 5 and 6 of the implementation format are not completed and included in the Dutch implementation report.

### 2. Fulfilment of the 1988 commitments

<b>Please describe HOW your country is going to reach the agreed reduction target for phosphorus, and indicate the year WHEN it is expected that the reduction target for phosphorus will be achieved:</b> The reduction target for phosphorus has been achieved.
<b>Please describe HOW your country is going to reach the agreed reduction target for nitrogen, and indicate the year WHEN it is expected that the reduction target for nitrogen will be achieved:</b> In the fourth national policy document on water management (1997), it is stated that the nitrogen load on sea and coastal waters will be further reduced. The reduction will be achieved mainly by measures in the agricultural sector. If the present fixed/agreed policy measures will all have been implemented, the overall reduction achieved in 2010 will be 47%. A reduction of about 50% compared to 1985 can be expected to be reached in 2010 if additional measures for the agricultural sector will be implemented. The indicated rather slow process of achieving reductions in the field is due to residual effects of past fertilisation due to soil processes.

### 3. Measures on a sector by sector basis

Sector	Type of measures implemented since 1995 or planned to be implemented
Agriculture	<p>In addition to and since the introduction of the mineral accounting system in 1998 and the other measures/actions indicated in the 1998 implementation report the following measures have been taken that lead to reduction in nutrient discharges/losses:</p> <ul style="list-style-type: none"> <li>• Decree on arable farming (open air) and livestock farming</li> <li>• General rules for greenhouses</li> <li>• More stringent standards for nutrient losses in 2003 (and, subject to further decisions of the new government, to strengthen the loss standards further in the 2003-2010 period).</li> </ul>
Sewage	<ul style="list-style-type: none"> <li>• the completion of the programme of nitrogen removal in sewage treatment plants (implementation of Decree on urban waste water)</li> <li>• the implementation of further measures to reduce discharges from sewage overflows (a.o. by shutting overflows and connecting them to sewage treatment systems)</li> <li>• the further implementation of measures related to scattered dwellings (e.g. by a Decree within the framework of the Soil Protection Act)</li> </ul>
Aquaculture	
Industry	(Further) implementation of fixed measures in company environmental plans and target group agreements
Forestry	

### 4. Reasons for not achieving the 1988 commitment with regard to nitrogen

Please indicate the problems encountered:

Delay in the nitrogen removal programme of sewage treatment plants
Difficulties to develop and implement measures in the agricultural sector that result in a rapid reduction

## NORWAY

### 1. National action plans to reduce nutrient inputs

Country: Norway	Please answer yes or no to the following questions
<b>Are the national plans related to:</b> 1. Nutrient discharges/losses into surface waters: 2. Nutrient inputs to the Maritime Area:	Yes
<b>Do national procedures for estimating nutrient discharges take account of:</b> 3. Relevant procedures for calculating the discharges/emissions at source. Background and retention estimations?	Yes
<b>Are the national procedures based on:</b> 4. A catchment area approach?	Yes

### 2. Fulfilment of the 1988 commitments

<b>Please describe HOW your country is going to reach the agreed reduction target for phosphorus, and indicate the year WHEN it is expected that the reduction target for phosphorus will be achieved:</b> The agreed reduction target for phosphorus has been met.
<b>Please describe HOW your country is going to reach the agreed reduction target for nitrogen, and indicate the year WHEN it is expected that the reduction target for nitrogen will be achieved:</b> Norway is committed to reach the OSPAR 50% reduction target for anthropogenic nitrogen inputs to the Norwegian coast from the Swedish border to the southernmost part of Norway; Lindesnes. At present Norway focuses on the implementation of the Urban Waste Water Directive and the "Nitrate Directive" in prioritised catchments draining to the Oslofjord region. Action plans on how/when to reach the 50% reduction target have not been revised since 1995. The inner Oslofjord and Hvaler/Singlefjorden area are defined as sensitive areas according to the Urban Waste Water Directive and the areas draining these areas as Vulnerable Zones according to the Nitrates Directive. Until 2003/2004, Norway focuses on monitoring surveys of sensitive areas according to the EU directives and the Norwegian parts of the OSPAR maritime area to which the comprehensive procedure will be applied (from the Swedish border to the southernmost part of Norway). The results from the surveys will form the basis for further action plans in 2005 according to defined sensitive areas.

### 3. Measures on a sector by sector basis

Sector	Type of measures implemented since 1995 or planned to be implemented
Agriculture	The implementation of planned measures has continued after 1995. Measures and means concerning soil tillage methods, incl. catch crops, and more efficient use of nutrients in plant production have been further developed. Incentives to stimulate more environmental farming such as ecological farming, making dams and vegetation strips and some technical measures favour the environment have been introduced. The measures are in accordance with the demand and recommendation in the Nitrate directive. A system is developed to estimate and evaluate the effects of means and measures. The aim is to ensure a cost-efficient policy and to form a basis for administrative decisions and dimensions of measures. A new assessment of the effects of actual measures combined with a revision of the methodology to calculate losses of nitrogen and phosphorus from the agricultural field based on data from monitoring surveys is being carried out in 2001.

Sector	Type of measures implemented since 1995 or planned to be implemented
Sewage	5 out of 6 planned WWTPs with efficient removal of nitrogen have been built. 5 of the WWTPs encompass catchment area 1, which encompass the eastern part of the Oslofjord, including the inner Oslofjord. The last WWTP with nitrogen removal has been built at the Skagerrak coast at Grimstad. A decision on further construction of WWTPs with nitrogen removal will be made in 2005.
Aquaculture	Norwegian aquaculture mainly takes place outside the Norwegian OSPAR problem area. On the Skagerrak coast, defined as OSPAR problem area with regard to eutrophication, there is a limit of 16 tonnes phosphorus and 100 tonnes of nitrogen from aquaculture. No new permits for aquaculture will be given within this area if the limits for P and N are exceeded. A new Norwegian standard, NS 9410 "Guidelines for environmental monitoring of marine fish farms", has been adopted. There is ongoing work for new regulations.
Industry	A WWTP with nitrogen removal has been build at one oil refinery in the Norwegian OSPAR problem area with regard to eutrophication.
Forestry	NMI
Other	NMI

#### 4. Reasons for not achieving the 1988 commitment with regard to nitrogen

The agreed reduction target for nitrogen has not been met due to uncertainty about the degree of contamination of the recipient and cost-benefit for meeting the reduction target. Norway will, the next few years, focus on monitoring surveys and the results of the surveys will be basis for further action plans in 2005. The EU directives on UWW and Nitrates define the inner Oslofjord and the Glomma estuary as sensitive areas (UWW Directive) and areas draining nitrogen from to these areas as vulnerable zones (Nitrates Directive). Actions to reduce nitrogen inputs are taken according to the Urban Waste Water Directive within the OSPAR problem area. The measures for the agriculture sector have not been complete enough to meet the reduction target. Further measures are needed.

#### 5. Main catchment areas

Catchment	Type of measures implemented since 1995 or planned to be implemented
Glomma	Priority is give to further implementation of measures in this drainage area to reduce input of nitrogen to the Maritime Area.
Drammenselva	
Numedalslågen	
Skienelva	
Otra	
Orreelva	
Orkla	
Vefsna	
Suldalslågen	
Alta	

#### 6. Coastal areas not included in the catchments listed in Table 5

Area/region/catchment	Type of measures implemented since 1995 or planned to be implemented
Not applicable	

## SWEDEN

### 1. National action plans to reduce nutrient inputs

Country: Sweden	Please answer yes or no to the following questions
<b>Are the national plans related to:</b>	
1. Nutrient discharges/losses into surface waters:	Yes
2. Nutrient inputs to the Maritime Area:	Yes
<b>Do national procedures for estimating nutrient discharges take account of:</b>	
3. Relevant procedures for calculating the discharges/emissions at source.	Yes
background and retention estimations?	
<b>Are the national procedures based on:</b>	Yes
4. A catchment area approach?	No - will be established when implementing to WFD

### 2. Fulfilment of the 1988 commitments

<b>Please describe HOW your country is going to reach the agreed reduction target for phosphorus, and indicate the year WHEN it is expected that the reduction target for phosphorus will be achieved:</b>
Considered achieved by Sweden through remedial measures taken before 1985 and onwards.
<b>Please describe HOW your country is going to reach the agreed reduction target for nitrogen, and indicate the year WHEN it is expected that the reduction target for nitrogen will be achieved:</b>
Reconstruction of municipal sewage treatment plants and measures taken within the agricultural sector, in combination with implementation of the WFD - focusing on a good water status in the coastal waters will result in a reduction in the order of 40% by 2010 and a fulfilment of the 1988 commitment within one generation (2020).

### 3. Measures on a sector by sector basis

Sector	Type of measures implemented since 1995 or planned to be implemented
Agriculture	<p>Current legislation is one part of the plan of action for reducing nutrient losses from agriculture. Ordinances and Regulations contain rules on storage capacity for manure, rules on certain shares of autumn and wintergrown land and requirements regarding land area available for spreading of manure, rules on spreading, and detailed rules on green land.</p> <p><b>Rules on autumn and wintergrown land</b> In Halland, Scania and Blekinge, rules stipulate that 60 per cent of arable land shall have a green cover during autumn/winter. In the rest of Götaland, the corresponding figure is 50 per cent. The rules entered into force in 1992. There are also rules on first tillage for certain crops in order for them to be approved as autumn or wintergrown land.</p> <p><b>Financial incentives</b> Since 1996 there are various forms of agri- environmental measures i.a. for reducing plant nutrient losses. This aid is partly financed by the EU. In 2001 measures included in The Environmental and Rural Development Plan for Sweden 2000-2006 were introduced. Measures included are at present riparian strips, catch crops, spring tillage, and wetlands and ponds. Sweden applies environmental fees since 1984 in order to reduce the use of fertilisers. At present (2002), the nitrogen tax is SEK 1,80 per kg nitrogen.</p> <p><b>Extension services and information</b> Extension services became a part of the Environmental and Rural Development Plan in 1995. Each regional authority has, in co-operation with organisations of their counties, to developed county programmes, drawing up regional objectives for the activities. The advice on environmental matters to farmers is free of charge.</p>

Sector	Type of measures implemented since 1995 or planned to be implemented
	<p>Training has been offered both in the form of advising individual farmers and arranging classes for groups of farmers. In contacts with individual farmers it has been possible to design environmentally sound solutions for handling manure and other plant nutrients, all based on the needs of the individual farm.</p> <p><b>Research and development</b> In connection with the introduction of the plan of action against Plant Nutrient Losses from Agriculture, research and development activities were initiated with the aim of finding methods that may reduce plant nutrient losses from agriculture. <i>A more full text is provided in the appendix (below)</i></p>
Sewage	<p>Since 1995, more than 70 large (&gt; 10000 pe) wastewater treatment plants (WWTPs) situated mainly in the southern part of Sweden and located near the coastline, have been reviewed and have received new discharge permits according to the requirements of the EC UWWT-directive and the implementation of the Swedish directive: SNFS 1994:7 (changed in SNFS 1998:7). These plants have subsequently been upgraded for nitrogen removal.</p> <p>Since the 1970s, Sweden has taken far-reaching measures to remove phosphorus at the WWTPs. To further reduce the load of phosphorus and nitrogen to meet the environmental quality objective "Zero eutrophication", the Government Bill 2000/01:130 adopted by the Swedish Riksdag (the Parliament) has pointed out e.g. improvement of the sewerage system. This will reduce overflows and stabilise the processes at the WWTPs.</p> <p>In order to further reduce the load, municipalities are requested to improve small-scale wastewater treatment in rural areas and thus consider e.g. source separation techniques and wetland filters.</p>
Aquaculture	"NMI" (except for the new environmental legislation, see comment under "Industry").
Industry	In 1999, a new environmental legislation entered into force in Sweden - the Environmental Code. It is believed that its application will lead to more stringent requirements on operators of environmentally hazardous activities.
Forestry	<p>No obligations on phosphorus and nitrogen specific for forestry, other than general care and considerations.</p> <p>From Statistical Yearbook 2001 can be read for forestry that in 1999 nitrogen fertilising of forested land covered an area of 26 400 ha, which compared to 1998 is an increase by 5 600 ha.</p>

#### 4. Reasons for not achieving the 1988 commitment with regard to nitrogen

Please indicate the problems encountered:

Remaining problems mainly within the agricultural sector.

#### 5. Main catchment areas

Catchment	Type of measures implemented since 1995 or planned to be implemented
	Will be established when implementing the WFD.

#### 6. Coastal areas not included in the catchments listed in Table 5

Area/region/catchment	Type of measures implemented since 1995 or planned to be implemented

## Appendix: Detailed information about measures within the agriculture sector in Sweden

### Legislation

Legislation is one part of the plan of action for reducing nutrient losses from agriculture.

Current rules are laid down in Ordinances and Regulations of the Environmental Code. Swedish Ordinance (SFS 1998:915) on environmental concerns in agriculture contains rules on storage capacity for manure, as well as rules on certain shares of autumn and wintergrown land. Swedish Regulation (SJVFS 1999:79) on environmental concerns in agriculture contains requirements regarding land area available for spreading of manure, rules on spreading, and detailed rules on green land.

### *Area available for spreading – stocking density*

Swedish Regulation (SJVFS 1999:79) lays down rules on stocking density, i.e. the maximum number of animals permitted per hectare of land that is available for the spreading of manure. The Regulation applies to farms that keep more than ten livestock units<sup>10</sup>. This regulation entered into force 1 January 1995 and 1 January 1989 for farmers that enlarged their production of animals during the period 1989-1994.

### *Storage of manure*

In areas identified as particularly sensitive (the counties of Halland, Scania, Blekinge and Gotland as well as the coastal areas of the counties of Stockholm, Södermanland, Östergötland, Kalmar and Västra Götaland as well as the island of Öland), all farms are required to have storage capacity for manure. In the rest of Sweden, this requirement applies only to farms of 100 livestock units or more. Storage facilities must be of a size corresponding to the manure production for 8 months for cattle, horses, sheep or goats and 10 months for other types of animal production. This regulation entered into force 1 January 1995 and 1 January 1989 for farmers that enlarged their production of animals during the period 1989-1994.

Manure shall be stored in a way that minimises the risk of polluting surface and groundwater according to the ordinance (SFS 1998:915) on environmental concerns in agriculture.

### *Spreading of fertilisers*

In all of Sweden, the rule is that manure and other organic fertilisers shall be incorporated into the soil on the day that they are spread, if this takes place during the period 1 December – 28 February. This rule entered into force 1 January 1989. However, since 1996 the manure shall be worked into the soil within four hours, if it is spread on bare soil, in the counties of Halland, Scania and Blekinge. This latter rule applies throughout the year.

Since January 1995 the following applies to the spreading of manure in the sensitive areas:

- during the period of 1 August – 30 November, manure and other organic fertilisers may only be spread in growing crops or before autumn sowing.

Solid manure (except poultry manure), however, may be spread on bare soil even if there is no subsequent autumn sowing. This applies during the period of 20 October – 30 November in the counties of Halland, Scania and Blekinge, and during the period of 10 October – 30 November in other sensitive coastal areas.

Since January 1999 the following applies to the spreading of manure in the sensitive areas:

- fertilisers may not be spread in quantities larger than what the crops can be assumed to require;
- fertiliser may not be spread on water-saturated or flooded ground;
- fertilisers may not be spread on frozen or snow-covered ground;
- commercial fertilisers containing nitrogen may not be spread during the period of 1 November – 15 February;
- manure and other organic fertiliser may not be spread during the period of 1 January – 15 February.

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<sup>10</sup>

One livestock unit corresponds to one adult bovine animal, one horse, two young bovine animals, three sows, ten pigs for slaughter, ten furred animals (breeding females) or 100 fowls.

### ***Additional information - Rules on autumn and wintergrown land***

In Halland, Scania and Blekinge, rules stipulate that 60 per cent of arable land shall have a green cover during autumn/winter. In the rest of Götaland, the corresponding figure is 50 per cent. However, this rule entered into force in 1992.

There are also rules on first tillage for certain crops in order for them to be approved as autumn or wintergrown land.

### **Financial incentives**

Since 1996 there are various forms of agri- environmental measures i.a. for reducing plant nutrient losses. This aid is partly financed by the EU. In 2001 measures included in The Environmental and Rural Development Plan for Sweden 2000-2006 were introduced. Measures included are at present riparian strips, catch crops, spring tillage, and wetlands and ponds.

Sweden applies environmental fees since 1984 in order to reduce the use of fertilisers. At present (2002), the nitrogen tax is SEK 1,80 per kg nitrogen.

### **Extension services and information**

Extension services became a part of the Environmental and Rural Development Plan in 1995. Each County Administrative Board has, in co-operation with organisations of their counties, developed county programmes, drawing up regional objectives for the activities. During the period 1996-1999 some 12 700 farmers have been provided with individual extension services concerning plant nutrients. The advice on environmental matters to farmers is free of charge. Training has been offered both in the form of advising individual farmers and arranging classes for groups of farmers. In contacts with individual farmers it has been possible to design environmentally sound solutions for handling manure and other plant nutrients, all based on the needs of the individual farm. At the arranged classes, County Administrative Boards and other operators have informed about and demonstrated the best ways to handle manure and fertilisers in order to reduce the risk of plant nutrient losses.

### **Research and development**

In connection with the introduction of the plan of action against Plant Nutrient Losses from Agriculture, research and development activities were initiated with the aim of finding methods that may reduce plant nutrient losses from agriculture. In the last few years some eight to nine million crowns have been used in various projects within the plan of action for reduced nutrient losses.

## SWITZERLAND

### 1. National action plans to reduce nutrient inputs

Country: SWITZERLAND (Draft Report)	Please answer yes or no to the following questions
<b>Are the national plans related to:</b> 1. Nutrient inputs to Surface Waters: 2. Nutrient inputs to the Maritime Area:	Yes No
<b>Do national procedures for estimating nutrient discharges take account of:</b> 3. Relevant procedures for calculating the discharges/emissions at source. Background and retention estimations?	Yes Yes (background estimations)
<b>Are the national procedures based on:</b> 4. A catchment area approach?	Yes

### 2. Fulfilment of the 1988 commitments

<p><b>Please describe HOW your country is going to reach the agreed reduction target for Phosphorus, and indicate the year WHEN it is expected that the reduction target for Nitrogen will be achieved:</b></p> <p>The reduction target for Phosphorus was reached in 1995.</p> <p><b>Please describe HOW your country is going to reach the agreed reduction target for Nitrogen, and indicate the year WHEN it is expected that the reduction target for Nitrogen will be achieved:</b></p> <p>Between 1994 and 1996 a task force set up by the Head of the Ministry of Home Affairs and the Head of the Ministry of Economics worked out a strategy aimed at solving the environmental problems caused in Switzerland by the emissions of harmful nitrogen compounds. The strategy includes measures in the source sectors agriculture, transport and combustion processes and wastewater treatment. Measures to be taken in agriculture are most cost-effective. Details about measures in the different sectors, see table 3 (below).</p> <p>The implementation of the proposed strategy is ongoing. It is expected that with the full implementation of the strategy a further reduction of 20% of the total emissions of nitrogen compounds into the environment can be reached until the end of 2005. In applying the strategy nitrogen inputs into surface waters in the Rhine catchment area can be reduced by about further 15% in the same time frame.</p> <p>At present it is not possible to indicate the year when it is expected that the 50% reduction target for inputs of Nitrogen into surface waters will be fully achieved.</p>
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### 3. Measures on a sector by sector basis

Sector	Type of measures implemented since 1995 or planned to be implemented
Agriculture	<p>Requirements within the framework of the Federal Law on Water Protection and the according Federal Ordinance on Water Protection, e.g.:</p> <p>Maximum limit of 3 cattle manure units (CMU) per hectare (315 kg N/ha and 45 kg P/ha). Under no circumstances this limit set by the federal government is to be exceeded. The cantonal authority shall reduce this federal limit value according to the locally predominant carrying capacity of soils, the altitude and the topographic conditions at the individual livestock enterprise. The limit values for all existing livestock farms have been set in 1997. The range of CMU lies between 3 in the lowlands and 1,1 in the highest alpine regions.</p> <p>Farm manure shall be used compatible to BEP and according to the best available agricultural techniques (1992).</p> <p>All contracts for surplus manure (life of contracts at least 1 year) must be drawn up and approved by the responsible authority. The recipient</p>

	<p>has to satisfy a Phosphorus balance in equilibrium (1992/1998). Minimum manure storage capacity of 3 month, higher storage capacity in mountain regions (1992). The competent authorities regularly control storage facilities (1998).</p> <p>Fertiliser advice programmes: The cantonal authorities ensure that an advisory service is set up (1992).</p> <p>In the revised Federal Law on Agriculture (Agricultural Policy 2002) ecological aspects in general and also the objectives to reduce nutrient inputs into waters are fully considered, e.g.:</p> <p>Reduced prize support to farmers: Prize support will decrease within 5 years (2003) of about 33%;</p> <p>To get any direct payment, farmers have to fulfil requirements concerning fertilising, soil protection, crop rotation, crop protection and extensification (1999);</p> <p>Special programme of measures for catchments with high nitrate content in ground water and in surface waters (1999).</p> <p>The result of the Programme "Agricultural Policy 2002" was examined in 2001. On the basis of this examination the Federal Council decided in 2002 on the programme "Agricultural Policy 2007" including the following goals for ecology in agriculture to be achieved by 2005:</p> <ul style="list-style-type: none"> <li>• keep the national potential of Nitrogen losses at the level of 74 000 tonnes N/year (reduction of 22 000 tonnes N/year or 23%, baseline year 1995);</li> <li>• reduction of Phosphorus surpluses by 50% to the level of 10 000 tonnes P (baseline year 1991/1992);</li> <li>• reduction of ammonia emissions by 9% (reduction of 4 800 tonnes N, baseline year 1990);</li> <li>• nitrate concentrations are below 40 mg/l in 90% of the groundwater catchments for drinking water purpose which have an area of contribution with land use by agriculture.</li> </ul>
Sewage	<p>Nutrient inputs from sewage treatment plants (STPs) into surface waters have to be reduced primarily by optimising the operation of the plants. In planning to renew or extend a STP the installation of nitrogen removal has to be proved. Based on the revision of the Water Protection Law of 20 June 1997 the Swiss Confederation supports financially the installation of nitrogen removal equipment in STPs if this measure can contribute to fulfil international agreements on the protection of water bodies outside of the country (e.g. the North Sea). In 2001 the Federal Department of the Environment, Traffic, Energy and Communications and the responsible departments of the cantons laying within the Rhine catchment have signed an agreement on a common list of STPs to be equipped with installations for nitrogen removal. Implementing this programme the Nitrogen inputs from STPs into the waters in the Rhine catchment area can be reduced by 2 600 tonnes N/year between 1995 and 2005.</p>
Aquaculture	<p>Fish farming activities are of minor importance in Switzerland. The results of a special study show that nitrogen inputs from fish farms into surface waters are also of minor importance.</p>
Industry	<p>In Switzerland the greater part of industries are connected to public sewerage, and the discharges are treated in municipal treatment plants with at least secondary treatment. In the Rhine watershed downstream of the lakes inside Switzerland total direct inputs of nitrogen from industry (all discharges are treated in industrial treatment plants) are relatively small (tot-nitrogen: 1 000 t/y) and originate for the most part from the chemical industry. The inputs of nutrients were reduced</p>

	substantially before 1995 and there is therefore practically no further reduction potential. Other industrial sectors are connected to municipal treatment plants (e.g. Food and drink processing industry, dairies) or do not exist in the Rhine watershed downstream of the lakes inside Switzerland (fertiliser industry, refineries).
Forestry	--
Transport and combustion processes (Air emissions and deposition)	In 2001 a mileage, weight and emission-dependent tax for heavy-duty vehicles was introduced. Switzerland also adopted the tight exhaust standards of the EU for light duty vehicles (EURO 3 as from 2000, EURO 4 as from 2005) and for heavy-duty vehicles (EURO 3 as from 2000, EURO 4 as from 2005, and EURO 5 as from 2008). They will lower atmospheric emissions of nitrogen oxides substantially. An incentive tax on non-renewable energy and an energy fee to promote renewable energy use were rejected in a public vote in 2000. Large infrastructure projects to enhance capacity and attractiveness of public transport and to transfer freight traffic from the road to the rail are being carried out.

#### 4. Main catchment areas

Catchment	Type of measures implemented <sup>2</sup> since 1995 or planned to be implemented <sup>3</sup>
Rhine basin	see tables 1, 2 and 3
downstream of the lakes	