Workshop on the Development of Harmonised Reporting Procedures for Nutrients (HARP)

WORKSHOP REPORT

Oslo-Norway, 26-29 January 1998

Organised by Norway, the DGXI of the European Commission and the European Environmental Agency (EEA)

Norwegian Institute for Water Research

REPORT

Main Office
P.O. Box 173, Kjelsås
N-0411 Oslo
Norway
Phone (47) 22 18 51 00
Telefax (47) 22 18 52 00
Internet: www.niva.no

Regional Office, Sørlandet
Televeien 1
N-4890 Grimstad
Norway
Phone (47) 37 29 50 55
Telefax (47) 37 04 45 13

Regional Office, Østlandet
Sandvikaveien 41
N-2312 Ottestad
Norway
Phone (47) 62 57 64 00
Telefax (47) 62 57 66 53

Regional Office, Vestlandet
Nordnesboder 5
N-5008 Bergen
Norway
Phone (47) 55 30 22 50
Telefax (47) 55 30 22 51

Akvaplan-NIVA A/S
N-9005 Tromsø
Norway
Phone (47) 77 68 52 80
Telefax (47) 77 68 05 09

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Abstract

The first Workshop organised in the framework of HARP was held in Oslo 26-29 January 1998 and was organised by Norway, DG XI of the EC and the EEA. Participants from all Contracting Parties/signatories to OSPAR (except Iceland and Luxembourg), and representatives from UNEP, the Secretariats of the Fifth North Sea Conference, HELCOM, OSPAR, Rhine Commission, EEA/ETC (marine and freshwater) attended the Workshop.

Starting points for discussions were the recommendations from OSPARs working group on nutrients (NUT) as regard key issues /main elements to be included in HARP. The workshop gave further clarification on which elements were to be included in HARP in order to achieve co-ordination between international organisations and to harmonise national calculation methods and reporting procedures. Further, the Workshop gave additional viewpoints on the use of harmonised information for reporting on the 50% reduction target for the North Sea, other reporting requirements/targets today and in the future, assessment of effects of measures and development of abatement strategies/action plans on catchment levels.

The Workshop resulted in recommendations and ideas for the further development of the various elements in HARP as regard catchment approach, quantification of agricultural nutrient losses to surface water, quantification of point sources, background load, normalisation of data, retention and riverine monitoring.

4 keywords, Norwegian	4 keywords, English
1. Internasjonal harmonisering	1. International harmonisation
2. Rapporteringsprosedyrer	2. Reporting Procedures
3. Næringssalter	3. Nutrients
4. Nordsjøkonferanse/OSPAR	4. North Sea Conference/OSPAR

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Stig A. Borgvang
Project manager

Head of research department

Preface

At the 4th North Sea Conference, the Ministers invited Norway, as a host country for the 5th North Sea Conference, in co-operation with the European Commission and the European Environmental Agency, to offer its services as lead country within OSPAR, to promote and co-ordinate the necessary reporting systems and procedures as a basis for transparent, reliable and comparable reports, including relevant sources, basic figures, calculation methods and emission factors.

The Norwegian Ministry of Environment initiated the project 'Harmonised Reporting Procedures for Nutrients' (HARP) in 1996. The Norwegian Pollution Control Authority (SFT) operates the project by contracting the services of the Norwegian Institute for Water Research (NIVA).

This Workshop is considered an important 'milestone' in the development of HARP, and was organised by Norway, DGXI of the European Commission (EC) and the European Environmental Agency (EEA). The contributions from the many participants at the Workshop are valuable inputs to the future development of HARP.

Oslo, 25 March 1998

John Rune Selvik, SFT

Harmonised Reporting Procedures for Nutrients (HARP)

Workshop Report

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1. Introduction

1.1 Organisation

The first Workshop organised in the HARP framework was held in Oslo 26-29 January 1998. It was organised by Norway, DG XI of the EC and the EEA. The Workshop Programme is at Annex A. The documents submitted to the Workshop are listed in Annex B.

Mr Stig A. Borgvang, Norwegian Institute for Water Research (NIVA), chaired the Plenary Sessions of the Workshop. The Working Sessions were chaired as follows:

- Session 1 was chaired by Mr Peter Gammeltoft, DG XI of the EC
- Session 2 was chaired by Mr John Rune Selvik, Norway
- Session 3 was chaired by Mr Hubert Tunney, Ireland
- Session:
  4/1 was chaired by Dr Jørgen Windolf, Denmark (However, Mr Jon Lasse Bratli, Norway, represented the Working Session Report to the Plenary)
  4/2 was chaired by Dr Hein Rune Skjoldal, Norway
- Session 5 was chaired by Dr Georges Pichot, Belgium

The Working Session Reports are the responsibility of the respective Working Session Chairmen. Any major comments which are not reflected in the Working Session Reports are referred to in Part 2. The Chairmen of the various Working Sessions presented their Chairman's report to the relevant Plenary Session. The presentations were followed by plenary discussions.

1.2 Opening of and representation at the Workshop

Ms Kari E. Fagernæs, Head of Section at the Norwegian Pollution Control Authority (SFT), welcomed the Workshop participants to Oslo, to SFT and to the HARP Workshop. Ms Fagernæs expressed in a symbolic way that she hoped the harmony of HARP music would be achieved during the Workshop and later in implementing HARP. Finally, Ms Fagernæs wished the Workshop and its participants every success and a pleasant stay in Oslo.

The Workshop was attended by participants from all Contracting Parties/signatories to OSPAR, except Iceland and Luxembourg. Furthermore representatives from UNEP, the Secretariats of the Fifth North Sea Conference, HELCOM, OSPAR, the Rhine Commission, EEA and ETC (marine and freshwater) also attended the Workshop. A list of participants is at Annex C.

1.3 Chairman's Introduction

The Chairman, Mr Stig A. Borgvang, explained that the work on the HARP development in 1997 had consisted, *inter alia*, of the compilation of information from North Sea States/OSPAR countries about their practices with regard to the quantification of nutrient losses/discharges/inputs from various sources. Furthermore, technical background documents (on nutrient retention and background load of nutrients) had been developed.

The Chairman explained that it has been considered important to gather the various countries' opinions, ideas and comments at this stage of the HARP development. Hence, in order to ensure that the "milestones" in the Workplan are reached in due time, a Workshop had been called for with the participation of representatives from OSPAR countries and relevant international organisations. The organisation of such a workshop should give the necessary impetus to the work so that the "final product", i.e. the HARP system, is acceptable to all relevant parties.

The nature of HARP and the many different sectors involved calls for a broad participation at the Workshop. It is therefore a great pleasure to note that the Workshop has broad participation from scientists on the relevant topics, as well as administrators from many countries and international organisations. A successful workshop will facilitate to the great extent the work on the development of HARP.

Furthermore, the Chairman recalled that a consultation meeting had been held in Oslo 6 October 1997 in order to finalise the programme for the HARP Workshop. The following organisations had participated: EC, EEA, HELCOM and the OSPAR Secretariat. Germany and the UK participated in their capacity of 'potential' participants in the planned pilot study, spring 1998. The Rhine Commission Secretariat and the North Sea Conference Secretariat had not been able to participate due to other commitments.

The consultation meeting had agreed on all the main elements to be included in the programme for the Workshop, with the exception of the possible inclusion of a session on nutrient retention in coastal areas. For that particular topic, the consultation meeting had agreed to ask all parties concerned for their advice, i.e. all OSPAR Contracting Parties and relevant IGOs and NGOs. The outcome of the 'hearing round' was that the HARP Workshop should consider the issue of retention of nutrients in coastal areas. However, this does not pre-empt the inclusion of this issue in HARP.

The Chairman also recalled that the timetable for the development of HARP stipulated that a first draft should be presented to NUT98. Some important points related to HARP, and its timetable, are worth mentioning in that respect:

- there are some main principles/key issues to be considered in the development of HARP in order to enable OSPAR countries to give guidance as to the further work with the development of HARP;
- it becomes more and more evident that Harmonised Reporting Procedures for Nutrients are of great interest for other organisations than OSPAR such as the Rhine Commission, EEA, HELCOM, OECD and UNEP;
- it is a question whether the HARP system should be linked to the 50% reduction target for nutrients only or if it should encompass reporting systems and procedures on nutrients in general;
- the type and nature of HARP has to date not been clarified, i.e. whether it should be drafted as e.g. an OSPAR Recommendation or if it should have a character of guidelines;
- the degree of harmonisation between countries and organisations needs to be considered as the work develops;

- the process leading to the adoption of HARP within OSPAR needs to be discussed.

The Chairman stressed that it is important to remember why this harmonisation procedure has been launched (3NSC, IMM93, 4NSC and OSPAR Action Plans), and the reasons for why there is a need for nutrient load figures. In order to better understand the basis for the development of HARP, it was considered useful to ask 'Why do we need nutrient load figures?' The possible answers to that question and the actions necessary to respond to the commitments behind the question are shown in figure 1 below.

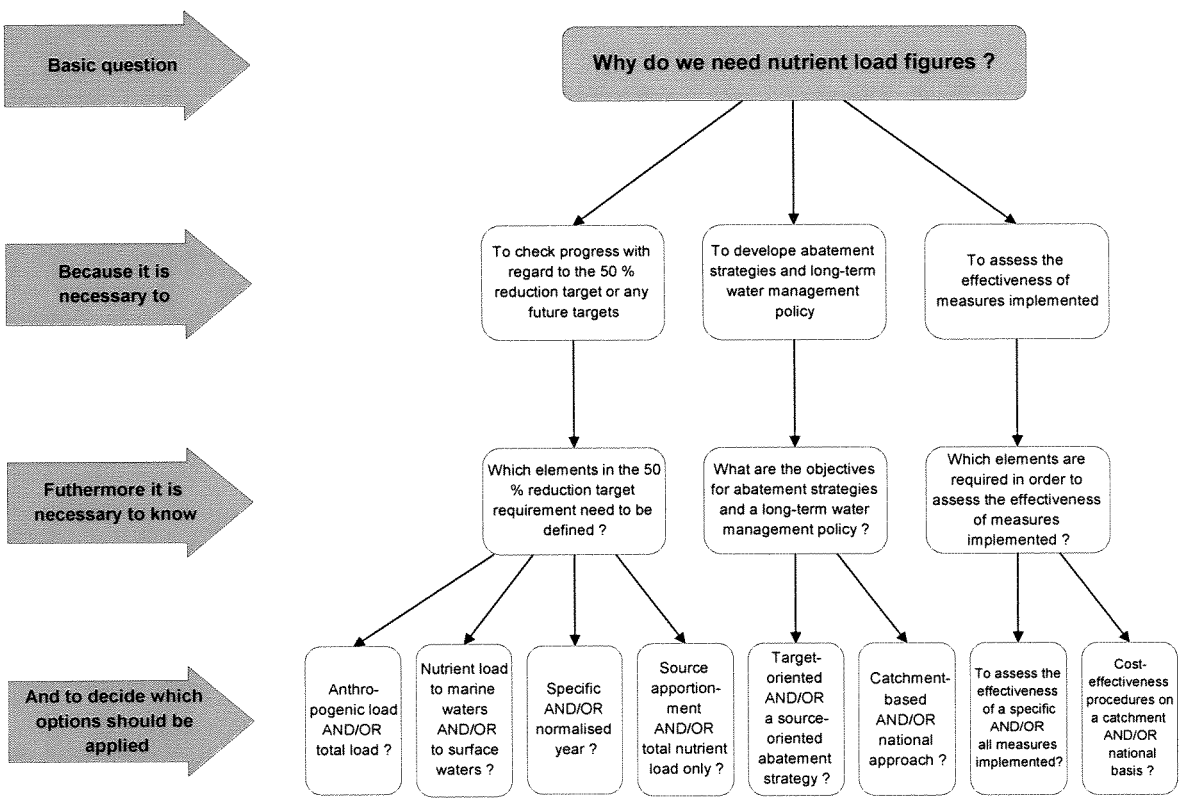


Figure 1. Background for the outline of options.

The actions to be taken as a response to the question of 'Why nutrient load figures are needed ?' encompass several options ('key issues'). It is important to be aware of the consequences of the options chosen, i.e. the answers to the key issues. A document had therefore been presented to the 1997 meeting of the Nutrients Working in the framework of OSPAR (NUT97), outlining the reasons for why nutrient load figures are necessary, the key issues to be considered and the consequences of the choices. These consequences are in Figure 2.

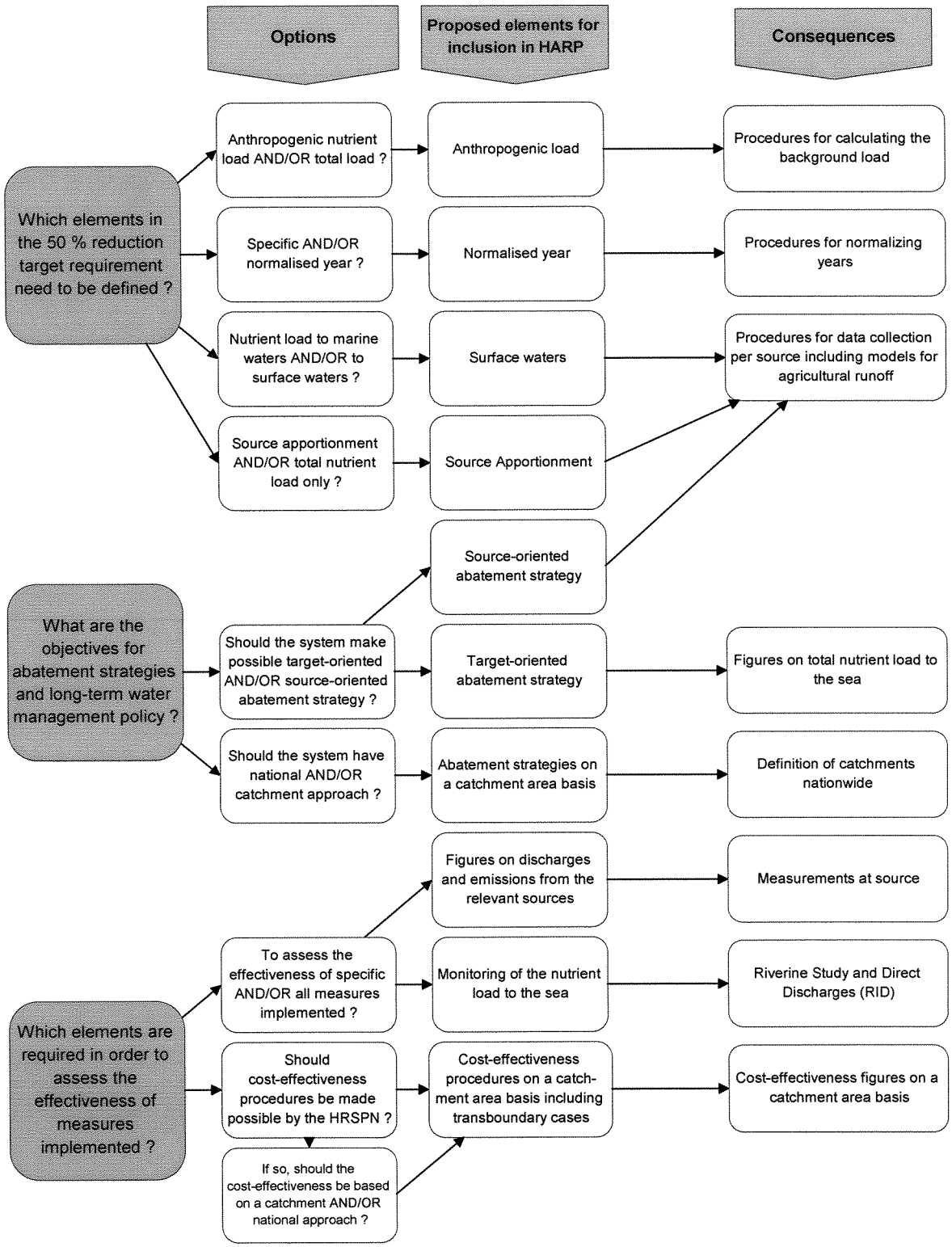


Figure 2. Selected elements and consequences

Finally, the Chairman recalled that NUT97 had agreed on recommendations concerning the key issues in the development of HARP, to be taken account of by the Workshop, namely that:

- nutrient loads should be addressed as anthropogenic loads and total loads;
- nutrient loads should comprise loads to marine waters and loads to surface waters;
- HARP should make provisions for specific years (point sources) and normalised years (diffuse sources);
- HARP should comprise nutrient load per source and total nutrient loads;
- HARP should make provisions for abatement strategies at national level and on a catchment area basis;
- methods for assessing the effectiveness of measures implemented per sector should be considered.

The consequences of the recommendations are that it will be necessary to:

- agree on procedures for calculating the background load of nutrients;
- assess the Riverine Inputs and Direct Discharges (RID) programme in order to check whether changes are required e.g. if the time resolution needs to be changed or the issue of bioavailability should be included in the assessment of the data;
- agree on procedures for data collection per source, including development of methods for quantifying agricultural nutrient losses to surface waters;
- agree on a procedure for 'normalising' a year;
- agree on a procedure for selecting catchments within each country.

1.4 General Comments

The participants of Germany and The Netherlands recalled that in Paragraph 31 of the North Sea Conference, the Ministers had agreed to remain committed to reach the 50 % reduction targets for nutrients set up by previous conferences. Furthermore, the Ministers had agreed to develop a harmonised reporting system to provide transparent, reliable and comparable data/figures on nutrients and had invited Norway to take the lead within OSPAR. In the view of the participants of Germany and The Netherlands, this means that HARP should be focused on the harmonisation of calculation methods and reporting systems for the evaluation of the before mentioned commitment within the NSC and OSPAR frameworks. It should make use of experiences gained in this field by the EC, EEA and other international fora, and be harmonised with their reporting procedures.

2. Conclusions from the five Working Session Reports

2.1 Working Session 1: Conceptual Framework of HARP

Mr Peter Gammeltoft, DG XI of the EC, chaired Working Session 1. Participants from 13 countries and 8 international organisations attended the Session. The discussions, which took place during Working Session 1, are reflected in the Chairman's report at Annex D. Session 1 was organised before the first official Plenary Session and was intended to set the scene for the subsequent Working Sessions, *inter alia*, as regards the 'key issues'.

The Chairman's conclusions from Working Session 1 are as follows:

- the HARP development should encompass not only reporting related to the 50% reduction target for the North Sea, but also other reporting requirements related to nutrients, and enable the assessment of the effects of measures implemented and the need for further measures;
- HARP should include procedures for calculating the background load of nutrients;
- the development of HARP should include an assessment of the sampling frequency and time resolution in the OSPARs Riverine Inputs and Direct Discharges (RID) programme; where a tighter time resolution than one year may be necessary;
- the issue of bioavailability should not be part of the HARP development;
- procedures for data collection per source, including development of methods for quantifying nutrient losses from agricultural activities, should be part of HARP (see Working Sessions 2 and 3);
- HARP should comprise a procedure for 'normalising a year';
- it is necessary to distinguish between atmospheric deposition of nutrients within the catchment areas and the direct deposition of nutrients on marine waters;
- the links between the data should be considered by Working Session 5, whilst the data management issues need to be considered by the EEA, EC, ICES, OSPAR and other relevant international conventions;
- future water management policy development is likely to emphasise the need to report on a catchment area basis, e.g. the Proposal for a Council Directive establishing a framework for Community action in the field of water policy;
- all catchments or groups of catchments draining into Convention waters should be considered;
- criteria for the selection of catchment size should be related to the state of the receiving water body in order to facilitate the development of appropriate action plans.

The Chairman suggested to add the following organisations to the list of relevant organisations to be informed about the development of HARP;

- UN-ECE
- Oder Commission
- Barcelona Convention
- Black Sea Convention

2.2 Working Session 2: Diffuse Sources

2.2.1 Main Working Session

Mr John Rune Selvik, Norway, chaired Working Session 2. Participants from 14 countries and 9 international organisations attended the Session. The discussions, which took place during Working Session 2, are reflected in the Chairman's report at Annex E. The main objective of Working Session 2 was to investigate the scope for harmonising calculations and estimates of the nutrient load from diffuse sources.

The Chairman's conclusions from Working Session 2 are as follows:

- the atmospheric deposition of nutrients on water bodies should be separated from the nutrient background load;
- the nutrient background load should be described as the natural background load of nutrients from all areas, describing the situation without anthropogenic influence;
- a hydrological approach to normalising data would be possible; e.g. a period of 15 years could be the starting point for further consideration;
- there is a scope for a harmonised approach in estimating nutrient losses to surface waters from agricultural activities, but this issues need further elaborations.

The Dutch participants considered the background load approach difficult since there are no pristine areas in the Netherlands. It appeared that these methods to separate the natural and anthropogenic part of the atmospheric nutrient deposition are insufficient. The Dutch participants noted that many surface waters in the lowest parts of the Netherlands receive large quantities of nutrients from nutrient rich seepage water and/or from mineralisation of peat. Both sources are of human origin, and include reclamation of polders and cultivation of peat areas by drainage. These sources cannot be arrested without destroying the said parts of the Netherlands. These sources are therefore included in the quantification of the nutrient background load of nutrients in the Netherlands.

2.2.2 Sub-group

Some participants continued the work in a smaller group after the main Working Session closure. The mandate given to the sub-group was to look in more detail into the possibility of describing a structure/frame for the further development of a common methodology for quantifying agriculture losses of nutrients to surface waters.

- The sub-group recommended the use of already harmonised, agriculture census-data as the basis for establishing a common ground for developing a database of agricultural activities and land types. The aggregated information levels could be for example groups of municipalities representing catchments. Nutrient balance calculations may be used for quantifying nutrient inputs to soil.

- The sub-group could not, at present, recommend a single instrument (model or method) for estimating the transformation of nutrients in the soil and subsequent loss of nutrients to surface water, but recognised that several models/methods used on a national level enable such estimates to be made.

Anyhow, the sub-group saw a potential in a longer perspective to agree on a single instrument, but such an agreement requires a programme for validations or comparison of the various models and methods.

- The sub-group also emphasised the need to have a workable procedure as part of HARP in the shorter perspective, and recognised the potential for carrying out an exercise applying several of the methods/models for the same catchments.

This could possibly lead to some guidance for on how to compare data estimated by various models or methods. Such an approach could facilitate both transparency and comparability between catchments, since the detailed description on how figures have been estimated would be available within the HARP framework and the data itself may be corrected systematically according to agreed procedures.

- Furthermore, the sub-group concluded that it was important to define the links between the different types of nutrient load estimate approaches, viz.;
  - nutrient balance approach
  - modelled nutrient losses including imission factor methods
  - source apportionment of the river nutrient load

It was pointed out which stages of the calculations that were shared by various models, and which stages that permit proper validation and thereby could provide accurate figures on nutrient losses.

- It was recommended that in reporting on modelled nutrient loss estimates, data for these calculation stages should be presented, and the methods used to move from one stage to the next should be explained. This would enable transparency, the understanding of the relationship between different estimates and progress towards harmonisation of various methodologies.

Procedures for estimating the non-anthropogenic or the natural background load of nutrients and procedures for normalising years were suggested during the discussions in plenary. They are outlined in Annex E (sections 7.5 and 7.6).

2.3 Working Session 3: Point Sources

Mr Hubert Tunney, Ireland, chaired Working Session 3. Participants from 11 countries and 4 international organisations attended the Session. The discussions, which took place during Working Session 3, are reflected in the Chairman's report at Annex F. The main objective of Working Session 3 was to review procedures for quantifying nutrient discharges from point sources.

To deal with the problems of defining a point source, a possible definition was agreed upon by the participants, namely;

> *Point Source (of Nutrients) may be defined as:*
>
> *A clearly identified, individual discharge (or a number of discharge in close proximity) to a watercourse or a body of water, such as effluent discharged from a sewage collecting and treatment system via an outfall pipe or channel. Small, dispersed point discharges (e.g. from scattered dwellings or from point sources in agriculture, e.g. farmyards) can be dealt with as diffuse sources. It follows that any source of nutrients, which is not accounted for as a point source, should be included as a diffuse source.*

Based on this definition, nutrient discharges from scattered dwellings can be included as diffuse sources. Furthermore, aquaculture can be placed in the category of point sources.

The Chairman's conclusions from Session 3 are as follows:

- a common approach for estimating nutrients in point source discharges is provided within the scope of EC and OSPAR work. The Principles of OSPARs Comprehensive Study on Riverine Inputs and Direct Discharges (RID) (see document HARP 2-2-98) provides methodologies for estimating nutrient discharge loads by measurement and by calculation. Annex I of the Urban Wastewater Treatment Directive (91/271/EEC) provides guidance for monitoring the concentrations of nutrients in treatment works' effluents[1]. The Chairman proposed that these two approaches could be combined as a basis for a common harmonised monitoring approach for point sources;

- the EC Directive gives information on frequency of sampling for nitrogen and phosphorus concentrations in relation to population equivalents (p.e.) as outlined in Annex I.D.3[2] of the EC Directive. In the Directive it is indicated that this applies to discharges to sensitive areas which are subject to eutrophication. Annual nutrient load should be calculated as a product of annual flow and flow weighted concentration as outlined in RID. The Chairman proposed that a similar approach could be used for industrial point sources. For point sources, he recommended that nutrient discharge figures from Urban Wastewater Treatment Plant and Industrial Plant load nutrient figures should be reported separately;

- annual collecting and reporting, in most cases, serve the purpose of HARP;

- reporting is necessary on a catchment as well as on a national basis;

- EC, the EEA and international conventions are in the best position to decide on handling the links between data.

[1] It was noted that this monitoring requirement related to effluents from agglomerations with population equivalent greater than 10 000 loacted in sensitive areas.

[2] Annex I.D.3: The minimum number of samples shall be determined according to the size of the treatment plant and be collected at regular intervals during the year:
- 10 000 to 49 999 p.e.: 12 samples.
- 50 000 p.e. or more: 24 samples.

2.4 Working Session 4: Nutrient Retention in Freshwater Systems and Coastal Areas

2.4.1 Working Session 4/1: Nutrient Retention in Freshwater Systems

Working Session 4/1 on Nutrient Retention in Freshwater Systems was chaired by Dr Jørgen Windolf, Denmark. Participants from 14 countries and 7 international organisations attended the Session. The discussions, which took place during Session 4/1, are reflected in the Chairman's report at Annex G. The main objective of Working Session 4/1 was to consider the issue of nutrient retention in freshwater systems in relation to the development of HARP.

The Chairman's conclusions from Working Session 4/1 are as follows:

- the HARP development should include nutrient retention in freshwater systems;
- within the HARP framework, one or a few general retention models for phosphorus and nitrogen should be elaborated.

The participants of Germany stated that the nutrient retention in freshwater systems should be taken into account only for the purpose of source apportionment. When the nutrient load is calculated by using load figures based on monitoring at the outlet of the rivers, nutrient retention in freshwater systems may only be used to differentiate between point and diffuse sources. Due to the fact that the estimate of nutrient retention in freshwater systems is uncertain, the quantification of nutrient retention in freshwaters cannot be used for the calculation of total load figures.

Furthermore, if the emission approach in the whole river catchment area is used to determine the total diffuse and point source nutrient emissions (discharges). Estimates of nutrient retention in freshwaters are not needed, because the retention represents the difference between the estimated emissions and the nutrient load figures at the river outlet.

2.4.2 Working Session 4/2: Nutrient Retention in Coastal Areas

Working Session 4/2 on Nutrient Retention in Coastal Areas was chaired by Dr Hein Rune Skjoldal, Norway. It was attended by participants from 13 countries and 7 international organisations. The discussions which took place during Working Session 4/2 are reflected in the Chairman's report at Annex H. The main objective of Working Session 4/2 was to consider whether, based on scientific evidence, there is scope for including the issue of nutrient retention in coastal areas in the development of HARP.

The Chairman's conclusions from Working Session 4/2 are as follows:

- information on nutrient input is required for assessing the eutrophication status of coastal and marine areas. HARP and procedures for eutrophication assessment, such as the OSPARs 'Common Procedure', need to be viewed in context;
- nutrient retention in coastal areas should not at the present time be a part of HARP;
- nutrient inputs to the marine area should ideally be reported at zero-salinity;
- HARP should take into account the need for nutrient input information for the purpose of assessing the eutrophication status of marine areas. This includes the need for seasonally resolved data on the main dissolved and particulate nutrient compartments being discharged into marine areas;
- nutrient retention in coastal areas, or remobilisation, must be considered when going from the local to sub-regional or regional scales in assessments of the eutrophication status of marine areas;
- nutrient retention in coastal areas should be kept on the agenda for further consideration, for inclusion in HARP in the long term.

Concerning the Chairman's conclusions on Working Session 4/2 "Nutrient Retention in Coastal Areas", the participants of Germany and the Netherlands stated that in the context of reporting on nutrient loads into marine areas, nutrient retention in coastal waters should, in general, not be considered because:

- in the OSPAR framework, coastal areas are part of the Convention Area, but the nutrient load reductions should be measured at the river mouths;
- nutrient retention in coastal waters is highly variable and often not permanent;
- sudden remobilisation of nutrients may occur through hydrodynamic events. They cannot be monitored, but may have significant effects on annual budgets and may completely invert annual nutrient retention effects;
- there are currently no generally accepted measurement methods for nutrient retention (e.g. sedimentation and denitrification), and no harmonisation can therefore take place.

2.5 Working Session 5: Compilation of Results from Sessions 1-4 including Discussions on the Quantification of the Nutrient Load from all Sources

Working Session 5 was chaired by Dr Georges Pichot, Belgium. It was attended by participants from 14 countries and 8 international organisations. The discussions, which took place during Session 5, are reflected in the Chairman's report at Annex I. The main objectives of Working Session 5 were to compile the results from Working Sessions 1-4, and discuss total nutrient load modelling[3]. These discussions should be based on the outcome of the deliberations in the other four Working Sessions.

The Chairman's conclusions from Working Session 5 are as follows:

General

- it is important to include in HARP information about characteristics/performances of sectors and sub-sectors included in the total nutrient figures for the various sources. This information is essential for a better understanding of the total nutrient figures and the evaluation of the measures. It will also serve as a basis for the estimates of the contributions of the various point and diffuse sources;
- it is necessary to report the nutrient load both to the surface water as (discharges/losses of nutrients from point and diffuse sources) and to marine areas (as riverine nutrient load and direct nutrient discharges);

The UK participants noted that, for some countries, a large proportion of industrial discharges are lead to the sewerage system and they are, therefore, parts of the 'sewage' point source data. Consequently, any analysis of the sectors contributing to the 'industrial' point sources - nutrient load may be of limited benefit and, without appropriate qualification, could be misleading.

Atmospheric deposition of nutrients

- data on atmospheric deposition of nitrogen exists within EMEP. HARP should therefore make use of the said EMEP data;
- there should be a co-operation between EMEP, other international organisations and the framework of the HARP project in order to obtain a complete picture of emissions, discharges and deposition of nitrogen;
- the practical implications of how 'background load of nitrogen' is applied in the EMEP framework, allows the distinction between anthropogenic deposition of nitrogen and natural deposition;
- it may be necessary to investigate the need to develop, within HARP, a method for evaluating data on phosphorus deposition, as this is not taken into account within EMEP. The INPUT Working Group within OSPAR should be invited to consider this question;

[3] Total nutrient load modelling signifies in this context a 'quantification of the nutrient load from all sources'.

Catchment approach

- all catchments or groups of catchments draining into the relevant marine areas should be considered, i.e. the total of the nutrient load from all catchments or group of catchments should represent the whole of the drainage area relating to the part of the marine areas under consideration;
- it is up to the discretion of each country to decide on the number of catchments to be notified as regards nutrient loads. Possible criteria for the selection of catchments could be the size of the catchment and the length of the coastline covered by each catchment;

- criteria for the selection of catchment size should be related to the state of the receiving water body, in order to facilitate the development of appropriate action plans;

Point Sources

- the nutrient load from point sources should be notified on a catchment basis, unless there are provisions in relevant commitments within the EC and/or international conventions requiring a higher resolution;
- strategies for obtaining the nutrient load from point sources;
    - a common approach for estimating nutrients in point source discharges is provided within the scope of EC and OSPAR work;
    - the Principles of OSPARs Comprehensive Study on Riverine Inputs and Direct Discharges (RID) (see document HARP 2-2-98) provides methodologies for estimating nutrient discharge loads by measurement and by calculation;
    - the total nutrient load should be monitored from the most important point sources and could be estimated from less important point sources;
    - annex I of the Urban Wastewater Treatment Directive (91/271/EEC) provides guidance for monitoring the concentrations of nutrients in treatment works' effluents;
    - these two approaches should be combined as a basis for a common harmonised monitoring approach for point sources.

    The UK participants noted that the monitoring requirement about the WasteWater Treatment Directive related to effluents from agglomerations with population equivalents greater than 10000, located in sensitive areas.

- the reporting frequency should be in accordance with existing EC requirements and/or reporting requirements within international conventions, ranging from 2 to 5 years, although preference should be given to a reporting frequency of 2 to 3 years. The ultimate aim should be to harmonise the reporting frequencies within international fora;

Natural background load of nutrients

- The sub-group under Working Session 2 (Diffuse Sources) had discussed the issue of natural background load of nutrients. After further discussion, a proposal for a procedure for estimating the natural background load of nutrients was developed, as at Annex E (section 7.5);

Procedures for normalising a year

- The sub-group under Working Session 2 (Diffuse Sources) proposed procedures for normalising a year, as at Annex E (section 7.6).

2.6 Future Work

The Workshop invited INPUT (1) 98 to:

- consider the need for changes as regards the time resolution and the sampling frequency in RID. Although, it should be born in mind that the purposes of HARP and INPUT for such activities might be different;

- examine the list of parameters measured within RID in the context of eutrophication issues, and consider whether other parameters need to be added to the list of mandatory parameters to be measured, and

- develop quality assurance procedures and intercalibration of the data collected within RID.

It should be noted that if RID data were to be used in the assessment of the marine environment, e.g. OSPARs 'Common Procedure', the temporal resolution of data need to be better than yearly and the spatial resolution should correspond to the part of the marine area assessed.

Independently of actions taken within the INPUT framework, the development of HARP will include the above mentioned issues. It is nevertheless hoped that the possible actions to be taken within INPUT will facilitate the HARP development and ensure that there will be no duplication of work.

One way forward could be that each Contracting Party appointed national contact points on issues such as assessing time resolution, quality assurance, sampling frequency and choice of parameters within RID.

Finally, it is hoped that this INPUT meeting could make sure that the UK would receive the necessary data, within a short time frame, in order to be able to finalise 'the OSPAR catchment area map' shortly.

3. Annex A: Workshop Programme

Monday 26 January (14.00-19.00)

14.00-19.00	**Session 1:** Conceptual Framework of HARP *Chairman: Mr Peter Gammeltoft, DGXI of the EC*

Tuesday 27 January (08.30-18.00)

08.30	Registration	
09.30	**Plenary 1:** Opening and Introduction *Chairman: Mr Stig A. Borgvang, Norway*	
10.30	Coffee Break	
10.45	Plenary 1 - continues: Report from Session 1	
12.00	Lunch	
13.00-15.30	**Session 2:** Diffuse Sources *Chairman: Mr John Rune Selvik, Norway*	**Session 3:** Point Sources *Chairman: Dr. Hubert Tunney, Ireland*
15.30-15.45	Coffee Break	
15.45-18.30	**Session 2:** Continues	**Session 4:** Nutrient Retention in Freshwater Systems and Coastal Areas *Chairmen: Dr Hein Rune Skjoldal, Norway (Coastal Areas) and Dr.Jørgen Windolf, Denmark (Freshwater Systems)*
20.00	Workshop Dinner	

Wednesday 28 January (09.00-18.00)

11.00	**Plenary 2:** Summary of Discussions in Sessions 2-4 *Chairman: Mr Stig A. Borgvang, Norway*
12.30	Lunch
13.30-15.30	**Session 5:** (Session 5 is open to all participants) Compilation of Results from Sessions 1-4, including Discussions of Total Nutrient Load Modelling *Chairman: Dr Georges Pichot, Belgium*
15.30	Coffee Break
16.00-18.30	Session 5: Continues

Thursday 29 January (09.00-14.00)

09.00	**Plenary 4:** Final Discussions of HARP *Chairman: Mr Stig A. Borgvang, Norway*
11.00	Coffee Break
11.15	**Plenary 5:** Summary and Conclusions *Chairman: Mr Stig A. Borgvang, Norway*
12.30-14.00	Lunch

4. Annex B: Document List

All Sessions

HARP 0-1-98: Description of the issues to be covered at each Working Session. *HARP Secretariat*

HARP 0-2-98: Conceptual framework for Harmonised Reporting Systems for Nutrients (HARP) *HARP Secretariat*

HARP 0-3-98: Draft Structure of HARP. *HARP Secretariat*

HARP 0-4-98: Not issued

HARP 0-5-98: Not issued

HARP 0-6-98: Input of Nutrients to Maritime Areas from Land-Based Sources in Germany. *Germany*

Session 1

HARP 1-1-98: Draft List of Words and Expressions

HARP 2-2-98. See below

Session 2

HARP 2-1-98: Background Loads of Nutrients. *HARP Secretariat*

HARP 2-2-98: Principles of OSPAR's Comprehensive Study on Riverine Inputs and Direct Discharges (RID). *FOR SESSIONS 1,2 and 5. OSPAR*

HARP 2-3-98: Agricultural Nutrient Balance. *OECD*

HARP 2-4-98: Agricultural Nutrient Surplus and Diffuse Nitrogen Losses to Surface Waters within England and Wales. *ADAS, United Kingdom*

HARP 2-5-98: Principles of Source Apportionment Methodologies. *FOR SESSIONS 2 and 3. HELCOM*

HARP 2-6-98: Guideline to Estimate Natural and Anthropogenic Contributions to Riverine Fluxes (Source Apportionment). *FOR SESSIONS 2 and 3. HELCOM*

HARP 2-7-98: Council Directive (91/676/EEC) concerning the protection of waters against pollution caused by nitrate from agriculture. *EC*

HARP 2-8-98: PARCOM Recommendation 92/7 on the reduction of nutrients from agriculture into areas where these inputs are likely, directly or indirectly, to cause pollution. *OSPAR*

HARP 2-9-98: Work on Harmonisation of Nutrient Reporting Systems within OSPAR: Agriculture *HARP Secretariat*

HARP 2-10-98: The Implementation of Nitrate Policies in Europe: Processes of Change in Environmental Policy and Agriculture.

HARP 2-11-98: Present and Future Emission of N and P from Agriculture to Surface Waters.

HARP 2-12-98: Report of the Commission to the Council and European Parliament. Measures Taken pursuant to Council Directive 91/676/EEC concerning the Protection of Waters against Pollution caused by Nitrates from Agricultural Sources. Summary of Reports submitted to the Commission by Member States under Article 11. *EC.*

HARP 2-13-98: Background of Nutrient Concentrations for the Lowland Region of Germany. *Germany*

HARP 2-14-98: Estimating Environmental Releases from Diffuse Sources – A Guide to Methods. *The Netherlands*

HARP 2-15-98: Soil Surface Nitrogen Balances in EU Countries. *EUROSTAT*

Session 3

HARP 3-1-98: Council Directives 91/271/EEC Concerning the Urban Waste Water Treatment. *EC*

HARP 3-2-98: Work on Harmonisation of Nutrient Reporting Systems within OSPAR: Aquaculture *HARP Secretariat*

HARP 3-3-98: Work on Harmonisation of Nutrient Reporting Systems within OSPAR: Industry *HARP Secretariat*

HARP 3-4-98: Work on Harmonisation of Nutrient Reporting Systems within OSPAR: Municipalities and Rural Settlements. *HARP Secretariat*

HARP 2-5-98: See above

HARP 2-6-98: See above

Session 4

HARP 4-1-98: Retention in Freshwater Systems. *HARP Secretariat*

HARP 4-2-98: Retention in Coastal Areas. *HARP Secretariat*

HARP 4-3-98: Work on Harmonisation of Nutrient Reporting Systems within OSPAR: Retention in Freshwater Systems. *HARP Secretariat*

Session 5

HARP 2-2-98. See above

HARP 5-1-98: Guidelines for the Fourth Baltic Sea Pollution Load Compilation (PLC4). *Germany*

5. Annex C: Participation list

Name	Adr1	Adr2	Adr3	Adr4	Country/ Org.	Phone
Mr Paul Scokart	Veterinary and Agrochemical Research Center	Leuvensesteenweg 17	B-3080 Tervuren	Belgium	Belgium	+3227692242
Mr Michel Boucneau	Vlaamse Milieumaatschappÿ	A. van de Maelestraat 96	9320-Erembodegem	Belgium	Belgium	+3253726615
Mr J.-M. Wauthier	Directeur Région Wallonne	15. avenue Prince de Liége	B-5100 Jambes (Namur)	Belgium	Belgium	+3281325841
Mr Ludo Vanongeval	Soil Service of Belgium	W. de Croylaan 48	B-3001 Leuven	Belgium	Belgium	+3216310922
Mr Brian Kronvang	National Environmental Research Institute	Vejlsøvej 25	DK-8600 Silkeborg	Denmark	Denmark	+4589201400
Ms Kristina Saarinen	Finnish Environment Insitute	PO Box 140	FIN-00251 Helsinki	Finland	Finland	+358040300758
Mr Olli-Pekka Pietiläinen	Finnish Environment Institute	PO Box 140	FIN-00251 Helsinki	Finland	Finland	+358940300314
Ms Marie-Françoise Slak	ENITA de Bordeaux Laboratoire Sols et	BP 201	F-33175 Gradignan Cedex	France	France	+33557350740
Mr Dagmar Kallweit	Federal Environmental Agency	Bismarckplatz 1	PO Box 33 00 22	D-14191 Berlin	Germany	+493089032839
Ms Heike Herata	Federal Environmental Agency	Bismarckplatz 1	PO Box 33 00 22	D-14191 Berlin	Germany	+493089032053
Mr Michael Bergemann	Wassergütestelle Elbe	Nessdeich 120-121	D-21129 Hamburg	Germany	Germany	+494038073247
Mr Ulrich Claussen	Federal Environmental Agency	Bismarckplatz 1	D-14193 Berlin	Germany	Germany	+493089032810
Mr Uwe Brockmann	Universitat Hamburg, Martin Luther Platz 6	Institut für Biogeochemie und Meereschemie	D-20146 Hamburg	Germany	Germany	+494041233989
Mr Volker Mohaupt	Umweltbundesamt	PO Box 33 00 22	D-14191 Berlin	Germany	Germany	+493089032036
Mr Jörg Ringeltaube	Umweltministeriu, Niedersachen	PO Box 4107	D-30041 Hannover	Germany	Germany	+495111203359
Mr Horst Behrendt	Institute of Freshwater Ecology and Inland Fisheries	Müggelseedamm 260	D-12587 Berlin	Germany	Germany	+493064840717

Name	Adr1	Adr2	Adr3	Adr4	Country/ Org.	Phone
Mr Klaus-Jürgen Künkel	Federal Agricultural Research Center Braunschweig,	Agricultural Institute for Climate Research	Eberswalder Strasse 84 F	D-15374 Müncheberg	Germany	+493343283822
Mr Chiaudani Giuseppe	University of Milan Department of Biology	Via Celoria 26	20133 Milano		Italy	+39226604370
Mr Premazzi Guido	Joint Research Centre Env. Institute	T.P. 290	21020 ISPRA (VA)	Italy	Italy/EC	+39332789266
Ms Rita Tijunaite	Joint Research Center EPA of Lithuania	Juozapaviciaus 9	2600 Vilnius	Lithuania	Lithuania	+3702728278
Mr Boleslovas Binkauskas	Joint Research Center EPA of Lithuania	Juozapaviciaus 9	2600 Vilnius	Lithuania	Lithuania	+3702722817
Mr Nils A. Vagstad	Center for Soil and Environmental Research	N-1432 Ås	Norway		Norway	+4764948100
Mr Jon Lasse Bratli	Norwegian Institute for Water Research	PO Box 173 Kjelsås	N-0411 Oslo	Norway	Norway	+4722185106
Ms Siri Sorteberg	The Norwegian Pollution Control Authority	PO Box 8100 Dep	N-0032 Oslo	Norway	Norway	+4722573617
Ms Kari Nygaard	Norwegian Institute for Water Research	PO Box 173 Kjelsås	N-0411 Oslo	Norway	Norway	+4722185295
Mr Dag S. Rosland	The Norwegian Pollution Control Authority	PO Box 8100 Dep	N-0032 Oslo	Norway	Norway	+4722573548
Ms Kari E. Fagernæs	The Norwegian Pollution Control Authority	PO Box 8100 Dep	N-0032 Oslo	Norway	Norway	+4722573572
Mr Harald Gaarde	The Norwegian Pollution Control Authority	PO Box 8100 Dep	N-0032 Oslo	Norway	Norway	+4722573680
Ms Gro Hege Ludvigsen	Center for Soil and Environmental Research	N-1432 Ås	Norway		Norway	+4764948150
Mr Jarle Molvær	Norwegian Institute for Water Research	PO Box 173 Kjelsås	N-0411 Oslo	Norway	Norway	+4722185169
Mr Per Stålnacke	Centre for Soil and Environmental Research	N-1432 Ås	Norway		Norway	+4764948133
Ms Kari Skogen	Ministry of Environment	PO Box 8013 Dep	N-0030 Oslo	Norway	Norway	+4722249090
Mr Birger Bjerkeng	Norwegian Institute for Water Research	PO Box 173 Kjelsås	N-0411 Oslo	Norway	Norway	+4722185151

Name	Adr1	Adr2	Adr3	Adr4	Country/ Org.	Phone
Mr Kjetil Mork	Statistics Norway	PO Box 1230	N-2201 Kongsvinger	Norway	Norway	+4762885459
Ms Anne Sundbye	Ministry of Environment	PO Box 8113 Dep	N-0030 Oslo	Norway	Norway	+4722245889
Mr Per Schive	Ministry of Environment	PO Box 8013 Dep	N-0030 Oslo	Norway	Norway	+4722249090
Mr Tor Traaen	Norwegian Institute for Water Research	PO Box 173 Kjelsås	N-0411 Oslo	Norway	Norway	+4722185154
Ms Gjertrud Holtan	Norwegian Institute for Water Research	PO Box 173 Kjelsås	N-0411 Oslo	Norway	Norway	+4722185112
Mr Dag Berge	Norwegian Institute for Water Research	PO Box 173 Kjelsås	N-0411 Oslo	Norway	Norway	+4722185160
Ms Leonor Tarrason	Norwegian Meteorological Institute	PO Box 43 Blindern	N-0313 Oslo	Norway	Norway	+4722963330
Mr Einar Svenden	Inst. of Marine Res., Bergen	PO Box 1817 Nordnes	N-5024 Bergen	Norway	Norway	+4755238500
Ms Maria Isabel Andrade	Direcção-Geral do Ambiente	Roa da Murgueira-Zambujal Apartao	Alfragi de 2720 Amadora	Portugal	Portugal	+35114728342
Mr Javier Ruza Rodriguez	Ministry of Environment	Plaza de San Juan de lakruz	28071 Madrid	Spain	Spain	+3415975893
Mr Jesús Barrera	CEFIC-CEEP	Capitán Haya No. 1, planta 11	28020 Madrid	Spain	Spain	+3415552003
Mr Anders Widell	Swedish Environmental Protection Agency	Blekholms-terrassen 36	S-106 48 Stockholm	Sweden	Sweden	+4686981221
Ms Maja Brandt	Swedish Meteorological and Hydrological	S-601 76 Norrköping	Sweden		Sweden	+4611158339
Ms Ingrid Svedinger	Swedish Environmental Protection Agency	Blekholms-terrassen 36	S-106 48 Stockholm	Sweden	Sweden	+4686981412
Ms Ulla-Britta Fallenius	Swedish Environmental Protection Agency	S-106 48 Stockholm	Sweden		Sweden	+4686981169
Mr Stig Norström	Swedish Environmental Protection Agency	S-106 48 Stockholm	Sweden		Sweden	+4686981053
Mr Sverker Evans	Swedish Environmental Protection Agency	S-106 48 Stockholm	Sweden		Sweden	+4686981302
Mr Ulrich Sieber	Federal Office of Environment, Forests and	CH-3003 Bern	Switzerland		Switzer-land	+41313226950

Name	Adr1	Adr2	Adr3	Adr4	Country/ Org.	Phone
Mr René Gächter	EAWAG	Limnological Research Center	CH-6047 Kastanienbaum	Switzerland	Switzer-land	+41413492111
Mr Markus Braun	Institut für Umweltschutz und Landwirtschaft	Liebefeld	CH-3003 Bern	Switzerland	Switzer-land	+41313238455
Mr P.F.J. van der Most	Ministry of Environment	PO Box 30945	2600 GX Den Haag	The Netherlands	The Nether-lands	+31703394606
Mr Paul C.M. Boers	Rÿkswaterstaat, RIZA	PO Box 17	8200 AA Lelystad	The Netherlands	The Nether-lands	+31320298429
Ms Jeannette Plokker	Rÿkswaterstaat, RIZA	PO Box 17	8200 AA Lelystad	The Netherlands	The Nether-lands	+31320298472
Mr Henk Buijtenhek	TNO	PO Box 342	7390 AH Apeldooren	The Netherlands	The Nether-lands	+31555493522
Ms Eunice Lord	ADAS	Wood Thorne, Wergs Road	Wolverhampton	WVG 8TQ	United Kingdom	+441902693361
Mr Steven J Malcolm	CEFAS	Fisheries Laboratory	Pakefield Road, Lowestreet	Suffolk, NR33 OHT	United Kingdom	+441502524422
Mr Andrew J Osborne	Dep. of the Env. , Transport and the Regions	4/D8 Ashdown House	123 Victoria Street	London SW1E 6DE	United Kingdom	+441718905313
Mr Norman Thorpe	Ministry of Agriculture, Fisheries and Food	Room 136, Nobel House	17 Smith Square	London SW 1P 3JR	United Kingdom	+441712386035
Mr Robert Goodchild	European Commission, DGXI	Boulevard du Triomphe 174	B-1160 Brussels	Belgium	EC DGXI	+3222950287
Mr Pascal Magoarou	European Commission, DGXI	Boulevard du Triomphe 174	B-1160 Brussels	Belgium	EC DGXI	+3222961845
Mr Anders Grimvall	Swedish University of Agricultural Sciences	Dep. of Statistics	PO Box 7013	S-75007 Uppsala, Sweden	EU DG XII	+4618671836
Mr Evangelos Papathanassiou	European Environment Agency	Kongens Nytorv 6	DK-1050 Copenhagen	Denmark	EEA	+4533367155
Mr Ola Kaarstad	Norsk Hydro	Bygdøy allé 2	N-0240 Oslo	Norway	EFMA	+4722432946
Ms Merete Johannessen	Norwegian Institute for Water Research	PO Box 173 Kjelsås	N-0411 Oslo	Norway	ETC/IW	+4722185140
Mr Tor Bokn	Norwegian Institute for Water Research	PO Box 173 Kjelsås	0411 Oslo	Norway	ETC/MC	+4722185173
Mr Claude Vidal	EUROSTAT	Jean Monnet Building	JMO C4/128	L-2920 Luxembourg	EURO-STAT	+352430137182

Name	Adr1	Adr2	Adr3	Adr4	Country/ Org.	Phone
Mr Ain Lääne	Helsinki Commission	Katajanokanlaituri 6B	FIN-00160 Helsinki	Finland	HELCOM	+358962202221
Mr Sverre Fosse	Aust-Agder County Council	Fylkeshuset	N-4800 Arendal	Norway	North Sea Comm.	+4737017345
Ms Hanne-Grete Nilsen	Secretariat of the Fifth North Sea Conference	Ministry of Environment	PO Box 8013 Dep.	N-0030 Oslo, Norway	NSC Secretariat	+4722245808
Mr Ben van de Wetering	Oslo and Paris Commissions	New Court, 48 Carey Street	London WC2A 2JQ	United Kingdom	OSPAR	+441712429927
Mr Marc Braun	ICPR (Rhine Commission)	IKSR, Hohenzollernstr. 18	Postfach 309	D-56003 Koblenz, Germany	Rhine Comm.	+4926112495
Mr Gerhart Schneider	UNEP- Water Branch	PO Box 47074	Nairobi	Kenya	UNEP	+2542623230

Chairmen at the Working Sessions:

Name	Adr1	Adr2	Adr3	Adr4	Country/ Org.	Phone
Session 1: Mr Peter Gammeltoft	European Commission, DGXI	Boulevard du Triomphe 174	B-1160 Brussels	Belgium	EC DGXI	+3222968695
Session 2: Mr John Rune Selvik	The Norwegian Pollution Control Authority	PO Box 8100 Dep	N-0032 Oslo	Norway	Norway	+4722573633
Session 3: Mr Hubert Tunney	TEAGASC	Johnstown Castle Research and Development	Wexford	Ireland	Ireland	+3535342888
Session 4/1: Mr Jørgen Windolf	National Envronmental Research Institute	Vejlsøvej 25	DK-8600 Silkeborg	Denmark	Denmark	+4589201400
Session 4/2: Mr Hein Rune Skjoldal	Institute of Marine Research	PO Box 1870 Nordnes	N-5024 Bergen	Norway	Norway	+4755238500
Session 5: Mr Georges Pichot	Unité de Gestion du Modelè	Mathématique de la Mer du Nord	Gulledelle 100	B-1200 Bruxelles	Belgium	+3227732111

Rapporteur Session 1: Mr Stig A. Borgvang, NIVA, Norway
Rapporteur Session 2: Mr Stig A. Borgvang, NIVA, Norway
Rapporteur Session 3: Ms Marianne Kroglund, NIVA, Norway
Rapporteur Session 4: Mr Jon Lasse Bratli, NIVA, Norway

Workshop Secretariat: Mr John Rune Selvik, SFT, Norway
Mr Stig A. Borgvang, NIVA, Norway
Ms Anja Skiple, NIVA, Norway

6. Annex D: Chairman's Report. Working Session 1. Conceptual Framework of HARP

Working Session 1 was chaired by Mr Peter Gammeltoft, DG XI of the EC. It was attended by participants from 13 countries and 8 international organisations.

6.1 Background

Scope

Accepting the need for harmonisation of nutrient reporting, the main objectives of Working Session 1 are:

- to make recommendations as regards the identified 'key issues'; and
- to examine the proposed definitions of key words and expressions used in HARP.

Working Session Topics

1. On the basis of the outcome of the 1997 meeting of the OSPAR Working Group on Nutrients (NUT), to consider the consequences of the NUT recommendations as regards the HARP development by assessing whether the draft 'consequences' are relevant and if there are additional 'consequences'.
2. To assess whether the list of proposed international organisations is appropriate, and whether the data requirements from these organisations are sufficiently clear for the purpose of HARP.
3. To examine the draft definitions of words and expressions (HARP 1-1-98), and to decide whether further clarification is needed from any of the other Working Sessions.

6.2 Chairman's Introduction

In his introduction, the Chairman highlighted, *inter alia*, the following points:

- the development of HARP is considered to be of importance for many international organisations and European countries;
- for countries being Contracting Parties/Member States to several international organisations, the reporting requirements are heavy, and harmonisation amongst these organisations would rationalise the work for the countries;
- the Workshop should provide recommendations as to the further development of HARP, and in that respect, he hoped that the Workshop participants would express themselves as individuals, in order to ease the discussions and improve the outcome of the Workshop.

6.3 Discussions

The following summarises some of the points raised in discussions, but it is not intended to reflect all the points made during discussions.

Consequences of the NUT recommendations

During discussions, it was pointed out that:

- it would be necessary to consider also the handling of the data (data management);
- the availability of information and the willingness of countries to submit information need consideration;
- the seasonal variations need to be considered, in particular for more nutrient sensitive areas;
- the issue of atmospheric deposition needs to be taken into account;
- HARP should make provisions for future needs as regards nutrient reporting and not only consider the 50% reduction target.

6.4 Conclusions

After further discussion, the Chairman concluded that:

- the HARP development should encompass not only reporting related to the 50% reduction target, but also other reporting requirements related to nutrients, and enable the assessment of the effects of measures implemented and the need for further measures;
- HARP should include procedures for calculating the background load of nutrients;
- the development of HARP should include an assessment of the sampling frequency and time resolution in the Riverine Inputs and Direct Discharges (RID) programme; where a tighter time resolution than one year may be necessary;
- the issue of bioavailability should not be part of the HARP development;
- procedures for data collection per source, including development of methods for quantifying losses from agricultural activities, should be part of HARP (see Working Sessions 2 and 3);
- HARP should comprise a procedure for 'normalising a year';
- it is necessary to distinguish between atmospheric deposition of nutrients within the catchment areas and the direct deposition of nutrients on marine waters;
- the links between the data should be considered by Working Session 5, whilst the data management issues need to be considered by the EEA, EC, ICES, OSPAR and other relevant international conventions;
- future water management policy development is likely to emphasise the need to report on a catchment area basis, e.g. the Proposal for a Council Directive establishing a framework for Community action in the field of water policy;
- all catchments or groups of catchments draining into Convention waters (OSPAR framework) should be considered;

- criteria for the selection of catchment size should be related to the state of the receiving water body in order to facilitate the development of appropriate action plans.

6.5 Relevant International Organisations

UNEP

The representative of UNEP explained that:

- to date, UNEP had concentrated its efforts on tropical and subtropical areas, but it is likely that more effort would be concentrated on Europe in the future, provided that the necessary funding becomes available;
- the development of HARP is of considerable interest for UNEP, and UNEP would endeavour to take a more active part in the development in the future.

EEA

The representative of the EEA explained that:

- one main goal of the work within the EEA is to avoid duplication of work and, for this reason, every harmonisation effort is of great interest for the EEA;
- the EEA had established an interregional forum in order to co-ordinate data handling procedures;
- the EEA would consider ways of taking a more active role in the development of HARP;
- the EEA monograph on eutrophication would soon be ready.

EC

The representative of the EC explained that:

- the DG XI already supported the development of HARP, e.g. by co-organising the current workshop;
- the work on the development of HARP could benefit the data reporting on at least two existing Directives, namely the Nitrate Directive and the Urban Waste Water Directive, as well as the Proposal for a Council Directive establishing a framework for Community action in the field of water policy;
- the harmonisation effort within HARP would be followed closely by the EC.

HELCOM

The representative of HELCOM explained that:

- work on compilation loads had been carried out in the HELCOM framework over the last 10 years, including the establishment of guidelines; and the next pollution load compilation would be ready by the end of this year;
- co-operation with OSPAR is considered to be very useful;
- HELCOM considers that the development of HARP is important also for HELCOM, and particularly because four HELCOM Contracting Parties also are Contracting Parties to OSPAR.

The Rhine Commission

The representative of the Rhine Commission explained that:

- as regards phosphorus, the Rhine Commission has set quality targets for the river Rhine, that these targets would be reached soon and the work related to phosphorus inputs is terminated;
- as regards nitrogen, the development of HARP would be very useful for the Rhine Commission in relation to nutrient emissions, whereas the imission method had an already agreed sampling frequency, analysing methods, procedures for data handling and reporting;
- the Rhine Commission has effectively completed this exercise which shows that harmonisation is possible. Nevertheless, they would be willing to integrate any relevant conclusions from HARP into their work.

The Meuse and Scheldt Commissions

A representative of Belgium stated that:

- the Meuse and Scheldt Commissions would be informed about the development of HARP;
- he was convinced that the member states of the said Commissions would show great interest in the HARP development;
- the Meuse and Scheldt Commissions are in the process of harmonising their reporting on nutrients.

List of other relevant international organisations

After discussion, the Chairman suggested to add the following organisations to the list of relevant organisations to be informed about the development of HARP;

- UN-ECE
- Oder Commission
- Barcelona Convention
- Black Sea Convention

Mr Stig A. Borgvang explained that these organisations will be kept informed about the HARP development, on the same basis as the 'OSPAR countries' and the IGOs and NGOs which already part the 'HARP family', as soon as the necessary contact point and addresses has been obtained.

6.6 Words and Expressions

Document HARP 1-1-98 includes a draft list of words and expressions defined for the purpose of HARP. During discussions, it was pointed out that, *inter alia*, the definitions of 'nutrient background load' and 'nutrient retention' need to be re-examined.

After further discussion, the Chairman invited the various Working Sessions to consider the definitions relevant to their work.

7. Annex E: Chairman's Report. Working Session 2. Diffuse Sources

Mr John Rune Selvik, Norway, chaired Working Session 2. It was attended by participants from 14 countries and 9 international organisations.

7.1 Background

Scope

The main objective of Working Session 2 was to investigate the scope for harmonising calculations and estimates of the nutrient load from diffuse sources such as:

- nutrient losses from the agricultural sector;
- nutrient losses from the forestry sector; and
- nutrient background load.

Working Session Topics

1. Define which sources/categories should be taken into account, with a possible indication of their importance, bearing in mind that the situation may vary from one country to another.
2. Consider whether each sector/category requires a specific quantifying method and whether:
    - there is scope for suggesting a common method of quantifying nutrient losses from diffuse sources and, if so, describe this method; or if
    - several methods should be used and, if so, describe these methods and suggest ways of comparing them.
3. Consider how the methods for quantifying nutrient losses could be developed in such a way that they take account of the consequences of the implementation of measures.
4. Define the notion 'Background load of Nutrients'.
5. Agree on procedures for quantifying the background load of nutrients.
6. Agree on a procedure for 'normalising' the nutrient run-off from a specific year, in order to use nutrient figures from normalised years for the quantification of nutrient losses from diffuse sources.

7.2 Chairman's Introduction

In his introduction, the Chairman highlighted, *inter alia*:

- that the quality of the results of the Working Session depended on the willingness of the participants to contribute in a positive way, i.e. there is a common responsibility to enable progress on, in particular, the agriculture sector, which is probable the most difficult sector to handle;
- that it would be necessary to define the notion of "diffuse sources";
- a list of requirements as regards a reporting system on diffuse sources, extracted from documents submitted to the Workshop. Furthermore, the Chairman pointed out that these requirements need to be further developed. Such requirements are as follows:

  - both total nitrogen and total phosphorus from agricultural sources and other diffuse sources should be included;

  - nutrient figures should be reported on a catchment level;

  - comparable national nutrient figures should be reported;

  - existing procedures should be used to the extent possible;

  - statistical data to make the procedures operational in the various countries is needed;

  - to quantify the effect of the measures taken to reduce the losses of nutrients to surface waters.

7.3 Discussions

The following summarises some of the points raised in discussions, but it is not intended to reflect all the points made during discussions.

Categories/sources of nutrient emissions to surface water

During discussions, it was pointed out that:

- by defining 'point sources', the remaining will be diffuse sources;
- the main anthropogenic diffuse sources of nutrients are:
  - agriculture
  - forestry
  - transport
  - industry

  From these sources there are emissions to:

  - air
  - soil
  - water

- nutrients follow different pathways to reach surface water. The pathway through air is well known and surface deposition can be apportioned in the different sources for admission to air (LR-TAP Convention);
- it is important to avoid 'double-counting';
- the emphasise should be put on sources of nutrient inputs to surface waters.

Definition

After discussion, the Chairman concluded that the definition of point sources, as agreed by Working Session 3, could be used also to define diffuse sources, namely

A point source is a clearly identified, individual discharge (or a number of discharges) in close proximity to a watercourse or a body of water, such as effluent discharges from a sewage treatment works via an outfall pit or channel. Small, dispersed point discharges (e.g. from scattered dwellings or from agriculture) can be dealt with as diffuse sources. It follows that any source of nutrients, which is not accounted for, as a point source should be included as a diffuse source.

Based on this definition, discharges from scattered dwelling may be fit into the category of diffuse sources. Furthermore, aquaculture falls into the category of point sources.

Methods for quantifying the nutrient load/ data collection per source

Several participants presented models used in their countries in order to quantify the nutrient loads from agriculture activities, such as:

- emission factor methods
  -the model used in Switzerland, the "Braun model"
- process modelling:
  - the GIS oriented dynamic model of the Netherlands (see document HARP 2-10-98, 2-11-98)
- nutrient balance methods:
  - the method used in Germany (see document HARP 0-6-98) and Belgium (based on the German method)

Furthermore, the representative of EUROSTAT presented its soil surface N-balance approach, based on an OECD model. This model is based on the PARCOM Guidelines for calculating mineral balances for the whole agricultural sector, including air emission during storage and spreading of manure. Many participants held the view that the nutrient balance approach would be a useful indicator of agricultural practices and their nutrient inputs to the environment.

The further discussion on this topic took place in a sub-group, and the outcome of these deliberations follows below.

Consequences of the implementation of measures

One requirement for quantification methods is that each category of measures taken to reduce nutrient input to surface waters should be reflected as changes in quantified losses of nutrients to surface waters. It was stated that there were several models available which would enable the assessment of the consequences of the implementation of measures to reduce nutrient losses, provided that the models comprise a parameter description of the measure(s).
It was considered of importance to convey to policy makers that in the case of interaction with groundwater, the big time-lag would, in many cases, jeopardise the assessment of the effectiveness of measures.

Background Load of Nutrients

Definition

It was pointed out that there were several possible definitions of 'background load of nutrients'. However, it is necessary to distinguish between natural nutrient background load and nutrient background load.

Some participants questioned if it is possible to separate the anthropogenic part of the atmospheric nutrient deposition from the total atmospheric nutrient deposition. Furthermore, the question of atmospheric deposition on land was considered. It appeared that the methods to separate deposition onshore from the total nutrient losses to surface waters are insufficient.

Deposition directly on water bodies may be significant in some areas. Since a source apportionment of deposition onshore can not be reflected in the estimated nutrient losses to surface waters, a source apportionment of deposition on water bodies is therefore of less relevance.

Several participants expressed the view that it is necessary to focus on the 'real problems', i.e. the quantification of the nutrient load from diffuse sources as, in their view, the background load of nutrients which, in many cases, would be insignificant.

After further discussion, the Chairman concluded that:

- the atmospheric nutrient deposition on water bodies should be separated from the nutrient background load;
- the nutrient background load should be described as the natural background load of nutrients from all areas, describing the situation without anthropogenic influence[4].

Quantification of natural background load of nutrients

Many participants considered that monitoring of the nutrient load from small catchments would enable the quantification of the background load of nutrients in larger areas.

After discussion, the Chairman concluded that relevant catchments in non-disturbed areas would provide figures for the natural background load of nutrients.

[4] See Dutch comment under section 2.

Direct estimation of nutrient background concentrations in running waters was mentioned as an alternative approach.

Normalised Year

The hydrological approach taken in The Netherlands includes several approaches, *inter alia*, 15 years series, 5 years series and moving averages.

It was considered important to have a procedure for 'normalising a year'.

After discussion, the Chairman concluded that a hydrological approach to normalising data would be possible, and that to take a period of 15 years could be the starting point for further consideration.

7.4 Outcome of Sub-group discussions

Mandate

The mandate given to the subgroup was to look in more detail into the possibility of describing a structure/frame for the further development of a common methodology for quantifying nutrient losses from agricultural activities to surface waters taking into consideration, *inter alia*:

- categories of nutrient losses;
- factors that affect the nutrient losses;
- appropriate methodology to obtain a range of possible emission factors;
- space resolution needed e.g. catchment/sub-catchment.

7.4.1 Discussion

In discussion, two possible main approaches for quantifying nutrient losses from agricultural activities were pointed out:

Method 1: River monitoring and source apportionment

Source apportionment done on monitored river load at the lowest point of the catchment under consideration enables the estimation of the agriculture nutrient load from the catchment. Source apportionment does not normally allow for further subdivision of the agriculture sector into loss categories such as type of grassland and type of arable land.

In order to facilitate source apportionment, figures on nutrient losses from point source data are needed.

Method 2: Estimating nutrient inputs to surface water based on agriculture statistics

It is necessary to have procedures for estimating agricultural nutrient losses from information/statistics about the agricultural activity in the area/catchment under consideration. Necessary information for this approach is the census-statistics, which is available for all European countries. Census data is harmonised and reported regularly to EUROSTAT. This method enables a sub-division of the agricultural sector into nutrient loss categories such as grassland. Grassland may be associated with livestock numbers and arable land which again may be differentiated in more detail into crop types.

Data from a census unit (the size of the unit varies between countries) includes figures on areas used e.g. for wheat production or cattle. Based on such data, a nutrient balance calculation may be made and result in figures for total nutrient losses to the soil.

Each of the above mentioned methods can be valuable for validation of the others.

The sub-group did not discuss details as regards nutrient pathways other than leaching from the root zone, because this was considered as the most important pathway where progress could be achieved.

The dynamics processes in the soil (subsurface retention) depend to a great extent on soil type, hydrology and fertiliser application rates resulting in, *inter alia*, nutrient losses to surface waters. Some countries estimate potential leaching from the root zone and establish a set of coefficients for root zone leaching (e.g. 40 kg N/ha/y for wheat production land in an UK catchment). A numerical model simulates the process in the soil with nutrient losses to surface water as one possible output for the specific type of agriculture land considered.

Others, like Switzerland and Norway, use an empirical approach and have developed a set of area/soil specific coefficients that directly calculate the losses of nutrients to surface waters. Switzerland uses its coefficients in a model approach which enables "manipulation of coefficients" to reflect actual measures and scenarios, and aggregation of data at relevant levels.

The German delegation explained that their national approach currently includes neither models nor estimation of leaching from the root zone, but uses nutrient concentrations and nutrient discharges from groundwater and drainage water for estimating the leaching to surface water. The reason is that there is insufficient knowledge about retention processes in the large groundwater aquifers of the loose rock regions with a small base flow.

The sub-group recognised that nitrogen is the most important nutrient factor in marine eutrophication in most areas, but HARP should include phosphorus because of it's important for eutrophication in inland waters and in some marine areas.

7.4.2 Conclusions

The sub-group recommended the use of already harmonised, agriculture census-data as the basis for establishing a common ground for developing a database of agricultural activities and land types on an aggregated information level such as groups of municipalities representing catchments. Nutrient balance calculations may be used for quantifying nutrient inputs to soil.

The sub-group could not, at present, recommend a single instrument (model or method) for estimating the transformation of nutrients in the soil and subsequent loss of nutrients to surface water, but recognised that several models/methods used on a national level enable such estimates to be made. However, the group saw a potential in a longer perspective to agrees on a single instrument, but pointed out that such an agreement requires a programme for validations or comparison of the various models and methods.

The sub-group emphasised the need to have a workable procedure as part of HARP in the shorter perspective and recognised the potential for carrying out an exercise applying several of the methods/models for the same catchments. This could possibly lead to some guidance for how to compare data estimates from different models or methods. Such an approach could increase transparency and facilitate the comparability between catchments. The reason is that the detailed description on how the figures have been estimated would be available within the HARP framework, and the data itself may be corrected systematically according to agreed harmonised procedures.

The sub-group pointed out that it was important to define the links between the different types of load estimate approaches such as:

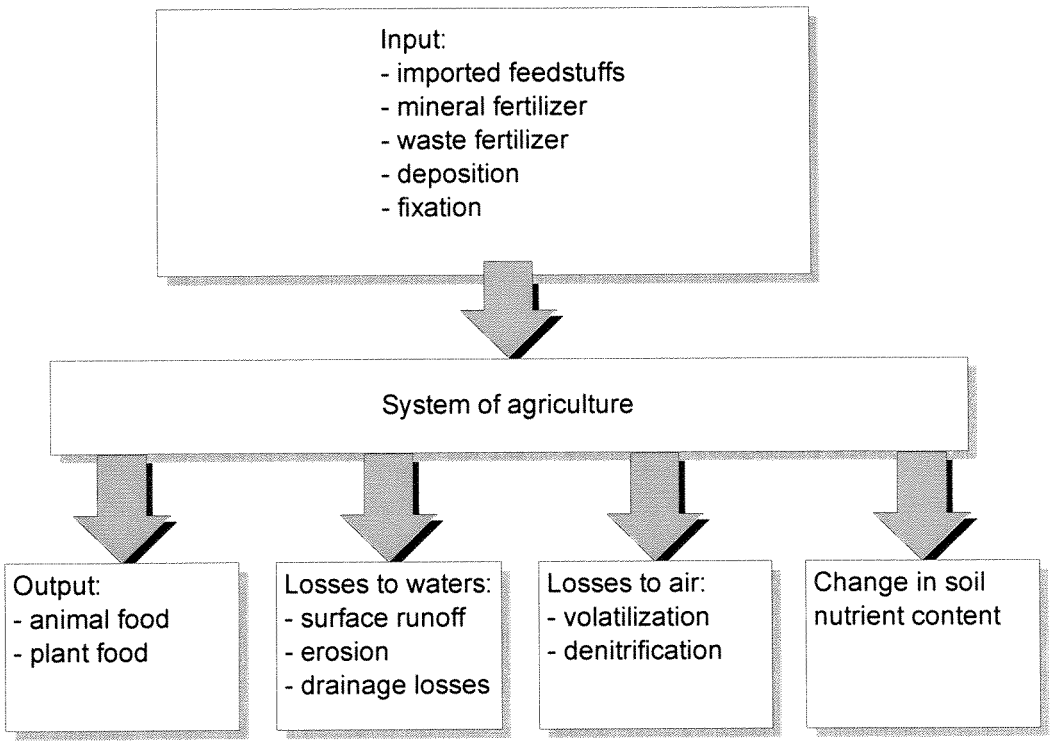
- nutrient balance approach
- modelled nutrient losses including imission factor methods
- source apportionment of the river nutrient load

It was pointed out which stages of the calculations that were shared by various models, and which stages that permit proper validation and thereby could provide accurate figures on nutrient losses.

It was recommended that in reporting on modelled nutrient loss estimates on a stage by stage basis, data for the respective stages should be presented, and the methods used to move from one stage to the next should be explained. This would increase transparency and the understanding of the relationship between different estimates, and facilitate progress towards harmonisation of methodologies.

It was recognised that not all stages could be completed for all catchments. However, the aim should be to clarify the whole sequence of stages, for at least some catchments, in order to facilitate validation and model development.

For the purpose of further illustration, the sub-group developed some figures on the basis of the information submitted to the Workshop (see figures 3-7).



Following PARCOM-guideline (1994)

Figure 3. Relationship between nutrient balances and nutrient losses to water

Figur 3 shows the link between nutrient balance and nutrient losses to water. It is developed on the basis of the guidelines established by the Paris Commission in 1995 (PARCOM Guidelines for Calculating Mineral Balances).

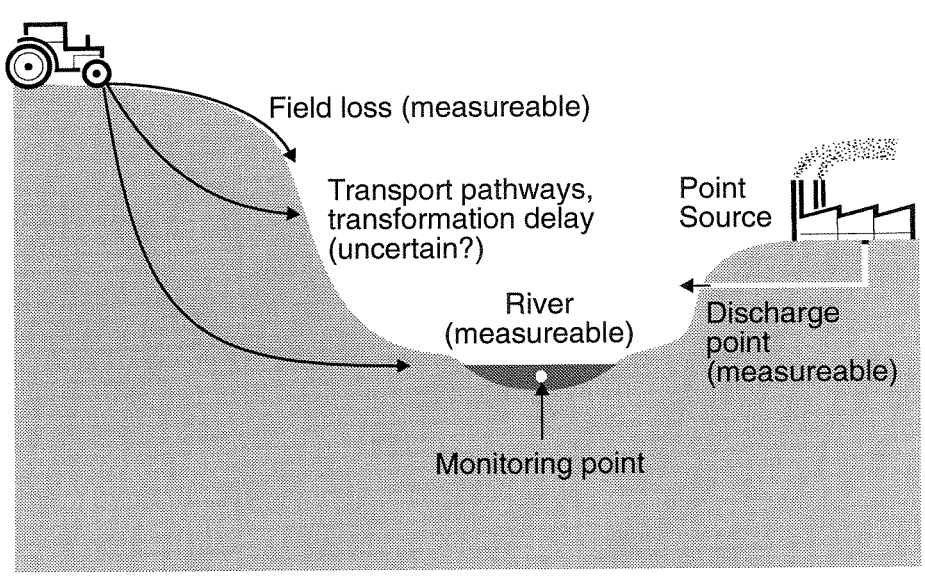


Figure 4. Stages in modelling nutrient losses to rivers

Figure 4 illustrates the main stages in the modelling of nutrient losses and the nutrient transport to rivers. It points out that the field losses of nutrients, the nutrient concentrations in the water bodies and the nutrient discharges from points sources can be quantified, but that the transformation processes and the time-lag are more difficult to quantify.

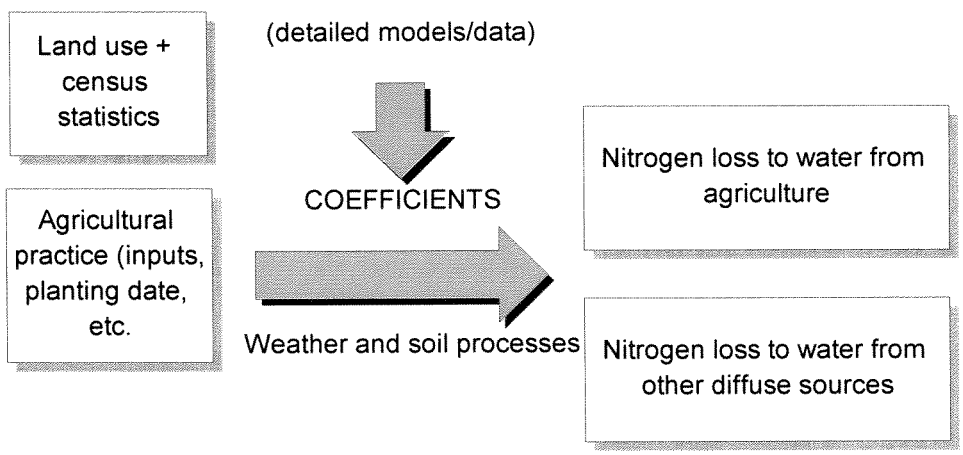


Figure 5. Nitrogen losses from the field

Figure **5** shows the first stages in modelling nitrogen losses to water from agriculture. The common data inputs are:

- data on land use (including crop areas, livestock numbers and non-agricultural land) for the whole catchment;
- other environmental data (soils, climate/weather);
- assumed agricultural practices (fertiliser and manure management, planting dates etc.).

The method by which this is turned into estimates of nitrogen loss varies and should be explained.

The output represents the total annual loss of nitrogen from agricultural land to surface water.

Because these nitrogen losses are at the field scale and refer to a single hydrological year, they can be related to field measurements and hence partly be validated.

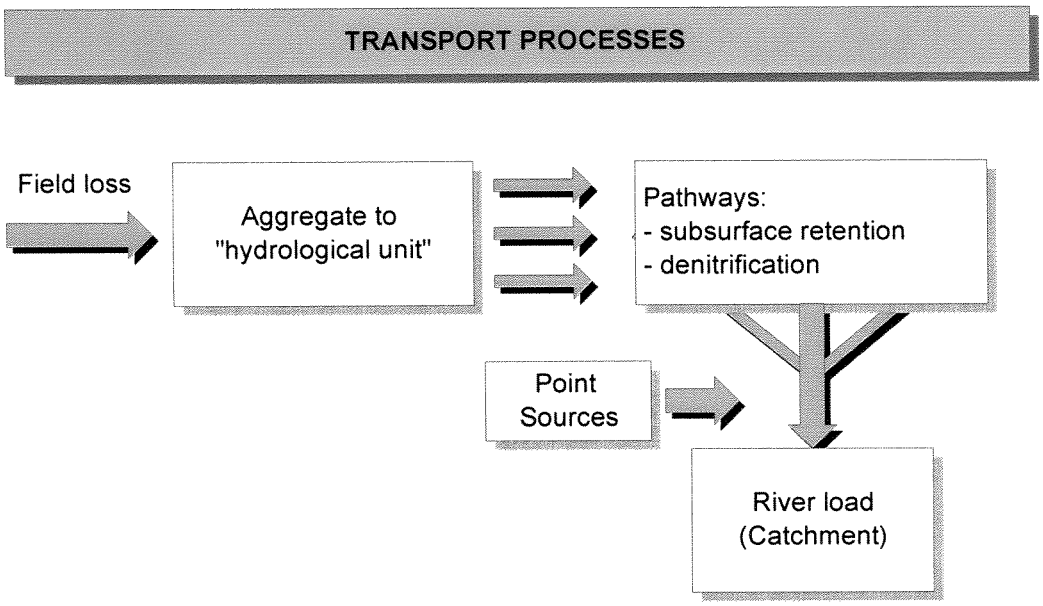


Figure 6. The total estimated nutrient river load, containing nitrogen from point and diffuses sources and all relevant processes which can be validated against measurements.

Figure 6 shows the relationship between annual field losses of nitrogen and river nitrogen load at the measurement point. The data items to be reported are:

- field level nitrogen loss estimates (from Figure 5); and
- nitrogen input from point sources which can be measured, in principle, as required within OSPAR.

The processes by which field losses of nutrients result in river load may be fast and straightforward or, on the contrary, very complex. For many rivers these processes are incompletely quantified. The assumptions and methods should be explained. The quantifications provide:

- modelled river nitrogen load and water flux, which can then be compared with;
- measured nitrogen and water flux.

By the method of quantification, the total river nutrient load is apportioned between sources (diffuse, point, groundwater etc.).

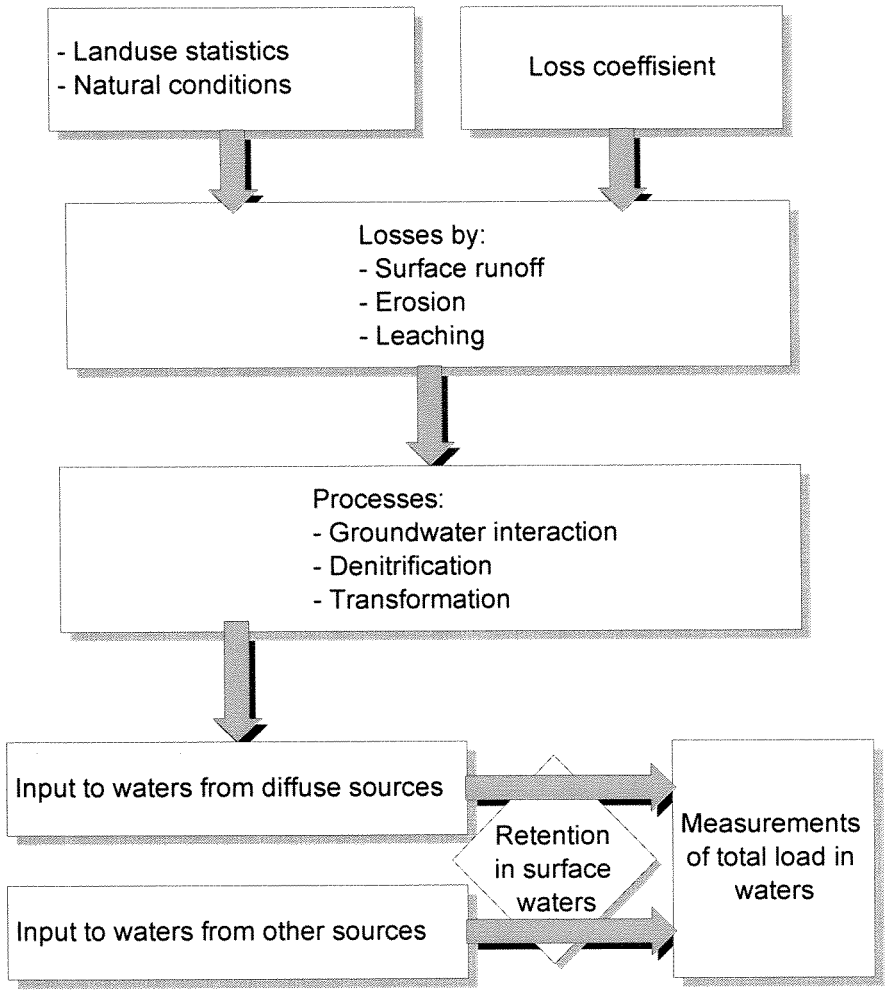


Figure 7. Proposal for a procedure for estimating nitrogen inputs from diffuse sources and the contribution to the total nutrient load.

Figure 7 shows a possible procedure to estimate nutrient losses from diffuse sources to water, including the nutrient losses from agriculture as shown in Figure 3.

The methods are complementary, river measurements give actual nutrient load, whereas modelling is needed for policy purposes to validate source apportionment calculations and to predict the impact of change in agricultural practices.

The above mentioned approach is proposed for nitrogen.

7.5 Proposal for quantifying methods for estimating the non-anthropogenic or natural background load of nutrients within HARP

7.5.1 Introduction: Current knowledge from measurements

Two documents were submitted to the Workshop dealing specifically with 'background load of nutrients', namely documents HARP 2-1-98 and HARP 2-13-98. The information in these two documents and the contributions from Workshop participants provides the basis for the following assumptions:

- the background load of nitrogen in Europe range from 50 to 500 kg N/km^2/year, i.e. 1,3-2,0 mg N/l. However, this is strongly dependent on the afforest proportion of the pristine catchments;

- the background load of phosphorus in Europe generally ranges from 2 to 10 kg P/ km^2/year, i.e. 0,05 mg P/l. In areas such as alpine regions above the tree limit, the losses of particulate P may be as high as 150 kg P/ km^2/year. It is assumed that factors such as geology and weathering are amongst the most important factors determining the loss of phosphorus;

- it is assumed that the background levels of organic nitrogen and phosphorus may be as twice as high from peatland bog area, although it should be borne in mind that the data is scarce;

- the lowest measured deposition rates in Northern Europe of less than 100 kg N/ km^2/year and of 5-10 kg P/ km^2/year could be taken as natural background deposition values;

- nutrient mass balances in individual regions (n), and measurements in glacier ice are additional sources of information about natural conditions;

- nutrient mass balances may be calculated as follows:

$$N_{fixation}+N\,d_{eposition}=N_{denitrification}+N_{leaching}+N_{concentration\ change}$$

- the total deposition of nutrients = anthropogenic deposition + natural deposition

7.5.2 Suggested calculation methods

The following procedures for quantifying the nutrient background values are proposed;

- the nutrient concentration or load values[5] should be chosen from areas which are as close to pristine as possible. It should be noted that not all countries would have 'close-to-pristine area'. In such cases, data may be taken from pristine catchments in other countries with similar geological and climatic conditions;

- areas with special natural conditions should be excluded in the calculations of special nutrient background values, as well as areas with special anthropogenic influences such as extensively drained areas, or areas with significant land use prior to measurements, areas with settlements;

[5] It appears that the 'concentration' approach is to be preferred.

- natural retention of nutrients should be considered in areas where there are lakes in the system or where the specific runoff rate is 10-15 l/ km^2/s;

- the difference between the measured deposition and the calculated anthropogenic fraction (EMEP), multiplied by the share of the open water areas in the catchment should be used to quantify the direct nutrient input to water bodies;

- for calculating the nitrogen background load from a data set with differing proportions of unmanaged areas, the values should be correlated against the unmanaged share and extrapolated to fully unmanaged areas (100% unmanaged value). If this is not done, the nitrogen and phosphorus background value should be chosen close to or below the median of the unmeasured values;

- if it is assumed that the nutrient concentration is close to zero, there is another calculation option, namely;
  Leached nitrogen = total leached * natural deposition/total deposition

7.6 Proposal for procedures for 'Normalising Years'

Procedures for normalising nutrient loads

Procedures for defining the major approaches for *hydrological* normalisation. Time series of water quality data are often strongly dependent on climatic factors. For example, it is a well-known fact that the load of both organic and inorganic substances may strongly depend on runoff. Annual variations in nutrient runoff may vary with at least a factor of four or more between years, even in the same decade. It has also been shown that statistical analyses of relationships between e.g. nutrient load and runoff may provide information and clarification as to whether observed temporal changes in riverine loads are caused by anthropogenic activities or merely reflect natural variation in river flow. Pure modelling approaches have also been developed in several countries. The following two approaches for flow-normalisation were identified:

1. Empirical hydrological normalisation (based on monitoring data)

A *Methods that can be applied to systems with random variation around a fairly constant long-term mean.*

B *Methods that can be applied to systems with pronounced trends.*

C *Methods that can be applied to systems where the runoff can be divided between various pathways.*

Empirical relationships (based on monitoring data) between runoff and nutrient concentrations, and transports of nutrients have been studied by many scientists. Most of the studies have aimed at estimating and describing fluxes and concentrations of nutrients under different hydrological conditions (e.g. different periods of the year). These relationships may also be used for flow-normalisation.

Flow-normalisation are normally intended for situations in which the momentary concentration or riverine load is a time-independent function of the runoff at the same moment or of time-lagged runoff values (category 1A). However, concentration-runoff and load-runoff relationships can sometimes change gradually over time. An alternative method that takes this into account has been developed in Sweden (category 1B: Stålnacke&Grimvall). The method has been tested in 80 Swedish rivers, Oder, Vistula, Daugava and Rhine Rivers, as well as in smaller agricultural watersheds of less than 16 km^2 in Sweden and Norway.

A similar approach for flow-normalisation of nutrient loads in streams is used in Denmark (Kronvang and co-workers) where nutrient leaching models are also used for studies related to evaluation of changed nutrient losses on changed agricultural practises.

In Germany, research has been conducted trying to separate the nutrient emissions and the runoff according to the main hydrological components (category 1C: Behrendt and co-workers). For the detection of anthropogenic trends, a window technique is developed, where mean annual nutrient discharge, concentration and load is calculated for discharge windows lower and higher than the mean long-term discharge.

2. Model-based hydrological normalisation

The empirical approaches have the advantage of being easily applicable, and can be used at various spatial scales (from small homogenous agricultural fields up to entire river basins). However, in systems with large 'memory-effects', such as small agricultural catchments, physical or process-oriented models (e.g. SOIL-N, HBV-N, DAISY, and ANIMO) are viable alternatives.

These modelling approaches can be used both for determination of the actual nutrient runoff and for forecasting and evaluation of effects of measures in e.g. changed agricultural practises. The main obstacle is the normally large data-input requirements. Research and development using the SOIL-N model for climate and hydrological normalisation is in preparation by SLU (Sweden).

In the Netherlands, the model ANIMO, in combination with the hydrological model DEMGEN, has been used for a number of years at different scale levels. Nutrient runoff data for specific years are modelled with the use of real meteorological data. Normalisation is performed in two ways;

- firstly, scenario analysis are run, using input data for the period 1971-1985; which is considered as representative for the Dutch climate. The results are graphically presented as moving averages over a 15 year-period;
- secondly, for trend analysis and comparison of different yeas, the nutrient runoff of these years is calculated using the meteorological data for 1985. This year is chosen because it is the reference year for input reductions within the North Sea Conference framework and OSPAR.

Conclusions

It is suggested that various alternatives in method-category 1 may, due to its simple data requirements, be compared within the framework of the HARP project. Modelling-approaches could also be considered whenever possible. Independently of the method used for the normalisation, a normalised year should not only represent the long term mean of discharge, but also the mean contribution of the different hydrological components as base flow, interflow and surface runoff, of the nutrient discharge.

8. Annex F: Chairman's Report. Working Session 3. Point Sources

Working Session 3 was chaired by Mr Hubert Tunney, TEAGASC, Ireland. It was attended by participants from 11 countries and 4 international organisations.

8.1 Background

Scope

The main objective of Working Session 3 was to review nutrient discharges from sources such as:

- municipal waste water;
- scattered dwellings;
- industry;
- aquaculture; and
- point sources in agriculture.

Working Session Topics

1. Working Session 3 should define point sources, and select the categories, which should be dealt with.

2. Further, Working Session 3 should consider whether:
    - there is a scope for suggesting a common method, including sampling frequency, of calculating nutrient discharges from point sources, if so, describe this method; or
    - several methods should be used and, if so, describe these methods and suggest ways of comparing them.

3. Consider whether data other than discharge/emission/input data should be fed into HARP such as data on Wastewater Treatment Plant (WWTP) type and size, number of p.e. in the catchment and information about industry not connected to WWTP.

On request from Working Session 1, the following items were also discussed:
- definition of point sources
- timescale (annual and seasonal)
- catchment or national level
- links between relevant data

8.2 Chairman's Introduction

In his introduction, the Chairman highlighted, *inter alia*, the following points:

- the Working Session should contribute, in the best way possible, to increase the harmonisation of reporting procedures and transparency, in the interest of all countries;
- the Working Session should address the above items in a simple and concise way.

8.3 Discussions and Conclusions

The following summarises the main points raised in discussions, but it is not intended to reflect all the points.

Definition of Point Sources

During discussions, it was pointed out that different countries use different criteria when categorising discharges such as from scattered dwellings, aquaculture and point sources in agriculture as point or diffuse sources. To deal with the problems of defining a point source, a definition was proposed and agreed upon by the participants.

> *Point Source (of Nutrients) may be defined as:*
>
> *A clearly identified, individual discharge (or a number of discharges in close proximity) to a watercourse or a body of water, such as effluent discharged from a sewage collecting and treatment system via an outfall pipe or channel. Small dispersed point discharges (e.g. from scattered dwellings or from point sources in agriculture, e.g. farmyards) can be dealt with as diffuse sources. It follows that any source of nutrients, which is not accounted for, as a point source should be included as a diffuse source.*

Based on this definition, discharges from scattered dwellings can be included as diffuse sources. Furthermore, aquaculture can be placed in the category of point sources. In general, where estimates are made on statistical information without detailed measurements (*e.g.* scattered dwellings and farmyards), many countries include this as diffuse sources.

Common methodology

It was generally agreed that it would be preferable to use a common method with regard to sampling and calculation methods. A common approach for estimating nutrients in point source discharges is provided within the scope of EC and OSPAR work. The Principles of OSPARs Comprehensive Study on Riverine Inputs and Direct Discharges (RID; Document HARP 2-2-98) provides methodologies for estimating nutrient discharge loads by measurement and by calculation. Annex I of the Urban Waste Water Treatment Directive (91/271/EEC) provides methodologies for monitoring the concentrations of nutrients in treatment works' effluents. The Chairman proposed that these two approaches could be combined as a basis for a common harmonised monitoring approach for point sources.

The said EC Directive gives information on frequency of sampling for nitrogen and phosphorus concentrations in relation to population equivalents (p.e.) as outlined in Annex I.D.3[6] of the EC Directive for the discharges to sensitive areas which are subject to eutrophication as identified by Member States. Annual load should be calculated as a product of annual flow and flow weighted concentration as outlined in RID. The Chairman proposed that a similar approach could be used for industrial point sources. For point sources, he recommended that Urban Waste Water Treatment Plant and Industrial Plant load figures should be reported separately.

Other types of data

On the question of other types of data being fed into HARP, some concern was expressed as to a possible 'overloading' of HARP. The Chairman concluded that the HARP system should deal primarily with data on nutrient discharges and additional data required targeting the source of the discharge. In order to keep the HARP system as simple and clear as possible, other types of data should, at this point, not be included, but could be made available at a future date, if required, to improve transparency and validation of data.

In future, the relative contribution from industry, agriculture and human populations would be useful additional data as an overview of the pollution sources in catchments.

Annual and seasonal sampling: collecting and reporting

The Chairman concluded that annual collecting and reporting, in most cases, serves the purpose of HARP. However, from larger sources with large seasonal variability (*e.g.* food-processing industry), a more frequent sampling may be necessary in order provide information on the seasonal variations of the discharges. For minor point discharges or those with little variation between years, it may be more efficient in terms of resources to monitor/estimate the annual load less frequently than every year. However, for the sake of completeness, the Chairman proposed that the estimates should be reported each year together with the annual estimates for point sources.

Catchment or national level

After discussion, the Chairman concluded that reporting was necessary on a catchment, as well as on a national basis.

Links between data

After discussion, the Chairman concluded that the EC, EEA and International Conventions were in the best position to decide on handling the links between data.

[6] See section 2.3 for comments.

9. Annex G: Chairman's Report. Working Session 4/1. Retention in Freshwater Systems

Working Session 4/1 was chaired by Dr Jørgen Windolf, Denmark. It was attended by participants from 14 countries and 7 international organisations.

9.1 Background

Working Session Topics

1. Define what is meant by "Retention in Freshwater Systems".
2. Consider methods for "upscaling" results from one or a few water bodies to be valid for whole catchments.
3. Assess the methods described in the documents submitted to the workshop (see Annex B) and consider whether:
   - there is scope for suggesting a common method to quantify the annual nutrient retention in freshwater systems and, if so, describe this method; or
   - several methods should be used and, if so, describe these methods and suggest ways of comparing them.

9.2 Chairman's Introduction

In his introduction, the Chairman highlighted, *inter alia*, the following points:

- whether annual variations only should be dealt with or if seasonal variations should be included;
- spatial variation is considerable;
- how to define "permanent" retention;
- nutrient retention should be divided into lakes, streams and flood/riparian areas.

9.3 Discussions

The following summarises some of the points raised in discussion, but is not intended to reflect all the points made.

General

During discussion, it was pointed out that:

- it is necessary to define whether "permanent removal of nutrients" covers a period of 1 year, 10 years or 1000 years;
- there are several reasons for including the issue of retention in freshwater systems in HARP, namely in order to:
    - estimate the source apportionment from the total nutrient load to the sea;
    - compare modelled nutrient loads with riverine input measurement, the retention is to be subtracted for model calculations of nutrient loads to primary recipients;
    - evaluate the ecosystem.

Possible Models or Methods

- Denmark presented a possible general model on nitrogen retention in lakes based on water renewal time.
- Germany presented another possible general model for both P and N for whole watercourses (with or without large lakes), on the basis of specific runoff (investigated range 3-40 $l/km^2/year$), water area (investigated range 0,1-10%) and land area (investigated range 500-150 000 km^2).
- The model for phosphorous based on water renewal time (Larsen & Mercier 1976) is not applicable as a general model in Denmark and Switzerland, which for several lakes have positive retention figures (larger outputs of phosphorus than inputs).
- Denmark uses an upscaling of measurement of P retention in 40 lakes in order to estimate P retention in other lakes.
- A Swedish model, HBV, was presented.

9.4 Conclusions[7]

After further discussion, the Chairman concluded that:

- in the development of HARP, retention in freshwater systems should be included;
- within the HARP framework, one or a few general retention models for P and N should be elaborated.

[7] See German comment under section 2.4.

10. Annex H: Chairman's Report. Working Session 4/2. Retention in Coastal Areas

Working Session 4/2 was chaired by Dr Hein Rune Skjoldal, Norway. It was attended by participants from 13 countries and 7 international organisations.

10.1 Background

Working Session Topics

1. Define what is meant with "Coastal Areas".
2. Define what is meant with "Retention in Coastal Areas".
3. Based on scientific evidence, assess whether there is scope for including the issues of nutrient retention in coastal areas in HARP:
   - in the short term?
   - in the long term?
4. Whether there is scope for suggesting a common method for quantifying the nutrient retention in coastal area and, if so, describe this method.
5. Whether several methods should be used and, if so, describe these methods and suggest ways of comparing them.

10.2 Chairman's Introduction

In his introduction, the Chairman highlighted, *inter alia*, the following points:

- whether permanent variations only should be dealt with, or also temporary variations;
- coastal areas could be divided into distinct coastal features, viz. estuaries and fjords, and more broadly into inshore/offshore areas. Coastal water masses and coastal currents are common oceanographic features in coastal areas;
- a number of different processes affect nutrient retention in coastal areas. These include physical/chemical processes (e.g. sorption, sedimentation and burial) and biological processes (e.g. primary production, denitrification and production at higher trophic levels);
- nutrient retention in coastal areas is related to nutrient export and transboundary flux. The fraction of nutrient input which is not retained is exported from the coastal area under consideration;
- nutrient retention in coastal areas is related to biological effects of nutrient input to the extent that biological processes are affected;

- input studies/calculations are performed for two purposes: regulatory and environmental assessment. The latter requires higher temporal resolution, as well as information on proportions of nutrients of both dissolved and particulate forms;
- possible methods:
  - direct measurements of processes;
  - nutrient-salinity plot;
  - empirical models e.g. organic loading and oxygen consumption model for fjords (the Norwegian "Fjordmiljø" model);
  - mathematical models, e.g. 3-D hydrodynamical models.

10.3 Discussions

During discussions, the following points were made:

- retention in coastal areas is difficult to measure and therefore neither measurements nor reporting can be harmonised. Tidal processes may complicate measurements;
- it is very difficult to estimate the suspended solid dynamics in estuaries and coastal waters;
- all methods have been used to a certain extent in the UK; nutrient salinity plot methods have been shown to have problems and must be used in conjunction with other methods; a simple phosphorus retention model has been developed;
- retention in fjords and other coastal areas has been found to be up to 50% of the total nutrient load;
- calculations of coastal retention should be carried out if the retention has any impact on the assessment of the quality of the environment in coastal waters;
- evaluation of nutrient retention in the near coastal waters is important when nutrient inputs contribute to eutrophication problems in the marine environment. Such evaluation is difficult, but techniques are being developed and useful results can be produced;
- the effects of remobilisation may have significant consequences for the nutrient load of coastal areas.

10.4 Conclusions[8]

After further discussion, the Chairman concluded that:

- information on nutrient input is required for assessing the eutrophication status of coastal and maritime areas. HARP and procedures for eutrophication assessment e.g. OSPARs 'Common Procedure' need to be viewed in context;
- nutrient retention in the coastal zone should not at the present time form a part of HARP. Nutrient inputs to the marine area should ideally be reported at zero-salinity;
- HARP should take into account the need for nutrient input information for the purpose of assessing the eutrophication status of the marine area. This includes the need for seasonally resolved data on the main dissolved and particulate nutrient compartments being discharged into the marine area;
- coastal nutrient retention or remobilisation must be considered when going from the local to sub-regional or regional scales in assessments of eutrophication status of the marine area;
- coastal nutrient retention should be kept on the agenda for further consideration for inclusion in HARP in the long term.

[8] See German and Dutch comment under section 2.4.

11. Annex I: Chairman's Report. Working Session 5. Compilation of Results from Sessions 1-4 including Discussions on the Quantification of the Nutrient Load from all Sources

Working Session 5 was chaired by Dr Georges Pichot, Belgium. It was attended by participants from 14 countries and 8 international organisations.

11.1 Background

Scope

To compile the results from Working Sessions 1-4, and discuss total nutrient load modelling.[9] These discussions should be based on the outcome of the deliberations in the other four sessions and any background documents presented on modelling.

The main objectives of Working Session 5 are:

- to review the preliminary draft version of HARP in the light of the results presented by Working Sessions 1-4;
- to review the results of Working Sessions 1-4 with regard to modelling; and
- to define how information about discharges, emissions and losses of nutrients should be reported in order to obtain transparent, reliable and comparable reports.

Working Session Topics

Working Session 5 should:

1.

- review the preliminary draft version of the structure of HARP in the light of the results presented by Working Sessions 1-4 (see document HARP 0-2-98);
- further develop the "building stones" of HARP;

As a result of the discussions during Working Sessions 1 to 4, the following issues were identified for consideration by Working Session 5:

- atmospheric deposition of nutrients
- catchment approach
- point sources
- natural background load of nutrients
- procedure for normalising a year

[9] Total nutrient load modelling signifies in this context a 'quantification of the nutrient load from all sources'.

2.
- propose harmonised procedures for data collection per source, including development of models for agricultural nutrient run-off, on the basis of the discussions at Working session 2;
- assess whether there is scope for establishing a convention-wide nutrient load model and, if so, give guidance as to how such a model should be developed;

3. agree on a procedure for selecting catchments within each OSPAR country;

4. consider methods for assessing the effectiveness of measures implemented per sector;

5. assess the Riverine Inputs and Direct Discharges (RID) programme in order to check whether changes are required e.g. if the time resolution needs to be changed or the issue of bioavailability should be included in the assessment of the data.

11.2 Chairman's Introduction

The Chairman pointed out that:

- it is important that the new reporting system (HARP) becomes as simple as possible to facilitate the work of the different countries' (environmental) administration;
- it is important to make the best use of already collected information from organisations such as EUROSTAT, OECD and EEA;
- the international notification obligations should not prevail conclusions linked to national approaches;
- HARP should be developed in such a way that it becomes a robust and transparent reporting system.

The Chairman pointed out that there was a sequential list of consequences to a decision/agreement being made for example within the OSPAR framework. These were the follow-up actions to the decisions/agreements made, as outlined below.

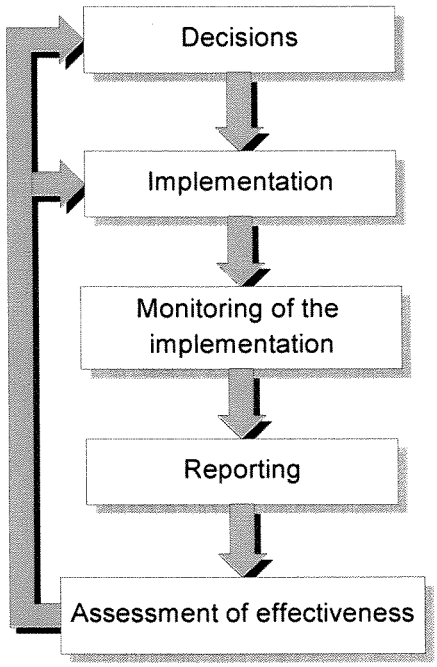


Figure 8. Follow-up actions to decisions/agreements

11.3 Presentations

EUROSTAT: National nitrogen balance: evaluation through commercial exchange data

The EUROSTAT representative informed the Workshop about an EUROSTAT study, which evaluates national nitrogen balances, using commercial exchange data. The model elaborated considers the country as a system, in which nitrogen compounds enter and go out by different ways and in different forms. The tool, required by EUROSTAT, should be able to produce nitrogen balances from data collected on a common basis for EC Member States.

Main entrances are from the atmosphere (biological fixation, atmospheric deposition, and fertiliser synthesis), commercial exchange and transfers from seas (fisheries).

Main issues are commercial exchanges, contribution to waters (surface and groundwater), air (denitrification, volatilisation), soil and biomass stock variations.

The COMEXT database available within EUROSTAT contains data on exchanges (imports and exports, to and from each European country, for about 12 000 products).

By attributing nitrogen content coefficients to each of the nitrogen-containing products, it becomes possible to calculate the quantities of nitrogen exchanged by each country on a yearly basis.

At that point of the study, it is possible to quantify nitrogen exchanges for feed and food (including human and pet food).

It appears that imports are much higher than exportations for most of the European countries. It is necessary to obtain more and better coefficients as regards fertilisers and heterogeneous products, and more data about fertilisers, biological fixation and deposition.

In the view of the EUROSTAT representative, it will be very difficult to harmonise models/coefficients for estimating nutrient run-off from agriculture, but transparency among the models/methods applied should be achieved.

11.4 Conclusions

After further discussion, the Chairman concluded that:

The Chairman's conclusions from Working Session 5 are as follows:

General[10]

- it is important to include in HARP information about characteristics/performances of sectors and sub-sectors included in the total figures for the various sources. This information is essential for a better understanding of the total nutrient figures and the evaluation of the measures. It will also serve as a basis for the quantification of the estimates of the contributions of the various point and diffuse sources;
- it is necessary to report the nutrient load both to the surface water as discharges/losses of nutrients from point and diffuse source and to the marine area as riverine load and direct discharges;

Atmospheric deposition of nutrients

- data on atmospheric deposition of nitrogen exists within EMEP. HARP should therefore make use of the said EMEP data;
- there should be a co-operation between EMEP, international organisations and the framework of HARP in order to obtain a complete picture of emissions, discharges and deposition of nitrogen;
- the practical implications of how 'background load of nitrogen' is applied in the EMEP framework, allows the distinction between anthropogenic deposition of nitrogen and natural deposition;
- it may be necessary to investigate the need to develop within HARP a method for evaluating data on phosphorus deposition, as this is not taken into account within EMEP. The INPUT Working Group within OSPAR should be invited to consider this question;

[10] See Section 2.5 for UK comment.

Catchment approach

- all catchments or groups of catchments draining into the relevant marine area should be considered, i.e. the total of the nutrient load from all catchments or group of catchments should represent the whole of the drainage area relating to the part of the marine area under consideration;

- it is up to the discretion of each country to decide the number of catchments to be notified as regards nutrient load. Possible criteria for the selection of catchments could be the size of the catchment and the length of the coastline covered by each catchment;

- criteria for the selection of catchment size should be related to the state of the receiving water body, in order to facilitate the development of appropriate action plans;

Point Sources[11]

- the nutrient load from point sources should be notified on a catchment basis unless there are provisions in relevant commitments within the EC and/or international conventions requiring a higher resolution;

- strategies for obtaining the nutrient load from point sources;
    - a common approach for estimating nutrients in point source discharges is provided within the scope of EC and OSPAR work;
    - the Principles of OSPARs Comprehensive Study on Riverine Inputs and Direct Discharges (RID; Document HARP 2-2-98) provides methodologies for estimating nutrient discharge loads by measurement and by calculation;
    - the total nutrient load should be monitored from the most important point sources and could be estimated from less important point sources;
    - annex I of the Urban Wastewater Treatment Directive (91/271/EEC) provides guidance for monitoring the concentrations of nutrients in treatment works' effluents;
    - these two approaches should be combined as a basis for a common harmonised monitoring approach for point sources.

- the reporting frequency should be in accordance with existing EC requirements and/or reporting requirements within international conventions, ranging from 2 to 5 years, although preference should be given to a reporting frequency of 2 to 3 years. The ultimate aim should be to harmonise the reporting frequencies within international fora.

[11] See Section 2.5 for UK comment.

Norwegian Institute for Water Research

P.O. Box 173 Kjelsås
N-0411 Oslo

Telephone: + 47 22 18 51 00
Telefax: + 47 22 18 52 00

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