2. Load-orientated approach: Quantification of total load to the Baltic Sea, retention and riverine load apportionment

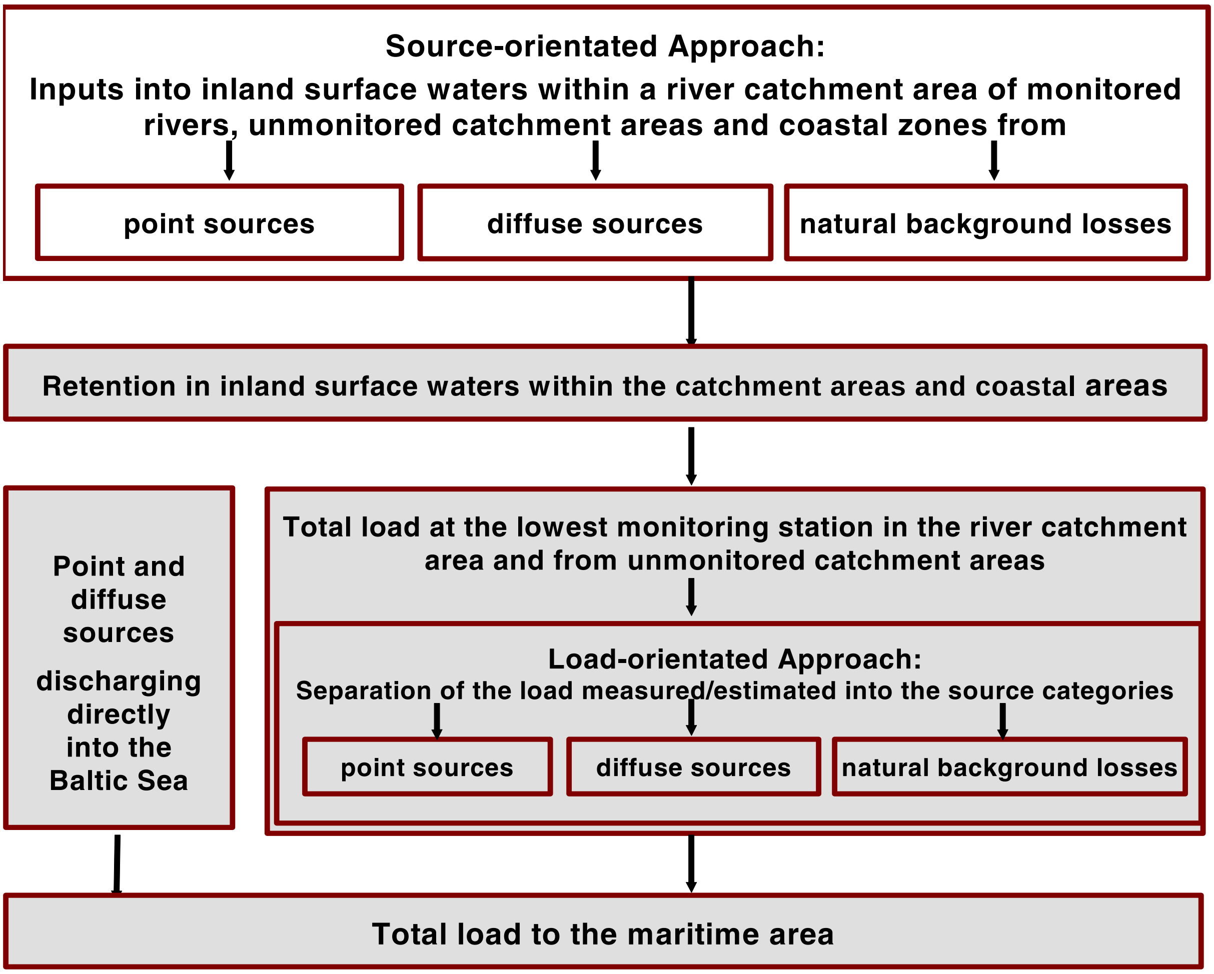
The Waterborne Pollution Load Compilation is dealing with point and diffuse sources within the catchment area of the Baltic Sea located within the borders of the Contracting Parties. This part of the Guidelines – the so-called load-orientated approach (see shaded boxes in the figure below) – is dealing with the quantification of the total load to the Baltic Sea from:

1. Monitored rivers;
2. Unmonitored areas (partly monitored rivers, unmonitored part of monitored rivers, unmonitored rivers and coastal areas including unmonitored islands); and
3. Point sources and diffuse sources discharging directly into the Baltic Sea.

Within the load-orientated approach the importance of different sources of riverine nutrient load has also to be quantified, which requires the quantification of:

4. Retention and
5. Riverine load apportionment.

The quantification of the total load to the Baltic Sea has to be carried out and reported every year for each main Baltic Sea sub-region catchment area by each Contracting Party (see chapter 1.5.1 and Annex 4.1). All other parts of the load-orientated approach including the quantification of retention and the riverine load apportionment will be done every six year starting in 2006 (see chapter 1.5.2 and Annex 4.3).



2.1. Quantification of the total load into the Baltic Sea

The objective is to obtain an estimate as exact as possible of the total input from monitored rivers, partly monitored rivers (unmonitored part of monitored rivers), unmonitored rivers and coastal areas including unmonitored islands and discharges from point sources and diffuse sources entering directly into the Baltic Sea. This requires that the calculation results under chapters 2.1. will be summed up for every Baltic Sea sub-region (see chapter 1.4) per Contracting Party.

2.1.1. Monitored rivers

The annual load for all monitored rivers should be determined and reported every year. For every monitored river the annual load should be calculated for the measurement site, to have a calculated figure for the monitored part. The load from the unmonitored part of the river catchment area can either be estimated for each river individually or estimated as a part of the unmonitored areas including coastal areas for each Baltic Sea sub-region.

For transboundary rivers the measurements should not only be carried out at the lowest monitoring station of the catchment area, but also at the measurement site located at the border between two countries. The Contracting Parties are also encouraged to cooperate with the upstream country in order to accommodate data collection.

2.1.1.1. Flow measurement and calculation

For rivers with hydrological stations the location of these stations, measurement equipment, frequency of water level and flow measurement as well as methods for calculation of annual run-off should follow the WMO Guide to Hydrological Practices (WMO-No. 168, 1975).

For rivers without permanent hydrological stations the flow measurement, equipment and methods for measurement and calculations of annual run-off should also follow the WMO Guide to Hydrological Practices (WMO-No. 168, 1975).

The frequency of flow measurement should as a minimum correspond to the sampling frequency for the determination of the load and be carried out at least 12 times per year.

The measurements should cover low, mean and high river flow rates, i.e. they need not necessarily to be done at regular monthly intervals but should as a minimum reflect the main annual river flow pattern. Continuously controlled and regularly calibrated equipment (e.g. current meters) and carefully performed measurements together with an accurate calculation can diminish errors.

2.1.1.2. Sampling strategy: site selection and sampling frequency

The sampling strategy should be designed on the basis of historical records and cover the whole flow cycle (low, mean and high river flow). It is important to cover periods of expected high river flow, if continuous monitoring are not performed. It is known that in general there is a positive (but not necessarily linear) correlation between periods of high river flow and high input load, especially for substances transported in connection with particles as suspended solids, some nutrient species and some heavy metals. Sampling should therefore be done at different high flow condition.

For all monitored rivers a minimum of 12 samples sets should be collected over a year in order to estimate the annual input load. The samples sets need not to be collected at regular monthly intervals but at a frequency that appropriately reflects the expected river flow pattern. This is particularly important if only 12 samples are taken annually and there is a marked annual variation in the flow pattern. If more samples are taken (e.g. 18, 26 ore more) and/or the flow pattern does not show a major annual variation the samples can be more evenly distributed during the year.

The monitoring site should be in the river stretch where the water is well mixed (such as at a weir or immediately downstream of a weir) and, therefore, of uniform quality. Pooled sampling strategy (i.e. more sub-samples are taken to make one poled samples, the sub-samples can be taken either flow- or time-proportional) is recommended where concentration of sampled substances can change markedly within a short period. Otherwise discrete samples can be collected. The representativeness of the sampling points in the cross-section must be checked. The Standards ISO 5667-6 and ISO 5667-9 should be used.

2.1.1.3. Methods for calculation of the load from monitored rivers

The objective is to obtain the total load from monitored rivers into the Baltic Sea. The calculation should be made on the basis of water quality monitoring data and hydrological observations. Rivers with long-term mean flow rates > 5 m³/s must be monitored regularly

By definition monitored rivers have flow and concentration measurements. When both hydrological and hydro-chemical measurements are performed at the same station, one of the calculation methods recommended below should be applied. The flow should be calculated to the hydro-chemical station prior to the load calculation if the hydrological and hydro-chemical observations are not performed at the same station. The following calculation methods should be used:

Daily flow and daily concentration regression:

$$L = \frac{m}{n} \sum_{i=1}^{n} Q_i * C_{ri}$$

$$C_{ri} = \frac{a}{Q_i} + b + c * Q_i$$

Q_i = daily flow (measured);
C_{ri} = the regression value of concentration for the stream flow;
M = conversion factor of units;
a,b,c = coefficients typical of each quality parameter, observation station and time series;
n = number of measurements

Daily flow and daily concentration (interpolated)

This method utilise interpolated concentration values at days were pollutants have not been measured.

The pollutants concentrations are measured at the days denoted by $t_i, i = 1,2,\ldots,n$. Concentrations are denoted $C_i, i = 1,2,\ldots,n$. Let t_0 and t_{n+1} be the start, respectively, the end of the year. The assumption is made that $C_0 = C_1$ and $C_{n+1} = C_n$.

Then the load L is estimated by:

$$\hat{L} = \sum_{i=0}^{n-1} \sum_{t_i < t \leq t_{i+1}} Q_t \frac{C_i \cdot (t_{i+1} - t) + C_{i+1}(t - t_i)}{t_{i+1} - t_i}$$

$\sum$ = denotes summation, i.e.

$\sum_{i=0}^{n-1}$ = denotes summation of values for the index in the interval 0 to *n-1*, and

$\sum_{t_i < t \leq t_{i+1}}$ = denotes summation of values for *t* in the interval t_i to t_{i+1}, but t_i is not included in the interval

The assumption that that $C_0 = C_1$ results in $C_{\text{interpolated}} = C_1$, for $t_0 < t \leq t_1$, and the assumption $C_{n+1} = C_n$ results in $c_{\text{interpolat ed}} =_n$, for $t_n < t \leq t_{n+1}$.

Concentrations are given in mg l^{-1}, run-off as l s^{-1}. To obtain a daily load multiply the estimate from the equation by 0.0864.

Mean monthly concentration and monthly flow:

$$L = \sum_{i=1}^{12} W_{ki} * C_{ki}$$

W_{ki} = volume of monthly run-off;
C_{ki} = mean monthly concentration

In OSPAR HARP guideline 7 “Quantification and reporting of the monitored riverine load of nitrogen and phosphorus, including flow normalisation procedures“ further details can be found concerning load calculation and trend analysis.

2.1.1.4. Reporting of the load from monitored rivers

The applied load calculation method(s) and formula must be reported. It is recommended to use one of the load calculation method described in chapter 2.1.1.3. If alternative load calculation methods were used, they must be described in detail. The load computation using only annual average of concentration and flow, respectively is not recommended as it leads to uncontrolled large errors. All information and data which have to be reported electronically are summarised in Annex 4.1.

Table 2.1: Overview of reporting obligations related to total load from monitored rivers.

MONITORED RIVERS (ONLY THE MONITORED PART)				
REPORTING CATCHMENT	**ANNUAL REPORTING**		**EVERY SIX YEAR REPORTING[1]**	
	FLOW	**LOAD**	**FLOW**	**LOAD**
Individually reported	Annual min, max as m^3/s, voluntary	Parameters as in table 1.1, t/a	Long-term[2] and annual average as m^3/s	Parameters as in table 1.2, t/a
			Annual min, max as m^3/s, voluntary	
Aggregated by sub-region reported	Annual average as m^3/s	Parameters as in table 1.1, t/a	Annual average as m^3/s	Parameters as in table 1.2, t/a

[1] For the transboundary rivers flow and load should be reported at the border of the river for parameters according to table 1.2.
[2] The long-term flow should preferably consist of a 30 year period where e.g. 1961-90 is recommended.

2.1.2. Unmonitored areas

Partly monitored rivers, unmonitored rivers, unmonitored part of monitored rivers and coastal areas including unmonitored islands belong to the category unmonitored areas (see Figure 1.1).

2.1.2.1. Methods for estimation of the load from partly monitored rivers

In partly monitored rivers there are concentration measurements but no flow measurements. There are different methods to estimate the run-off, e.g. sophisticated models using GIS but most of these models are specific for a region and have to be tested before they can be applied for other regions. A more simple methodology is to extrapolate the run-off for the unmonitored catchment area based on knowledge about the hydrological behaviour of the run-off of a comparable monitored catchment area. If there is no developed model or experience with modelling run-off the extrapolation method below might be used.

If an unmonitored area has conditions on climate, topography, geology, soil type, land use etc. that are similar with a monitored area, equal hydrological conditions can be assumed. The different areas of the basins have to be taken into account when calculating the run-off from the unmonitored area, e.g.:

$$Q_n = Q_m \frac{A_n}{A_m}$$

Q_n = run-off from unmonitored basin;
Q_m = run-off from monitored basin;
A_n = area of unmonitored hydrological basin;
A_m = area of monitored hydrological basin.

This can be done for monthly or annual means in general but not for daily values. For the estimation of the annual load the same formulas as in chapter 2.1.4. should be used. if other methodologies are applied, Information about the used methodology should be provided.

2.1.2.2. *Methods for estimation of the load from unmonitored areas*

Unmonitored rivers, unmonitored part of monitored rivers and coastal areas including unmonitored islands mean that neither concentration measurements nor flow measurements have been carried out. It is recommended to use one of the methods described below. The load estimation method must be reported. Alternative load calculation methods might be used but must be described in detail.

There are different methods to estimate the load from unmonitored:

- On the basis of more or less sophisticated models;
- On the basis of land use within these areas; and
- On the basis of extrapolating the knowledge about neighbouring rivers under similar conditions.

If an unmonitored area has conditions on climate, topography, geology, soil type, land use etc. similar with a monitored area also similar load in the output (river) will be found. A rough calculation then takes into account only the different areas of the basins, e.g.:

$$L_n = L_m \frac{A_n}{A_m}$$

L_n = load from unmonitored area A_n;
L_m = known load coming from monitored area A_m;
A_n = area of unmonitored hydrological basin;
A_m = area of monitored hydrological basin.

If possible the discharge from large point sources should be taken into consideration, as there discharge rarely are equal in the monitored area that are extrapolated to the unmonitored and coastal area. In some regions/countries the discharge from point source is monitored also in unmonitored areas including coastal areas. Then the equation above is changed to:

$$L_u = DL_m \frac{A_n}{A_m} + PL_U$$

L_u = estimated load coming from unmonitored area An;
DL_m = known diffuse load coming from monitored area Am (estimated as monitored load minus discharge from point sources);
Pl_u = monitored or estimated point source discharge from unmonitored areas;
A_n = area of unmonitored hydrological basin;
A_m = area of monitored hydrological basin.

2.1.2.3. *Reporting of the load from unmonitored areas*

The annual load from unmonitored areas (partly monitored rivers, unmonitored parts of monitored rivers, unmonitored rivers and coastal areas including unmonitored islands, see equation in 2.1.2.2.) should be reported every year as a total load per Contracting Parties to each Baltic Sea sub-region. Alternatively, the unmonitored part of the monitored river can be reported individually. The applied load estimation method(s) should be reported. All information and data which have to be reported electronically are summarised in Annex 4.1.

Table 2.2: Overview of reporting obligations related to total load from unmonitored areas

UNMONITORED AREAS				
	ANNUAL REPORTING		EVERY SIX YEAR REPORTING	
	FLOW	LOAD	FLOW	LOAD
Aggregated by sub-region[1]	Average as m^3/s	Parameters as in table 1.1, t/a	Average as m^3/s	Parameters as in table 1.2, t/a

[1] The unmonitored part of the monitored river can be reported individually

2.1.3. Concentrations below the detection limit

If some of the monitored concentrations for a substance (e.g. some heavy metals) are below the detection limit, the estimated concentration should be calculated using the following equation which is one of the options listed in the guidance document on monitoring adopted by EU under the IPPC Directive:

Estimation = (100%-A) x LOQ, where A=percentage of samples below LOQ and
LOQ = the lowest quantifiable amount of compound (see chapters 4.5 and 4.6).

2.1.4. Point sources and diffuse sources discharging directly into the Baltic Sea

The discharges from point sources and losses from diffuse sources entering directly into the Baltic Sea have to be quantified according to chapter 3. For the annual reporting the data must be reported summarised per point source category (municipal waste water treatment plants, industrial plants and fish farming plants; see chapter 3) by every Baltic Sea sub-region and by Contracting Party. The applied load estimation method(s) should be reported. All information and data which have to be reported electronically are summarised in Annex 4.1

Table 2.3: Overview of reporting obligations related to point sources and diffuse sources discharging directly the Baltic Sea

POINT SOURCES AND DIFFUSE SOURCES DISCHARGING DIRECTLY TO THE BALTIC SEA					
AGGREGATED BY SUB-REGION		**ANNUAL REPORTING**		**EVERY SIX YEAR REPORTING**	
		FLOW	**LOAD**	**FLOW**	**LOAD**
Point sources	**MWWTP**	Total, m^3/a	Parameters as in table 1.1, t/a	Details on reporting obligations are in chapter 3 and specified in table 3.2. Parameters as in table 1.2	
	Industry	Total, m^3/a	Parameters as in table 1.1, t/a	Details on reporting obligations are in chapter 3 and specified in table 3.4. Parameters as in table 1.2	
	Fish Farms	Total, m^3/a[1]	Parameters as in table 1.1, t/a	Details on reporting obligations are in chapter 3 and specified in table 3.6. Parameters as in table 1.2	
Diffuse sources (direct)	**Scattered dwellings**	Total, m^3/a	Parameters as in table 1.1, t/a	Details on reporting obligations are in chapter 3 and specified in table 3.7. Parameters as in table 1.2	
	Storm water overflows	Total, m^3/a	Parameters as in table 1.1, t/a	Details on reporting obligations are in chapter 3 and specified in table 3.7. Parameters as in table 1.2	

[1] For fish farms where it is relevant (outlet for discharges)

2.2. Quantification of retention for nutrients

2.2.1. Introduction

Retention of nutrients is defined as removal of phosphorous and nitrogen in surface waters of river systems including lakes and inundation of river valleys.

Retention calculations are necessary in order to enable the quantification of discharges/ losses of nutrients to marine areas from land-based sources. It is also necessary to have figures on nitrogen and phosphorus retention to compare and validate the figures on nutrient discharges/losses from land-based sources with the measurements at the river mouths.

Retention is, *inter alia*, a function of temperature, nutrient concentration, physical characteristics of rivers and lakes, such as residence time (lakes) and specific run-off, hydraulic load and bottom characteristics (rivers). Many parameters are difficult to measure, and therefore difficult to implement in calculation procedures. In general, nitrogen retention is more influenced by biological processes, whereas the phosphorus retention is more influenced by sedimentation processes.

Parameters influencing nitrogen and phosphorus retention are, *inter alia*, renewal time in lakes, input of nitrogen and phosphorus to inland surface waters, trophic level, oxygen condition, volumes of lakes, temperature, nitrogen fixation, general water chemistry, water vegetation and human activity in the catchment.

2.2.2. Quantification

Factors such as topography and climate will vary considerably amongst the Baltic Sea countries, and even amongst regions within the same country. This makes it difficult to fully harmonise the methods of calculating the nutrient retention in inland surface waters. Many countries will have their own methods, depending on the characteristics of the catchment area and taking into account presence of shallow lakes, deep lakes, small or large rivers, reservoirs, frequency of flooding etc.

In most cases, nutrient retention is quantified on the basis of the mass balance of investigated lakes and rivers. The different methods may be divided into the following categories:

- Models of nutrient retention based on the mass balances of river systems (including both rivers and lakes), see method 1 in Annex 1 and method 3 in Annex 3;
- Models of nutrient retention based on mass balances of lakes and transformation of these findings related to the whole river system, see method 2 in Annex 2; and
- *In-situ* measurements or other types of measurements that provide retention coefficients for nitrogen removal and phosphorus retention in streams and rivers.

The following factors are considered to be important when quantifying the retention of nutrients in a river catchment area:

- The portion of lakes, river stretches and riparian areas in each catchment area;
- The hydrological and morphological conditions within the river system; and
- The development of retention coefficients or methods for both nitrogen and phosphorus should be based on national and/or international research on retention in different inland surface waters.

New methodologies are under development (see OSPAR HARP-NUT Guideline 9 on retention after further elaboration).

2.2.3. Reporting

Retention calculations should be carried out every six year starting in 2006. Retention figures should be preferably reported individually for the monitored part of the catchment area of every monitored river or aggregated for some of the monitored rivers. For unmonitored areas (partly monitored rivers, unmonitored part of monitored rivers, unmonitored rivers and coastal areas including unmonitored islands) retention figures should be reported per Contracting Party for each Baltic Sea sub-region. The applied estimation method should be reported together with retention figures.

All information and data which have to be reported electronically are summarised in Annex 4.3.

Table 2.4: Overview of reporting obligations related to retention of nutrients

RETENTION		
REPORTING CATCHMENT		**EVERY SIX YEAR REPORTING**
Monitored rivers reported	**Individually**	N and P in t/a
Monitored rivers reported	**Aggregated by sub-region**	N and P in t/a
Unmonitored areas	**Aggregated by sub-region**	N and P in t/a

In a written report, that is forwarded to the project manager and not to the data manager, the reporting should include the characteristic parameters of the catchment areas as catchment size, run-off, area of surface waters and the figures for the quantified retention. If national procedures for the quantification of nutrient retention are used (other methods than described in the Annexes 1, 2, and 3), the methods and the results should also be reported for transparency purposes. Since the nutrient retention rate varies considerably during a year, the retention should be reported as a yearly or longer than yearly average.

2.3. Riverine load apportionment for nutrients

In these guidelines the principles of riverine load apportionment methodologies are described briefly. Riverine load apportionment is a tool to evaluate the contribution of point and diffuse sources to the total riverine nitrogen and phosphorus load entering the Baltic Sea (see chapter 2.1). The apportionment is done on the basis of the total riverine nitrogen and phosphorus load taking into account the retention in inland surface waters.

2.3.1. Introduction

The load apportionment should be carried out on figures of the riverine load of total nitrogen and total phosphorus. The riverine load apportionment should be carried out every six year starting in 2006 for the monitored rivers and reported either individually per monitored river or aggregated. For unmonitored areas (partly monitored rivers, unmonitored part of monitored rivers, unmonitored rivers and coastal areas including unmonitored islands) riverine load apportionment figures should be reported per Contracting Parties for each Baltic Sea sub-region, if riverine load apportionment has been carried out.

The following assumptions are made regarding the separation of the total nitrogen and phosphorus load in the river catchment area into source categories:

- The nitrogen and phosphorus discharges from **point sources** are virtually the same (or vary very little) in volume and quality during the year. They depend on meteorological/hydrological factors to a small extent. The input sites into a water body can usually be clearly identified; and

- The nitrogen and phosphorus losses from **diffuse sources** entering inland surface waters are usually variable, the variations may be several orders of magnitude. The losses from diffuse sources are strongly influenced by meteorological/hydrological factors such as precipitation, but also by soil conditions, such as frozen soils. The input sites into a water body can normally not be clearly identified.

One important issue in the separation of the nutrient load from point and diffuse sources is therefore the difference in their behaviour in relation to meteorological/hydrological factors. To make such a differentiation, the various natural and anthropogenic components of the discharges/losses regime in the river system should be considered.

Estimates of nutrient retention in inland surface waters (temporary and permanent sinks and removal processes as denitrification, retention in lakes and flooded riparian areas) are needed in order to calculate nutrient losses to inland surface water from diffuse anthropogenic sources. To assess the importance of different sources these river-internal retention processes must be taken into account due to the fact that the measured riverine load only expresses the net riverine export. If the retention is not considered in the riverine load apportionment calculations, the initial nutrient load from point-sources as well as from agriculture and other diffuse sources will be underestimated. Further, background losses to inland surface water are necessary for calculating the anthropogenic nutrient losses entering inland surface waters from diffuse anthropogenic sources.

2.3.2. Calculation principle for riverine load apportionment

Riverine load apportionment is based on the assumption that the total nitrogen and phosphorus load at the selected river measurement site (L_{river}) is the sum of the various sources:

- The discharges from point sources (D_P),
- The losses of anthropogenic diffuse sources (LO_D); and
- The natural background losses (LO_B);

by taking into account the processes of river-internal and lake retention (R). The riverine load apportionment should be carried out for the monitored rivers. Further, riverine load apportionment can be carried out for unmonitored areas if reliable estimates on riverine nutrient load and nutrient discharges from point sources as well as retention can be derived. The riverine load apportionment procedure can be expressed in the following formula:

$$\mathbf{L_{river}=D_P+LO_D+LO_B-R} \quad \mathbf{(1)}$$

The aim of riverine load apportionment is to estimate anthropogenic diffuse losses of nitrogen and phosphorus and evaluated the contribution of point and diffuse sources to the total riverine nitrogen and phosphorus load, i.e. to quantify the nitrogen and phosphorus losses from diffuse sources (**LO_D**) as follows:

$$\mathbf{LO_D = L_{river}-D_P-LO_B+R} \quad \mathbf{(2)}$$

In the anthropogenic diffuses losses in equation (2) losses from scattered dwellings are included. The importance of different sources on the total riverine nitrogen and phosphorus load could be quantified as follows:

$$\textbf{Proportion of } LO_B = LO_B/(L_{river}+R)x100\% \qquad (3)$$

$$\textbf{Proportion of } D_P = D_P/L_{river}+R)x100\% \qquad (4)$$

$$\textbf{Proportion of } LO_D = LO_D/(L_{river}+R)x100\% \qquad (5)$$

The procedure outlined above requires measurements at the selected river monitoring site in order to determine L_{river}, which represents the riverine load (can be a normalised riverine load). Further, it requires the determination of the nitrogen and phosphorus point source discharges (D_P) and natural background losses of nitrogen and phosphorus (LO_B) in the river catchment area concerned, as well as the quantification of retention of nitrogen and phosphorus (R) in inland surface waters (e.g. streams, rivers, lakes and reservoirs).

The results of the riverine load apportionment can be very depended on the used retention estimate (see chapter 2.2). If there is a significant degree of uncertainty over the retention estimate more than one retention methodology or a sensitivity analysis should be applied to get a range for the quantification of diffuse sources entering inland surface waters.

2.3.3. Data requirements

For riverine load apportionment different methods are used in the countries, but all of them requires many of the following information/data:

- The annual figures of Nitrogen and Phosphorus riverine loads (L_{River}): chapter 2.1;
- The annual point source discharges of nutrients entering inland surface waters upstream the riverine monitoring point(s) (D_P): chapter 3.1;
- Natural background losses to inland surface waters upstream the riverine monitoring point(s) (LO_B) of nitrogen and phosphorus as totals: chapter 3.3;
- Quantification of retention in inland surface waters as rivers, lakes, reservoirs and on inundated floodplains upstream the riverine monitoring point(s), in order to obtain total retention of nitrogen and phosphorus in inland surface waters in the catchment area (R): chapter 2.2; and
- Data from the river catchment areas as watershed characteristics: land use; soil types; population (total, connected to sewage systems and population in scattered dwellings: chapter 2.2.3.

2.3.4. Reporting

The riverine load apportionment should be carried out every six year starting in 2006. The following information should be preferably reported individually for the monitored part of the catchment area of every monitored river or aggregated for some of the monitored rivers. For unmonitored areas (partly monitored rivers, unmonitored part of monitored rivers, unmonitored rivers and coastal areas including unmonitored islands) the riverine load apportionment figures should be reported per Contracting Party for each Baltic Sea sub-region if riverine load apportionment have been carried out.

- Annual point source discharges (D_P), Losses from diffuse sources (LO_D) and natural background losses (LO_B), for nitrogen and phosphorus as total and as percentage;
- Annual retention (R) for nitrogen and phosphorus (river-internal retention and retention in lakes (in chapter 2.2.3.); and

- Description of the methods used for the riverine load apportionment and for the retention (in chapter 2.2.3.)

The applied estimation method should be reported together with riverine load apportionment figures. All information and data which have to be reported electronically are summarised in Annex 4.3.

Table 2.5: Overview of reporting obligations related to riverine load apportionment.

RIVERINE LOAD APPORTIONMENT					
REPORTING CATCHMENT		**ANNUAL REPORTING**	**EVERY SIX YEAR REPORTING**		
			Natural background sources	**Anthropogenic sources**	
				Point sources	**Diffuse sources**
Monitored rivers[4]	**Individually**	No reporting	Total N and total P, t/a	Total N and total P, t/a by point source category[2]	Total N and total P, t/a by diffuse source category[3]
Monitored rivers	**Aggregated by sub-region**	No reporting	Total N and total P, t/a	Total N and total P, t/a by point source category[2]	Total N and total P, t/a by diffuse source category[3]
Unmonitored areas[1]	**Aggregated by sub-region**	No reporting	Total N and total P, t/a	Total N and total P, t/a by point source category[2]	Total N and total P, t/a by diffuse source category[3]

[1] To be reported if riverine load apportionment have been performed on unmonitored areas.
[2] MWWTP, industry, fish farms and other point sources.
[3] If methods exist, diffuses sources can be further divided into pathways (as specified in chapter 3.2.1.).
[4] For the transboundary rivers flow and load should be reported at the border of the river for parameters according to table 1.2.