Emission estimates for diffuse sources
Netherlands Emission Inventory

Loss of angling lead

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NETHERLANDS NATIONAL WATER BOARD - WATER UNIT
in cooperation with DELTARES and TNO

Loss of angling lead

1 Description of emission source

This fact sheet relates to emissions resulting from the use of sinkers by anglers in fresh waters. In the National Emission Inventory, the process is assigned to the governmental target sector "Agriculture".

2 Explanation of calculation method

Emissions are calculated by multiplying an activity rate (AR), in this case the number of inhabitants in the Netherlands, by an emission factor (EF), expressed in emission per AR unit. This method of calculation is explained in detail in the Guide to the Regional approach to diffuse sources [1].

Emission = AR x EF

Where:
AR = Number of inhabitants
EF = Emission factor (kg/inhabitant)

The emission calculated in this way is referred to as the gross emission. A specific proportion of this ends up in surface water: this is the net pollution of the surface water.

3 Activity rates

The number of inhabitants in the Netherlands as at January 1 of the year in question – values available from Statistics Netherlands (CBS) [2] – is taken as the activity rate.

Table 1: Activity rate; number of inhabitants in the Netherlands

Year	1985	1990	1993	1995	2000	2005	2006
Number of inhabitants	14,453,833	14,892,600	15,239,182	15,424,100	15,863,950	16,305,526	16,334,210

4 Emission factors

Van Bon and Boersema [3] estimated that the lead load on surface water through the use of sinkers in angling amounted to 60 tonnes/year. For economic year (EJR) 93/94 it is assumed that this figure of 60 tonnes is also applicable for 1993. The working group "Vislood" (sinkers), with representatives from the Ministry of Housing, Spatial Planning and the Environment (VROM), Ministry of Agriculture, Nature and Food Quality (LNV) and Ministry of Transport, Public Works and Water Management (V&W) as well as sector organisation DIBEVO and the Dutch association of angling federations (NWS), produced an estimate of the amount of sinker lead ending up in fresh surface water, which is considerably lower than the 60 tonnes referred to above. The working group states that in 1993 a maximum of 28 tonnes of lead coming from sinkers polluted surface water [4]. This value is therefore taken as the emission level in 1993. For EJR/RIM+, this emission value is linked to the number of inhabitants. For 1993, this means an emission factor of $1.84*10^{-3}$ kg of lead per inhabitant per year with 15.24 million inhabitants.

Table 2: Emission factor for lead (kg/inhabitant)

Year	1985	1990	1993	1995	2000	2005	2006
EF (kg/inhabitant)	0.00184	0.00184	0.00184	0.00184	0.00184	0.00184	0.00184

5 Effects of policy measures

There are not yet any known measures for banning or restricting the use of lead in angling.

6 Emissions calculated

The emission of lead due to angling shown in table 3 is calculated by multiplying the number of inhabitants (table 1) by the emission factor (table 2).

Table 3: Emission of lead due to angling

Year	1985	1990	1993	1995	2000	2005	2006
Emission of lead (kg/year)	26,595	27,402	28,040	28,339	29,190	30,002	30,055

As it relates to direct discharge into surface waters, the total emission is the same as the net load. The net load to the surface water due to this emission source is calculated using the calculating rules as shown in [1].

7 Release into environmental compartments

100% of the emissions enter directly into the surface water (direct emission).

8 Description of emission pathways to water

The emissions calculated here are direct emissions into water. When calculating the surface water load due to this emission source, it is important to take into account the fact that the metals end up in the surface water in solid form and not as a solution. The Water System Survey (WSV [5]) uses a figure of 1% of net load per year in solution.

9 Spatial allocation

The spatial allocation of emissions is worked out on the basis of a set of digital maps held by the Netherlands Environmental Assessment Agency (PBL). These maps present the spatial distribution of all kinds of parameters throughout the Netherlands, such as population density, traffic intensity, area of agricultural crops, etc. For the purposes of emission registration these maps are used as 'locators' to determine the spatial distribution of emissions. The range of possible locators is limited (see [6] for a list of available locators), as not every conceivable parameter can be used as a locator. That is why the locator judged to be the best proxy of the activity rate of the emission in question is used.
It is assumed that the distribution of emissions throughout the country is proportional to the national distribution of the locator.

The table below shows the locator used for the spatial allocation of the various emission sources.

Table 4: Locators for spatial allocation

	Locators
Recreational angling	Length of banks

The method used to determine the locators is described in [6]:

Length of banks
The bank length of surface waters is determined per grid cell measuring 500*500 metres. This is done by selecting the surface water from the topographical map and generating an overlay with the 500*500m square map, according to which the total length of the banks is added up per square. The data dates back to the end of the 1990s.

10 Comments and changes in regard to previous version

No changes were made to the calculation methodology compared with the previous emission inventory.

11 Accuracy and indicated subjects for improvement

The method used in the Emission Inventory publications has been followed as far as possible in classifying the quality of information [7]. It is based on the CORINAIR (CORe emission INventories AIR) methodology, which applies the following quality classifications: CORINAIR uses the following quality classifications:

A: a value based on a large number of measurements from representative sources;
B: a value based on a number of measurements from some of the sources that are representative of the sector;
C: a value based on a limited number of measurements, together with estimates based on technical knowledge of the process;
D: a value based on a small number of measurements, together with estimates based on assumptions;
E: a value based on a technical calculation on the basis of a number of assumptions.

The activity rate, the number of inhabitants in the Netherlands, is known very accurately, however it is not ideal as the AR, so it is classified in quality category B. The emission factor has a large degree of inaccuracy, as it is based on an estimate from 1993. The EF is therefore assigned to category E. As all emissions are to the surface water, the elements of distribution among compartments and emission pathways to water are classified under A. Spatial allocation based on bank length is uncertain, so it is classified under D.

Element of emission calculation	**Reliability classification**
Activity rates	B
Emission factor	E
Distribution among compartments	A
Emission pathways to water	A
Spatial allocation	D

Areas for improvement:
- At the moment, the AR is the number of inhabitants in the Netherlands. However, only anglers cause this emission. The only way of calculating the AR based on the number of anglers would be to take the number of fishing documents issued (since January 1, 2007 the "VISPas" fishing permit and corresponding angling certificate among other documents). However, it is not enough to use this data, as apart from the registered anglers, there is also a large share of young people who fish. In 2004, this share was estimated to be 29% of the total number of anglers [8]. Furthermore, a share of the emission is due to unauthorised anglers (who do not have the valid documents) – there is little to no data available about this share.
- This document does not take emissions into salt or brackish water in consideration.
- At the moment, calculations only focus on recreational angling; professional fishing is another source of lead emission, and should definitely be included.
- As stated in section 8, it is important to take into account the fact that only 1% of the lead is dissolved. This will be included in the next inventory of the National Emission Inventory (2009 t-2).

12 Request for reactions

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13 References

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