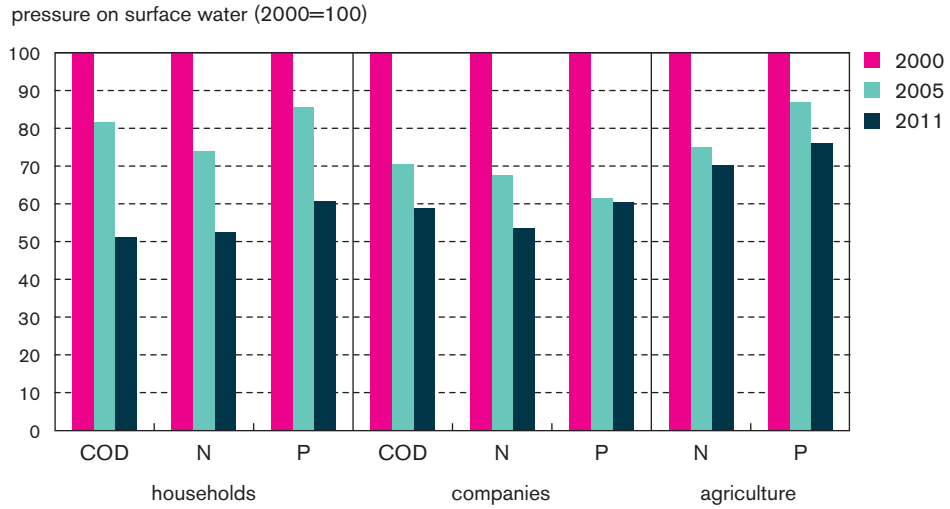
DPSIR

😐 Pressure on the surface water from oxygen-binding substances and nutrients



Source: VMM

Pressure on surface water from households continues to decrease

The pollutant load of a domestic origin that the Flemish surface waters have to deal with has decreased further in the period 2000-2011 due to the systematic expansion and improvement of the public waste water treatment network. However, households are still responsible for a major part of the pollutant load on the surface water from nitrogen (N, 30 % in 2011) and phosphorus (P, 42 % in 2011).

Favourable trend in pressure on surface water from companies is not continuing

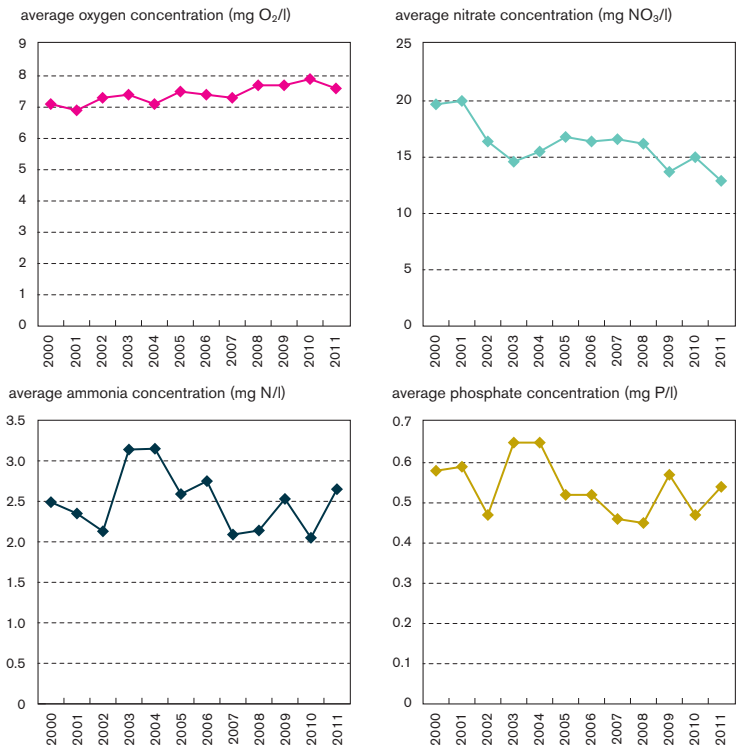
Companies achieved a sharp decrease in the 2000-2005 period; in 2006 and 2007 there was no clear trend. In 2008 and 2009, there was again a clear decrease. The financial-economic crisis probably played a significant role in this decrease. Since then, there has been no further reduction. The small proportion of companies in the load on the surface water with nitrogen (9 %) and phosphorus (15 %) is remarkable.

Losses of nitrogen and phosphorus from agriculture decreased to a lesser extent

The modelled nitrogen and phosphorus losses from agriculture in 2011 are at a lower level than at the start of the 2000s. The decrease is less pronounced than for households and companies. With respectively 61 % and 44 %, agriculture is, via fertilisation, responsible for the largest share of the total nitrogen and phoshorus load that ends up in the surface water.

😐 Oxygen and nutrients in surface water

DPSIR



Source: VMM

No clear picture

Sufficient dissolved oxygen (O_2) in the water is an important prerequisite for a diversified ecosystem. The ammonia concentration (NH_4) is a good indicator for water contamination from untreated or insufficiently treated discharges. Too much nitrate (NO_3) and/or phosphate (PO_4) in the surface water can lead to excessive algae growth.

Taken over the whole 2000-2011 period, the average oxygen and nitrate concentrations show signs of a gradual improvement. These positive changes are attributable to the decrease in the pollutant load to the surface water. Weather conditions, and precipitation in particular, also play a major role and often cause fluctuations in e.g. nitrate concentrations. The phosphate concentrations also showed an improvement, which seems, however, to have stopped since 2008. The ammonia concentrations do not show any clear trend.

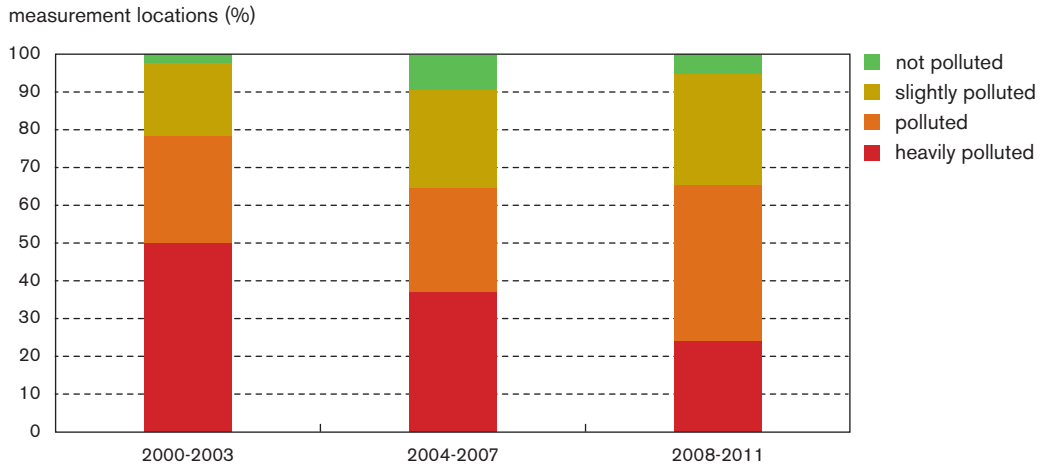
The results of a statistical analysis per measurement location are similar for the various substances. In the period 2000-2011, more than half of the measurement locations showed no statistically significant trend, about 30 % a significant improvement and some 10 % became significant worse. The gradual improvement of the average concentrations is the net result of this. The situation, therefore, is not improving everywhere and to the same extent.

The MINA plan 4 (2011-2015) proposes, among other things, as plan targets for 2015 that 79 % of the surface water bodies must meet the standard for oxygen and 27 % for total nitrogen. The percentage of Flemish water bodies, i.e. the larger watercourses, that met the standards in 2011 was 61 % for oxygen saturation and 30 % for total nitrogen. Only 20 % of the Flemish water bodies met the standard for phosphate (not included as a target in MINA plan 4).

To improve water quality further, the public water treatment system must be expanded further and improved. In addition, a further reduction in the losses from agriculture is especially needed.

😐 Watercourse sediment quality

DPSIR



Source: VMM

Watercourse sediment quality is improving

Pollution of the surface water is not limited to the water column itself. A number of substances have a tendency to bind to the particulate matter. If this suspended matter settles, it will form a water bottom or sediment layer together with the pollutants bound to it.

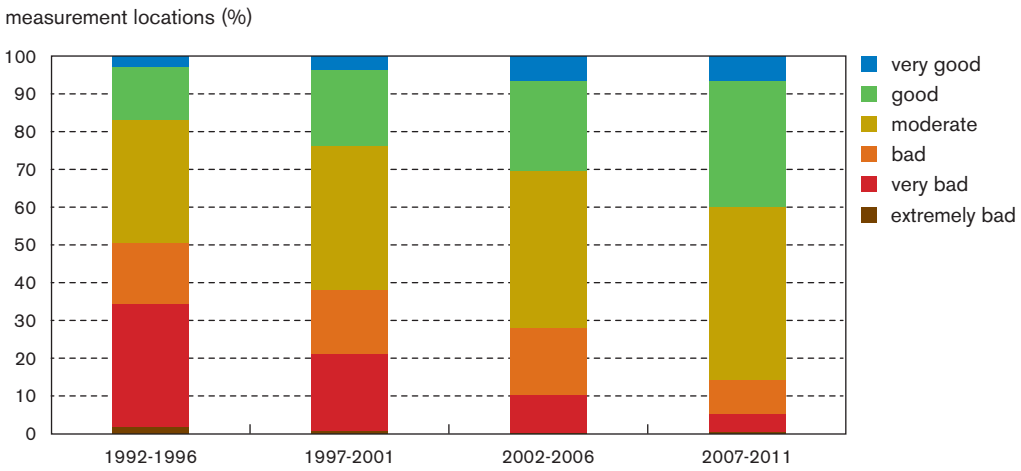
In the period 2008-2011, 25 % of the measurement locations investigated were heavily polluted, 70 % slightly polluted to polluted and only 5 % not polluted. From the evaluation against the standards, it appears that a few substances exceed the standards in more than 40 % of the measurement locations. These substances include a number of PCBs, a degradation product of DDT, and the heavy metals zinc and copper.

A comparison of the quality of the 241 watercourse sediments that were sampled in the periods 2000-2003, 2004-2007 as well as in 2008-2011, has revealed a positive trend (figure). The sharp decrease in the percentage of heavily polluted watercourse sediments (from 50 % to 24 %) and the increase in the percentage of slightly polluted watercourse sediments (from 19 % to 29 %) illustrate this improvement. The percentage of unpolluted watercourse sediments, however, shows no clear trend. The decrease in the percentage of heavily polluted sediments resulted mainly in an increase in the percentage of polluted sediments (from 29 % to 41 %).

For a number of watercourses, the improvement can be attributed to recently completed dredging and clearing works. Further research did however reveal that not all remedial measures result in an improved sediment quality, notably when the historic contamination has penetrated deep into the sediment. Therefore, it is not always advisable to clear deeper, as this could reveal other problems. A proper preliminary investigation should, therefore, always be carried out before proceeding with any effective remedial action regarding the watercourse sediment. Other factors that could have a positive effect on the sediment quality include reduced discharges of toxic substances, so that the newly formed watercourse sediment is less contaminated, and changes in the physico-chemical quality of the water column. Higher oxygen concentrations can, for example, lead to the subsequent release of toxic substances from the watercourse sediment into the water column.

😐 Biological quality

DPSIR



Source: VMM

Quality improving but long way to go yet

For the evaluation of the biological water quality, use is first of all made of the Belgian Biotic Index (BBI), an index that is based on the presence or absence of aquatic macro-invertebrates (invertebrates that can perceived with the naked eye). In addition to macro-invertebrates, other biological quality elements are monitored. Macrophytes include all plants under water, on the water surface or along the banks that are visible to the naked eye. Algae belong to the group of phytoplankton and are, in principle, single-celled, although in many species the cells are clustered together into colonies or filaments. The chlorophyll-a content in the surface water is determined as a measure for the biomass of phytoplankton. The term phytobenthos refers to the microscopic algae that live on the bottom, on the banks or on aquatic plants.

During the 2011 measurement campaign, the BBI was determined at 361 measurement locations. Of these, almost 34 % achieved a good or very good biological quality. Both the European and the Flemish legislation stipulate that a good ecological condition or good ecological potential is to be achieved everywhere, in principle by 2015. For macro-invertebrates, the distance to that target is determined using another index, namely the MMIF (Multimetric Macro-Invertebrate Index Flanders). Over the period 2007-2011, only 19 % of the water bodies scored good or higher, 29 % scored moderate, 33 % poor and 18 % bad. Also for the other biological quality elements, there is still a long way to go. For the macrophytes, only 6 % of the water bodies sampled in the period 2007-2011 belonged to the category good or higher. For phytobenthos, this was 7 %. For phytoplankton, 38 % of the water bodies met the standard for chlorophyll-a.

In the course of the last two decades, the biological quality (BBI) of the Flemish surface waters has improved slowly but surely (figure). The percentage of measurement locations with extremely or very bad quality decreased significantly and the percentage with a moderate or good quality increased significantly. The positive developments are the result of the expansion and improvement of the public waste water treatment system and the efforts made by companies and agriculture.

Considerable efforts are still needed in order to reach the final objective. Not only to further reduce the pollutant loads that find their way into the surface water, but certainly also to restore the watercourses to a more natural state (e.g. remeandering, nature-friendly banks, etc.).