



# Indicators for the Scheldt estuary

## Opportunities for nature



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Government, business and society work together on new 'opportunities for nature' in the Scheldt area. Significant progress has been made concerning waste water treatment and European standards on treatment efficiency for nitrogen and phosphorus compounds are largely met in both the Netherlands and Flanders. Given the limited size and growth in organic agriculture in the Scheldt river basin district, measures mainly focus on reduction of the flow of eutrophying substances into surface waters. However in years with 'wet winters' it remains - despite the overall downward trend - a challenge to keep nitrate concentrations below the threshold (50 mg NO<sub>3</sub> / L). Important common objectives are also set for the restoration of fish migration in the Scheldt. In 2009, 3 of 50 (6%) of fish migration barriers in the estuary are removed. The (Benelux) target of 1996, therefore is still far out of reach.

### Why monitor this indicator?

The Long Term Vision for the Scheldt estuary aims in its target 2030 at maintaining and strengthening the environment in and around the Scheldt estuary [1]. In implementation of the international, European and local legislation specific guidelines went into force to strengthen the estuarine nature and environment: measures to improve [surface water quality](#), [protection of habitats and species](#) (Natura 2000), reduction of chemical and organic pollution, [protection and development of natural areas](#). The government and society work together to create new opportunities for nature in and around the river by i.a. removing barriers to fish migration, limiting the supply of pollutant and specific fertilizing substances to the river from agriculture and other sectors, the implementation of wastewater treatment plants, the sustainable use of natural resources and space. These are typical response-indicators that indicate to what extent the government, business and society, are coping with existing issues. This fact sheet focuses more specifically on organic agriculture in the Scheldt municipalities and efforts to prevent further eutrophication in regional waters, the level of sewerage and treatment in the Scheldt river basin and the removal of fish migration barriers in the estuary.

**Organic agriculture** safeguards harmony between man and nature through farming practices with special attention for the health of humans, animals and the environment, providing guarantees for consumers, the sustainable use of energy and natural resources and applying modern scientific knowledge. The legislation on organic agriculture at European level, was established in EC Regulation 2092/9, replaced by the EC Regulation 'organic production and labeling' on 1 January 2009 [2]. The EU Common Agricultural Policy (CAP) also contributes to the European ambitions concerning preservation and reinforcement of nature and environment [3].

The Dutch policy on organic agriculture is explained in the '[Policy note organic farming chain 2008-2011: Organic connected, growth prospects](#)' (MinLNV, 2007). The ambition in terms of development of organic farming includes i.a. a 5% annual growth in organic farmland area for the next policy period. In June 2008, the Flemish Minister of Agriculture presented the "[Strategic Plan for Organic Farming 2008-2012: Organic farming: partner for a sustainable future](#)". Leverage 2 from the plan aims at an increase in production, which is dependent on the demand for organic products and an improved guidance in the transition from traditional business to sustainable or organic production. The "[Year plan Organic farming 2010](#)" is the concrete translation of this strategy, which was created in close collaboration with BioForum Flanders, General Farmers syndicate and Farmers Union (DLV, Flemish Government).

Sustainable agriculture off course focuses on more than just organic farming. The [Nitrates Directive](#) (91/676/EEC) focuses specifically on water pollution caused by nitrates from agricultural sources (the so

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called 'manure problem'). Member States must identify waters that are (possibly) affected by pollution, designate vulnerable zones and establish and implement action programmes for those zones. It is also required to regularly measure water nitrate concentrations at specific monitoring stations to evaluate the impact of the measures taken.

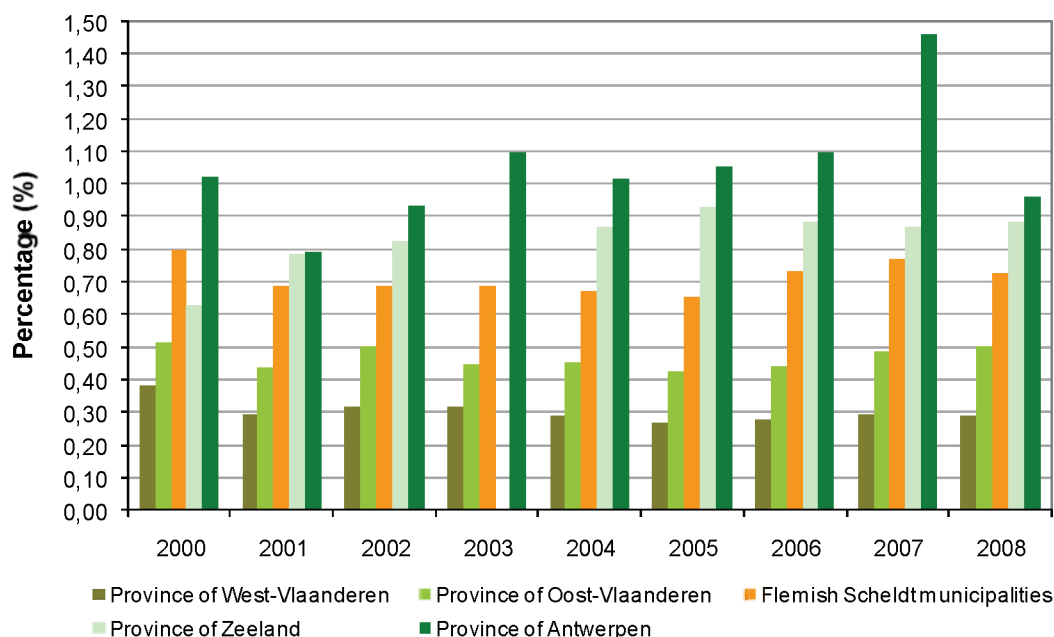
The [Urban Wastewater Directive](#) (91/271/EEC) determines how Member States should collect urban waste water (domestic and industrial), treat it and discharge it into **waste water treatment plants** (WWTP), in order to protect the (aquatic) environment against the adverse effects of polluted water. Member States are obliged to collect their waste water through a sewer system, purify the water and discharge it only when certain statutory standards of treatment are achieved (both physical-chemical and biological).

Ensuring a good **fish migration** also represents an important link for the achievement of the objectives under the Water Framework Directive, WFD ([good ecological status of surface waters](#)) and European Habitats Directive ([the protection and conservation of natural habitats and wild flora and fauna within the European Union, including some fish species](#)). Many structures such as dams, water mills, sluices and bridges indeed do result in a fragmentation of the waterways network. In that way, species that migrate through the water are hampered. The target 2030 of the Long Term Vision for the Scheldt estuary explicitly refers to the removal of barriers for migrating fish so that these fish can move freely between potential habitats in the Scheldt estuary.

## What does the indicator show?

### *Organic farming in the municipalities along the Scheldt estuary*

The data on organic farming in the Netherlands are not freely available at the lower administrative level (municipalities). This requires an annual paid assignment. For the current measurement 'area organic farming production', the data are presented at the level of the province of Zeeland. For Flanders, these data are available at municipal level. A comparison of the desired scale (Scheldt municipalities) is therefore not possible.



**Figure 1:** Proportion (%) of the area of organic farming businesses in the total agricultural area of the Scheldt municipalities in Flanders, compared to this figure in the provinces of Oost-Vlaanderen and Antwerpen in Belgium and Zeeland in the Netherlands. Source: Department of Agriculture and Fisheries, Monitoring and Research Division; BioMonitor Netherlands, Foundation SKAL, processing by Agricultural Economics Research Institute Wageningen.

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In the Flemish Scheldt municipalities, the share of organic farmland in total agricultural area averaged 0.7% over the period 2000-2008 (see figure 1). This is higher than the province of Oost-Vlaanderen, but less than the average share of organic farmland in the province of Antwerpen and Zeeland. There is virtually no growth in the organic farming area in the Flemish Scheldt municipalities that fluctuates around the 640 ha in a total farmland area of 89,000 ha. The number of organic farming businesses in the Flemish Scheldt municipalities remained fairly stable at around 40 companies. In the province of Zeeland, both the proportion (%) as the absolute organic farming area increased: from 785 ha in 2000 to 1,057 ha in 2008. The available data offer no possibility to comment on the situation of the municipalities along the Westerschelde.

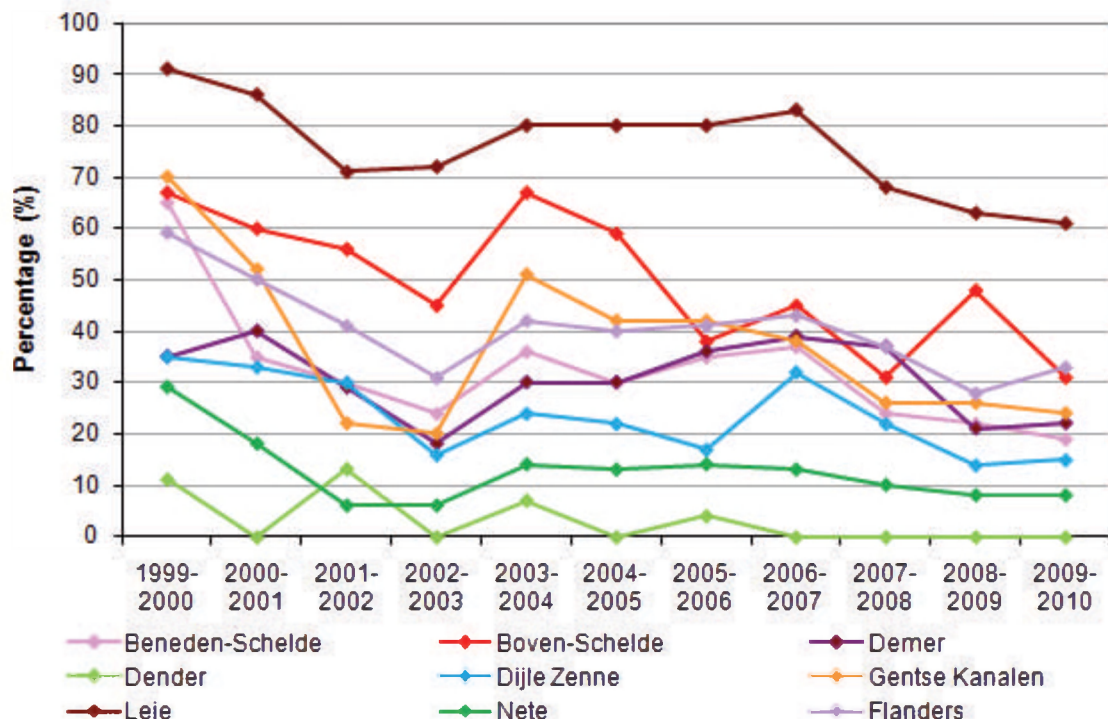
### *Effects of agriculture: efforts to prevent further eutrophication in regional waters*

Under the terms of the Nitrates Directive (91/676/EEC), the Netherlands and Flanders measure concentrations of nitrate in the water of nitrate sensitive and vulnerable zones, to evaluate the impact of the measures taken.

In Flanders the existing surface water monitoring network of the Flemish Environment Agency (VMM) was therefore expanded with specific measuring points to monitor the evolution of eutrophying impact from agriculture: the Manure Action Plan-monitoring network (MAP-monitoring network). The MAP-monitoring network especially observes winter concentrations because of the peak levels associated with increased precipitation in winter (e.g. 2003-2004 period, or "winter year" 2003-2004).

Compared to 1999 the situation improved per basin (e.g. Nete basin, Dijle-Zenne basin, basin of the 'Gentse kanalen') or stable (e.g. Demer basin) (see figure 2). Over the period July 1999 - June 2000 65% of the sites in the Beneden-Schelde basin exceeded the 50 mg NO<sub>3</sub>/L threshold at least once. In the period July 2006 - July 2007 this proportion fell to 19%.

For the Netherlands, the Water Department (Directorate General for Public Works and Water Management, RWS) reports mainly based on summer average nitrogen concentrations mg N/L but the data are not available at the catchment or river basin level.



**Figure 2:** Percentage of MAP-sites where nitrate concentration exceeded at least once the 50 mg/liter threshold in the "winter years" for the period July 1999 - July 2010, Scheldt river basin district. Source: Flemish Environment Agency (VMM).

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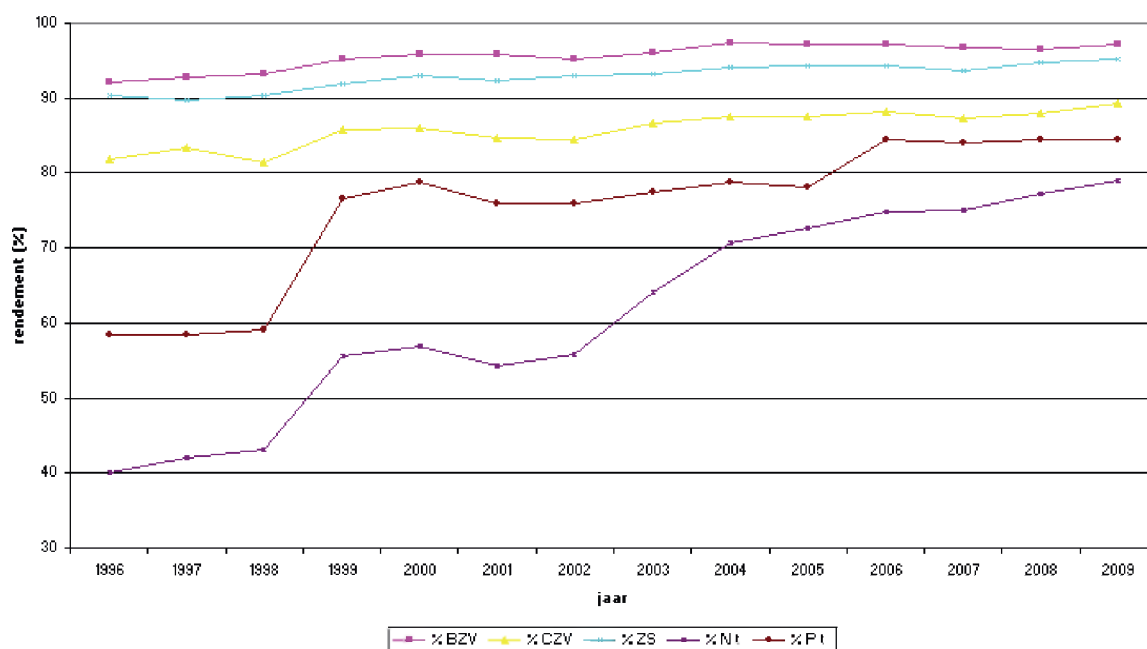
### *Waste water treatment policy (level of sewerage and treatment in the Scheldt river basin)*

Due to the stricter discharge standards, better enforcement, the introduction of cleaner production methods, the environmental levy on industrial waste water and increasing environmental awareness, different sectors in Flanders and the Netherlands have increased efforts to reduce their pollutant loads. The decrease in pollutant loads of companies and households to the surface waters in the Scheldt river basin has been further pursued by the waste water treatment policy. The first track of this policy focuses on the joint collection of waste water from an increasing percentage of the population and the treatment of this sewage in waste water treatment plants (WWTPs). A second track focuses on improving treatment efficiency of these WWTPs.

### Flanders

Since 1998, the number of regional WWTPs in Flanders has increased from 154 to 240 in 2009. During 2009, seven new regional WWTPs were established. Of the 240 regional WWTPs that were operational end 2009, 212 are situated in the Scheldt river basin district. Data on the treatment capacity of the WWTPs (expressed in population equivalents or PE, a measure of the amount of oxygen-binding substances in the waste water of one person per day) and the yields of these WWTP (expressed as % ratio of removed pollutant load through WWTP and the pollutant load flowing into the WWTP or influent load) are not available at the level of individual basins or the Scheldt river basin district at the time of preparation of this fact sheet.

The average treatment efficiency for Flanders has stagnated since 2006 for most parameters: biochemical oxygen demand (BZV, 97%), suspended solids (ZS, 95%), chemical oxygen demand (CZV, 89%) and total phosphorus (P<sub>tot</sub>, 84%) (see figure 3). Only for nitrogen (N<sub>tot</sub>), there is an increase in efficiency by 2% in 2009 compared to the previous year. European objectives for treatment efficiency of N and P (75%) are easily met.



**Figure 3:** Evolution of the average treatment efficiency in sewage treatment plants in Flanders (1996-2009). The data are not available per basin. Source: Flemish Environment Agency (VMM), Department Ecological Supervision.



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Per basin, data are compiled that monitor the expansion of the municipal and supra-municipal sanitation infrastructure. These data include the number of inhabitants who actually reside or discharge in the area, the current sewerage level (proportion of discharging inhabitants connected to sewerage) and the current treatment level (percentage of discharging inhabitants connected to WWTPs).

**Table 1:** Parameters for sewerage and treatment level per basin in Flanders (data 2009). Source: VMM database, report sewerage and treatment level per basin committee, 2009

Basin committee	Inhabitants (residents)	Inhabitants (discharging)	Inhabitants on sewerage	Max connectable inhabitants	Inhabitants on WWTP	Sewerage level	Treatment level
Gentse Kanalen	426,082	473,754	416,831	453,722	368,516	88	77.8
Beneden-Schelde	1,154,787	1,355,139	1,242,930	1,322,499	1,053,815	91.7	77.8
Leie	525,864	499,227	423,149	455,138	288,980	84.8	57.9
Boven-Schelde	387,155	178,393	128,516	159,730	92,898	72	52.1
Dender	355,326	313,749	272,573	300,120	208,535	86.9	66.5
Dijle Zenne	771,237	763,946	692,837	742,247	403,065	90.7	52.8
Demer	653,591	690,293	615,979	669,516	482,581	89.2	69.9
Nete	620,914	583,732	456,906	535,027	439,281	78.3	75.3
<b>Totals:</b>	<b>4,894,956</b>	<b>4,858,233</b>	<b>4,249,721</b>	<b>4,637,999</b>	<b>3,337,671</b>	<b>87.5%</b>	<b>68.7%</b>

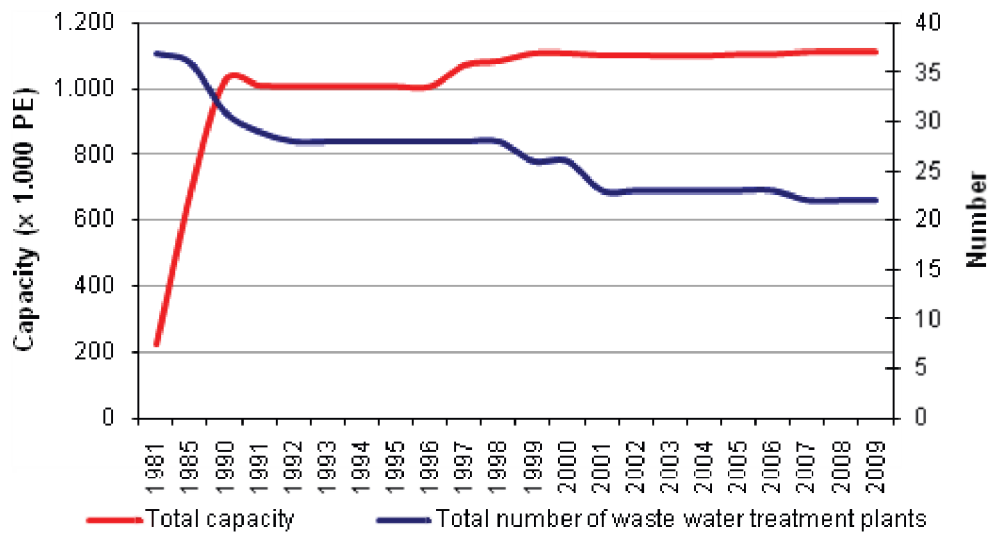
On average, the sewerage level in the Flemish basins of the Scheldt river basin district (Beneden-Schelde, Boven-Schelde, Demer, Dender, Dijle Zenne, Gentse Kanalen, Leie, Nete) is 87.5%. The level of treatment averages 68.7% (see table 1).

## The Netherlands

Statistics Netherlands (CBS) collects data on the number of waste water treatment plants that discharge into waters belonging to the Scheldt river basin district, including the Westerschelde and the Oosterschelde. These WWTPs treat water from virtually all households and companies that discharge into the sewerage. The plants are managed by the regional water quality managers, district treatment and water boards. The design or treatment capacity of the WWTPs is also expressed in PE (see above). The evolution in the Scheldt river basin district (see figure 4) indicates a reduced number of WWTPs (22 in 2008 compared to 37 in 1981) with and increased treatment capacity (1.1 million PE in 2008 compared to 224,000 PE in 1981). Data on the degree of connection to the sewer system and to the WWTPs are not available in the Netherlands. The data only refer to the urban wastewater.

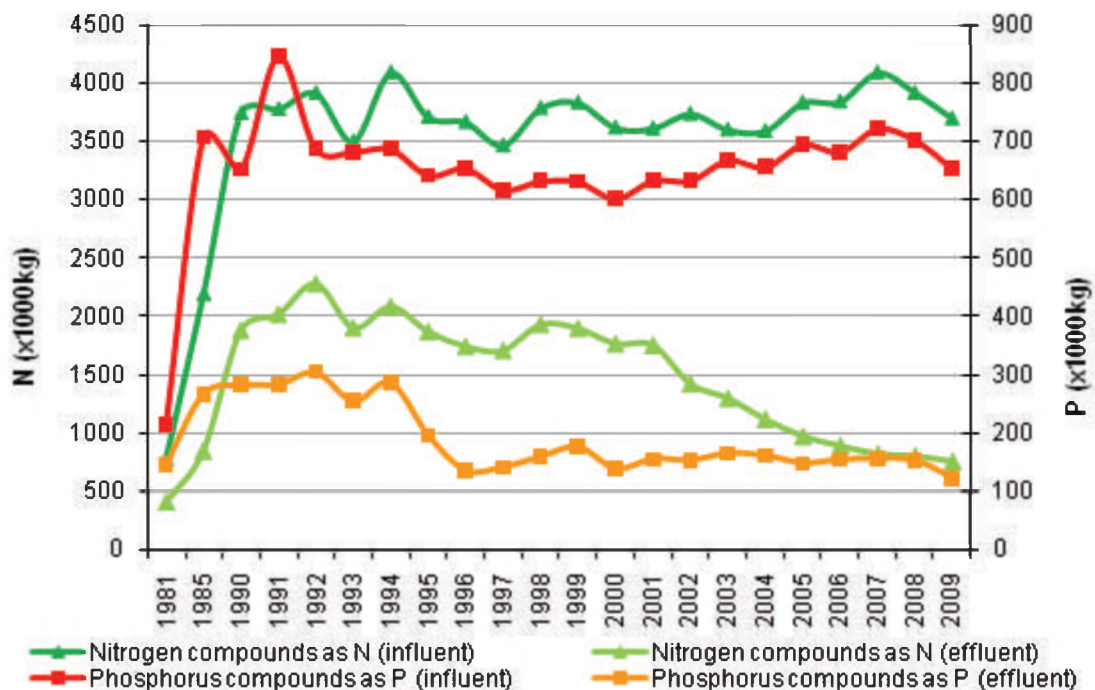


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**Figure 4:** Evolution of the number of WWTPs and water treatment capacity (population equivalent, PE) in the Scheldt river basin district of the Netherlands (1981-2008). Source: Statistics Netherlands (CBS), Statline database.

Also in the Dutch part of the Scheldt river basin district (Ooster- en Westerschelde) treatment efficiency of WWTPs in 2009, is well above the EU 75% treatment standard for total nitrogen and phosphorus compounds (79% and 81% respectively, own calculations based on CBS data). The nitrogen and phosphorus loads in the waste water that flows into the sewage treatment plants (influent) remained stable in the period 1990 to 2009 (annual average of 3,750 x 1,000kg N and 670 x 1,000kg P), while the N and P loads of the effluent were reduced by about 60% over the same period (see figure 5).



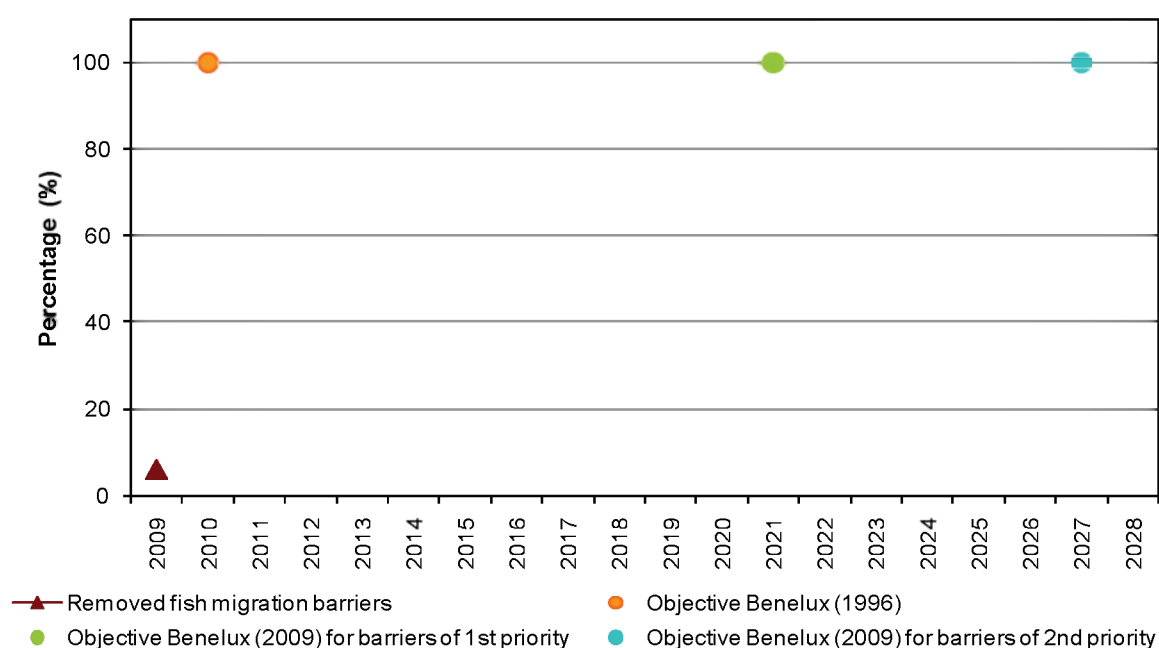
**Figure 5:** Evolution of nitrogen and phosphorus load (x 1.000kg) in waste water (influent and effluent) of the WWTPs in the Scheldt river basin district (Ooster- en Westerschelde) in the Netherlands (1981-2009). Specific data on the level of the Westerschelde are not available. Source: Statistics Netherlands, (CBS) Statline database.

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### *Elimination of fish migration barriers in the Scheldt estuary*

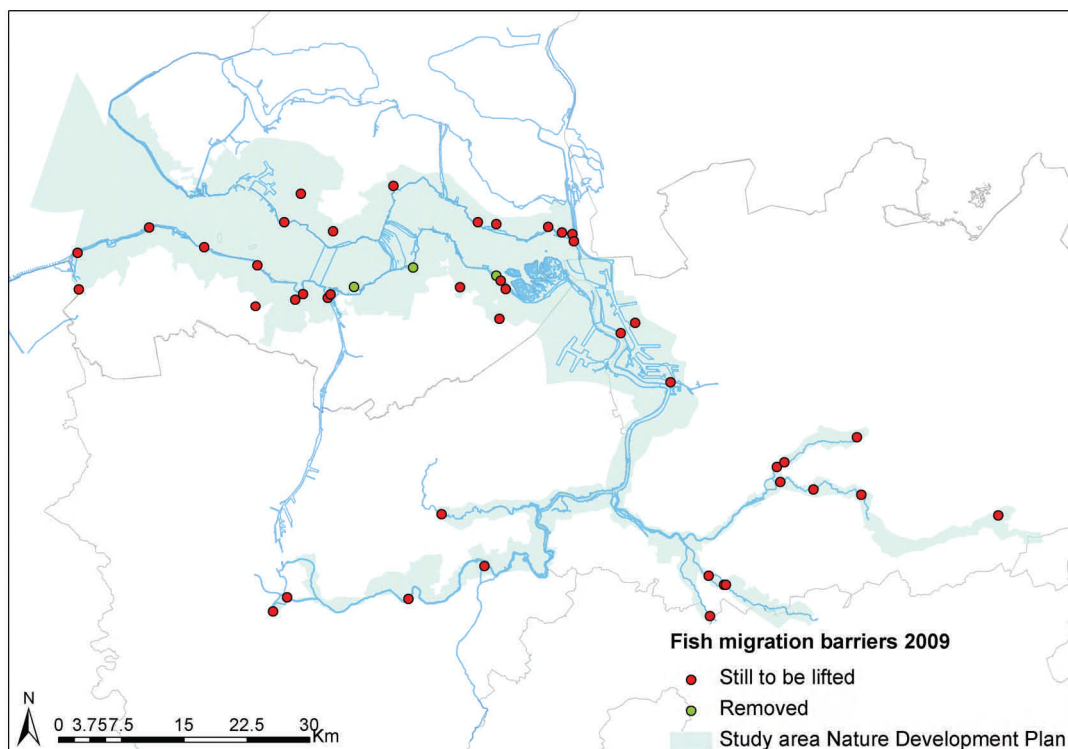
While no agreements have been made to achieve an integrated and standardized database on (eliminated) fish migration barriers, the structure of the data sets for Flanders and the Netherlands are quite similar ([see technical fact sheet](#)) so data can be combined in this measurement.

In 2009, three of the 50 or about 6% of the fish migration barriers in the Scheldt estuary (study area of the Nature Development Plan, [4]) were removed (see figure 6). The objective of the Benelux decision 1996 [5], to make a free fish migration possible in the Benelux river basins before 1 January 2010, is therefore far beyond reach. Partly because of the fact that this timing was not feasible, the decision was reviewed in 2009 and new targets were set [6]. These targets are based on important fish migration routes and ecologically valuable areas. The parties of the decision must review current priority maps with fish migration barriers by June 2010 at the latest based on these important migration routes and ecologically valuable areas. In the future, a division will be made between barriers of first and second priority to make an assessment of targets set possible.



**Figure 6:** (Annual cumulative) Percentage removed or lifted fish migration barriers in the Scheldt estuary. Source: Flemish Environment Agency (VMM), Recreational fisheries Netherlands, District Water Board 'Zeeuws-Vlaanderen' and District Water Board 'Zeeuwse Eilanden'.

Figure 7 gives an overview of the location of the fish migration barriers in the Scheldt estuary. Both removed or still to be lifted fish migration barriers are visualized.



**Figure 7:** Map of fish migration barriers (removed or still to be lifted) in the Scheldt estuary (study area Nature Development Plan). Source: Flemish Environment Agency (VMM), Recreational fisheries Netherlands, District Water Board 'Zeeuws-Vlaanderen' and District Water Board 'Zeeuwse Eilanden'.

## Where do the data come from?

- Data of organic agriculture at the municipal level in the Netherlands is collected by the Foundation SKAL, processed by the Agricultural Economics Research Institute Wageningen and reported annually in the "BioMonitor" at provincial and national level. The data on (aggregated) level of the province of Zeeland is freely available. Data of organic farming in Flanders are provided at the municipal level by the Department of Agriculture and Fisheries, Monitoring and Research Division.
- The data on the percentage of MAP-sites where the nitrate concentration exceeded at least once the 50 mg/liter threshold is collected by the Flemish Environment Agency (VMM).
- Data on the number of sewage treatment plants, water treatment capacity and treatment efficiency of sewage treatment plants, sewerage and treatment level come from Statistics Netherlands (CBS) and the VMM.
- The information on fish migration barriers in the Scheldt estuary (NOPSE study area) were provided by the VMM (fish migration barriers database), Recreational fisheries Netherlands, District Water Board 'Zeeuws-Vlaanderen' and District Water Board 'Zeeuwse Eilanden'.

## Opportunities and threats

To date (national) objectives for water quality are only limitedly achieved (see also indicator 'surface water quality'). An important condition for achieving the desired water quality goals, is the coordination and integration between different policy fields. An example can be found in the defining decisions for



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standards of i.a. use of nitrogen and phosphorus in agriculture, which were taken at EU and national level. As for the ecological quality of water systems, in addition to the WFD, mainly agricultural policy, spatial development policy and nature policy are of direct importance.

The Nature development plan Scheldt estuary [4], the Flemish [Sigma Plan](#) and Dutch [Nature Plan](#) ('Natuurpakket') Westerschelde (see indicator 'protection and development of natural areas') foresee this match between the achievement of targets for nature, space, safety and water quality in a significant way. The provision of buffer zones along waterways and in stagnant waters in Flanders is one concrete measure to prevent and control direct and diffuse pollution of surface water by agriculture. Within these buffer zones, the use of pesticides and fertilizers is restricted or prohibited. The width of such buffer zone is determined by the ecological value of the watercourse and soil characteristics of the valley. Besides the expansion of the wastewater treatment infrastructure, the discharge of pollutant substances in domestic waste water must be significantly reduced. Small hazardous waste (paint, pesticides, waste oil, antifreeze, various chemicals) must be brought to collection points and not removed through the sink. Furthermore, it is better to use phosphate-free detergents and to avoid excessive use of chlorine-containing cleaning products. The adverse effect of phosphate surrogates on the mobility of heavy metals in the environment has not been sufficiently investigated. A form of 'rational use of water' in households is the separate collection of rain- and waste water. Waste water is then not only less diluted, drinking water is also saved. The collected rainwater can be used in home applications where drinking water quality is not needed. Moreover, rainwater allows a decreased use of cleaning products because it is softer.

## Integration with other indicators/measurements?

### *More opportunities for nature are created*

The quality of surface water affects a variety of functionalities and features of the Scheldt estuary. Good water quality is a crucial condition for aquatic communities and species (benthic organisms, fish, ...) to achieve a good conservation status in accordance with the European Habitats and Birds Directive and/or local conservation priorities (see indicator 'status of species and habitats'). Many of the environmental contaminants are fat-soluble and can accumulate in elevated concentrations in biota and negatively affect these organisms (see indicator 'loads of pollutant substances'). Humans also benefit from a good water quality, creating a pleasant environment for recreation and tourism and for residents in the first place. In conditions of good water quality, the hazards associated with fish consumption decrease. Healthy bathing water also creates a positive image for the Scheldt estuary for tourists and residents (see indicator 'loads of pollutant substances' and 'socio-economic importance of residential tourism').

Improving the quality of the river bed sediments and reducing the nutrient loads (see indicator 'loads of pollutant substances'), both sources of pollution to surface waters, increases water quality and the potential for ecological restoration of the watercourse. Further development of water treatment plants, construction of nature friendly river banks and removing obstacles in migration for fish (see indicator 'opportunities for nature') are some of the many measures that were included in river basin management plans to achieve the goals imposed by the Water Framework Directive on the European countries, to realize.

Measures such as the removal fish migration barriers, the active restriction of manure and other sources of eutrophication and a reduced quality of the aquatic environment, the application of organic farming are examples of the societal response to the challenges within the policy and management of the Scheldt estuary. Other indicators are 'protection and development of natural areas', 'societal response and cooperation', 'communication across borders'.



## How to cite this fact sheet?

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Online available at: <http://www.scheldemonitor.be/indicatoren.php>

## References

- [1] **Directie Zeeland; Administratie Waterwegen en Zeewezen** (2001). Langetermijnvisie Schelde-estuarium. Ministerie van Verkeer en Waterstaat. Directoraat-Generaal Rijkswaterstaat. Directie Zeeland/ Ministerie van de Vlaamse Gemeenschap. Departement Leefmilieu en Infrastructuur. Administratie Waterwegen en Zeewezen: Middelburg, The Netherlands. 86 pp. + toelichting 98 pp., [details](#)
- [2] **Council Regulation (EC) No. 834/2007** of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:189:0001:0023:EN:PDF>
- [3] EC Common Agriculture Policy-CAP. [http://ec.europa.eu/agriculture/publi/capexplained/cap\\_en.pdf](http://ec.europa.eu/agriculture/publi/capexplained/cap_en.pdf)
- [4] **Van den Bergh, E.; Van Damme, S.; Graveland, J.; de Jong, D.J.; Baten, I.; Meire, P.** (2003). Studie-rapport natuurontwikkelingsmaatregelen ten behoeve van de Ontwikkelingsschets 2010 voor het Schelde-estuarium; Op basis van een ecosysteemanalyse en verkenning van mogelijke maatregelen om het streefbeeld Natuurlijkheid van de Lange Termijn Visie te bereiken. Werkdocument RIKZ, 2003.825x. [S.n.]. 99 + annexes pp., [details](#)
- [5] Decision of the Committee of ministers of the Benelux Economic Union concerning the free migration of fish species in the hydrographical river basins of the Benelux countries M (96) 5. [http://www.benelux.int/pdf/pdf\\_nl/dos/09-D\\_NO-016-biilage1\\_NL.pdf](http://www.benelux.int/pdf/pdf_nl/dos/09-D_NO-016-biilage1_NL.pdf)
- [6] Decision of the Committee of ministers of the Benelux Economic Union to repeal and replace Decision M (96) 5 of 26 April 1996 concerning the free migration of fish species in the hydrographical river basins of the Benelux countries M (2009) 1. [http://www.benelux.int/pdf/pdf\\_nl/dos/09-D\\_NO-016-biilage6\\_NL.pdf](http://www.benelux.int/pdf/pdf_nl/dos/09-D_NO-016-biilage6_NL.pdf)