



# Indicators for the Scheldt estuary

## Population pressure



Population in the municipalities along the Scheldt estuary has increased since 1990 by 5.4% to nearly 2 million (2008). Both the Flemish and Dutch Scheldt municipalities have lost agricultural land to the benefit of other land use such as (semi) built-up and traffic. 14% of the total area of the Scheldt municipalities was built-up in 2009, an increase of 1.7% from 1996 -1997. The average income of a resident in both the Flemish and Dutch Scheldt municipalities in 2007 was lower than the average income of a resident in the Flemish Region and the Netherlands respectively.

### Why monitor this indicator?

The target of the 2030 Long-term Vision for the Scheldt estuary [1] envisages a sustainable use of the estuarine system for human needs. Trends in population numbers and densities, land use changes and social developments may reflect the pressure of the population on the surrounding ecosystem: the need for land, housing, employment, recreation possibilities, ... The demographic and social developments and needs are relevant data in the formulation of policies for the region of the Scheldt estuary. A comparison of these developments in relation to the changes in the Flemish Region and the Netherlands provides additional information about the significance of the observed trends.

The European Commission is working on a new Thematic Strategy and Directive for soil protection and sustainable use of soil [2]. The soil is, from an ecological point of view, under increasing pressure (erosion, contamination, sealing, ...) due to human activities such as agriculture and forestry, industry, tourism and urbanization. Protecting the soil is, among other things, important for the achievement of national and European objectives on water quality, human health, climate change, the protection of nature and biodiversity, food security and a sustainable development of Europe in general. The proposed Directive focuses in particular on land use that significantly hampers normal soil functions (e.g. 'the permanent covering of the soil surface with an impermeable material') The Dutch and Flemish soil policies [3] also focus on a sustainable use and management of the soil by which it meets the needs of the current generations without compromising the ability of future generations to meet their own needs.

Poverty and social exclusion are also on the agenda of the European, Dutch and Flemish strategies for sustainable development [4]. In the context of sustainable development of the Scheldt estuary, attention must be given to this issue.

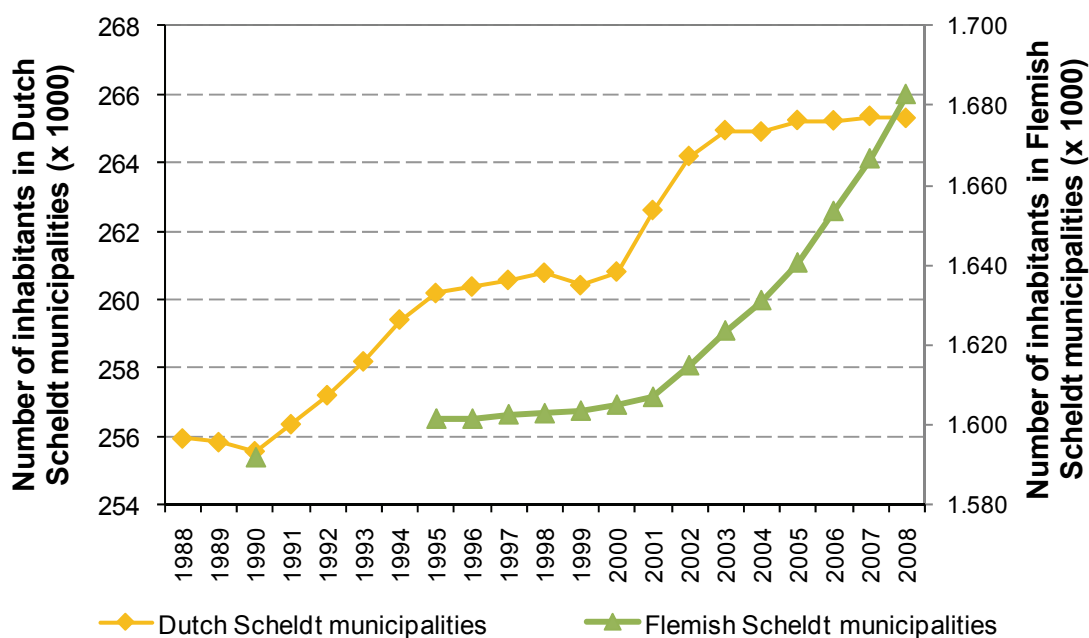
The 'prosperity index' examines to what extent the relative prosperity in the Scheldt municipalities (based on the average income per inhabitant) differs from the prosperity in the Netherlands and the Flemish Region. In addition, the employment and growth of key economic sectors in the Scheldt estuary such as the ports (see indicator 'socio-economic importance of ports' [5]) translate the local economy to prosperity of local people.

## What does the indicator show?

### *Numbers and density of the population in the Scheldt estuary*

The Flemish population data are based on the National Register of natural persons. In this register, data are gathered from the municipal population registers of all citizens that stay in the country. The Dutch population data are based on the Municipal Administration (GBA). The GBA basically includes anyone who lives in a Dutch municipality on indefinite basis..

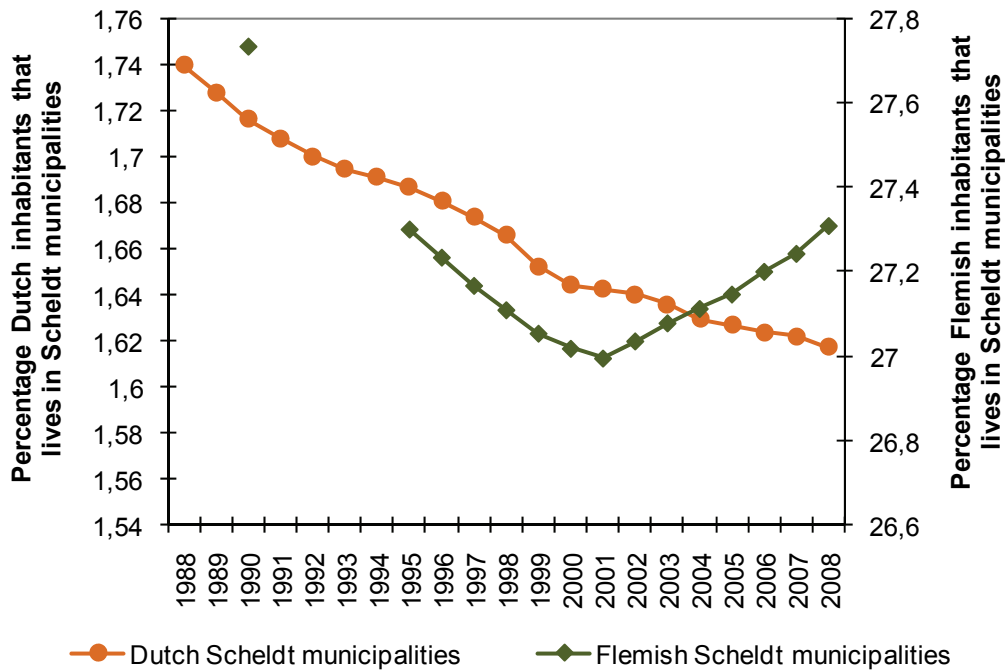
Population in the municipalities along the Scheldt estuary has increased since 1990 by 5.4% to nearly 2 million (2008). The population of the 51 Flemish Scheldt municipalities has increased since 1990 by 5.7% or slightly less than 91,000 inhabitants. Also in the 9 Dutch Scheldt municipalities, the population has increased in the period 1988 - 2008 by 3.7% or more than 9,300 inhabitants (see Figure 1). Figure 4 shows the boundaries of the Flemish and Dutch Scheldt municipalities (see also technical fact sheet of this measurement [6]).



**Figure 1:** Evolution of the population in Dutch (left) and Flemish (right) Scheldt municipalities. Source: Statistics Netherlands (CBS), Directorate-general Statistics and Economic information (ADSEI).

In the period 1988 - 2008, the number of inhabitants in the Dutch Scheldt municipalities has increased relatively less than the population in the Netherlands. As a consequence, the percentage of inhabitants living in the Dutch Scheldt municipalities relative to the total number of inhabitants in the Netherlands decreased (see Figure 2). Less than 2% of the inhabitants of the Netherlands live in a municipality along the Scheldt. For the Flemish Region this is 27.3% (2008). Since 2001, this share is rising again.

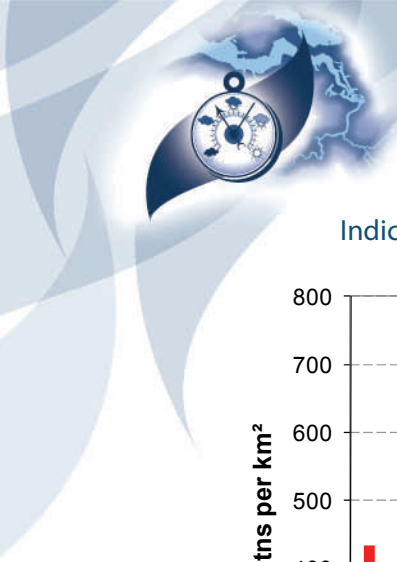
## Indicators for the Scheldt estuary



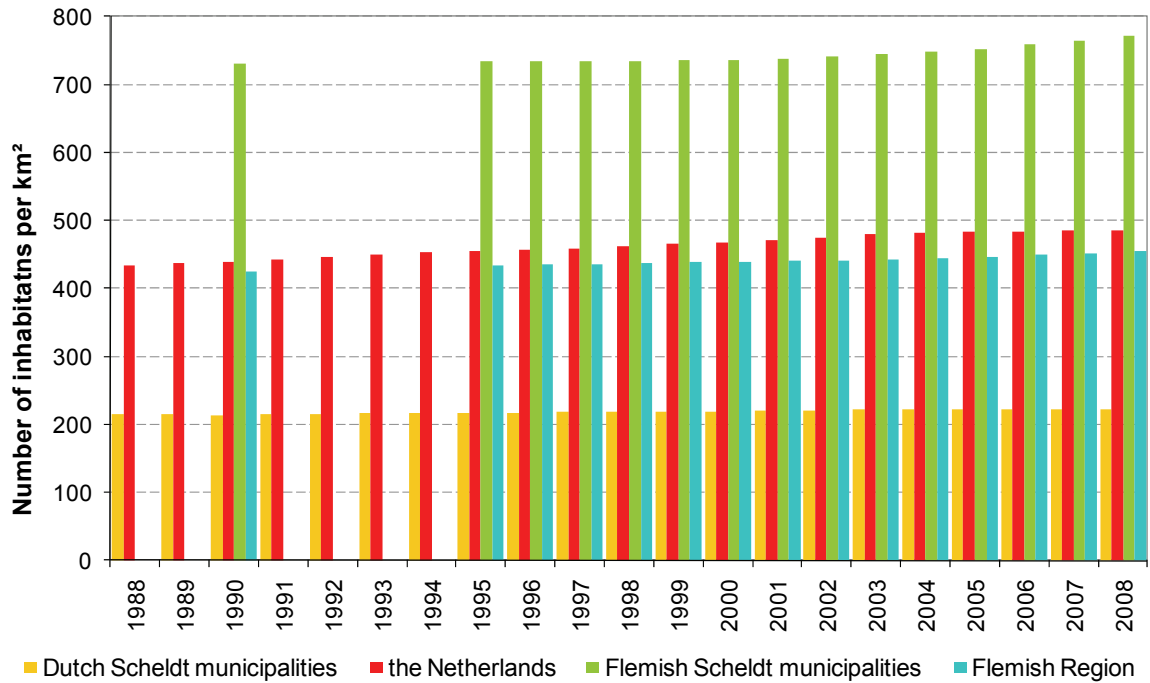
**Figure 2:** Evolution of the population in Dutch and Flemish Scheldt municipalities as a percentage of the total number of inhabitants in the Netherlands (left) or the Flemish Region (right) respectively. Source: Statistics Netherlands (CBS), Directorate-general Statistics and Economic information (ADSEI).

Population density in the Scheldt municipalities also has increased, as in the entire Flemish Region and the Netherlands (see Figure 3). The Dutch Scheldt municipalities have, with 222 inhabitants per km<sup>2</sup> in 2008, a lower population density than the Flemish Scheldt municipalities with 772 inhabitants per km<sup>2</sup> in 2008. The population density in the Flemish Scheldt municipalities is even higher than in the Flemish Region (456 inhabitants per km<sup>2</sup> in 2008). The population density in the Netherlands is about twice as large as in the Dutch Scheldt municipalities (486 inhabitants per km<sup>2</sup> in 2008).

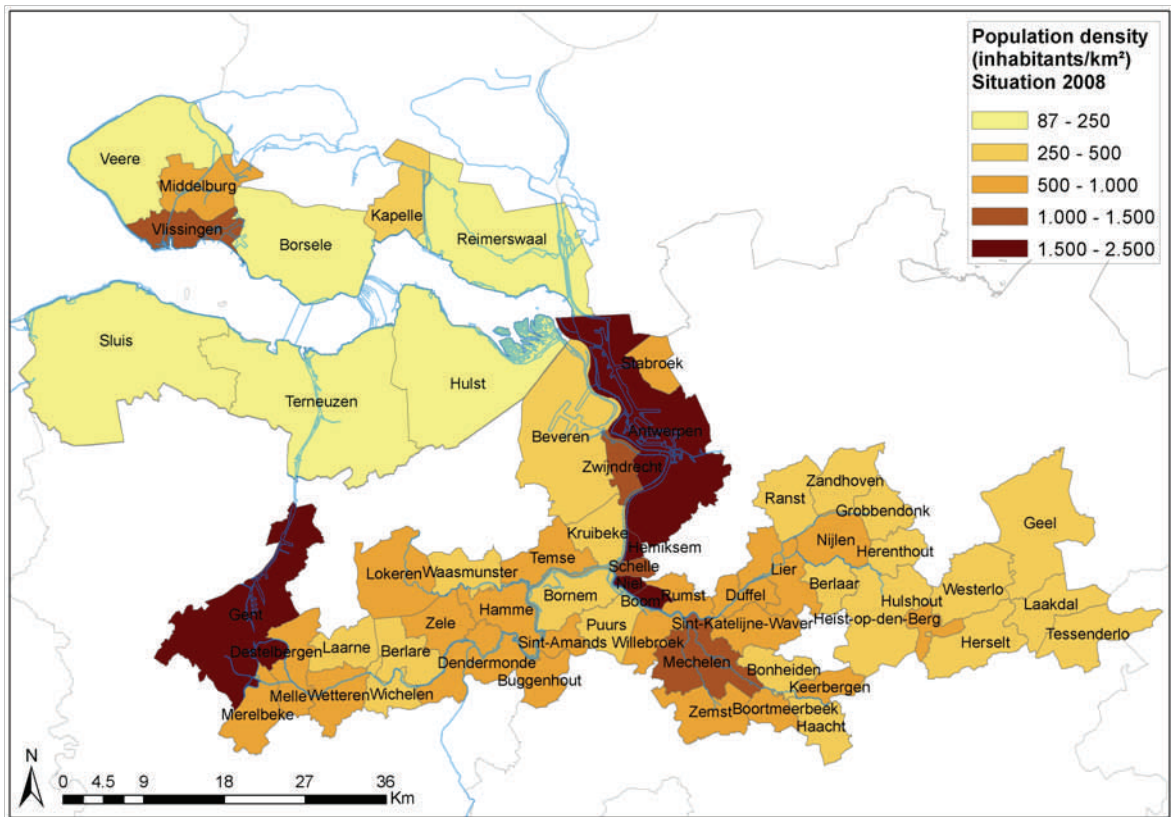
Middelburg and Vlissingen are the most densely populated municipalities along the Westerschelde (respectively 975 and 1,312 inhabitants per km<sup>2</sup> in 2008, see Figure 4). Antwerpen, Gent, Niel, Boom and Hemiksem have the highest population density on the Flemish side of the estuary (more than 1,500 inhabitants per km<sup>2</sup> in 2008).



### Indicators for the Scheldt estuary



**Figure 3:** Number of inhabitants per square kilometer in the Flemish/Dutch Scheldt municipalities compared to the number of inhabitants per square kilometer in the Flemish Region/Netherlands. Source: Statistics Netherlands (CBS), Directorate-general Statistics and Economic information (ADSEI).



**Figure 4:** Population density or number of inhabitants per square kilometer in the Flemish/Dutch Scheldt municipalities. Situation 2008. Source: Statistics Netherlands (CBS), Directorate-general Statistics and Economic information (ADSEI).

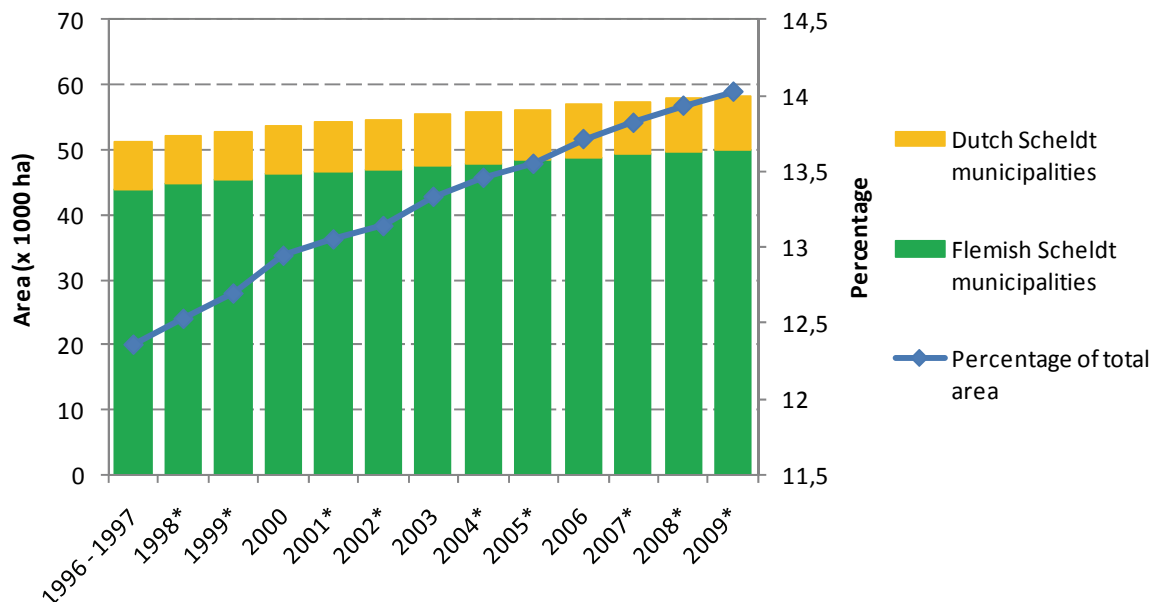
## Indicators for the Scheldt estuary

### Area of built-up land and other land use in the Scheldt estuary

Flanders and the Netherlands use different categories and nomenclature for the classification of land use in their land use databases (see also technical fact sheet of this measurement, [7]). As a result, data on land use in the Scheldt estuary are split into Flanders and the Netherlands. However, a number of similar land use classes are defined in the context of this measurement in order to allow for a rough comparison. Respectively 11.5% and 7% of the total area of the Flemish Scheldt municipalities and the Flemish Region classified as "unknown" in 2009. This may affect the trends shown.

### Area of built-up land in Dutch and Flemish Scheldt municipalities

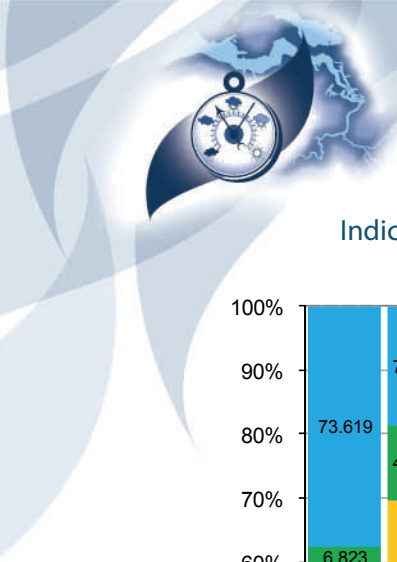
The area of built-up land in the Flemish and Dutch Scheldt municipalities has increased from 51,254 ha in 1996 - 1997 to 58,184 ha in 2009 (see Figure 5). Most of this area is on Flemish territory. In 2009 14% of the total area of the Scheldt municipalities is built-up. In 1996 - 1997 this was 12.4%.



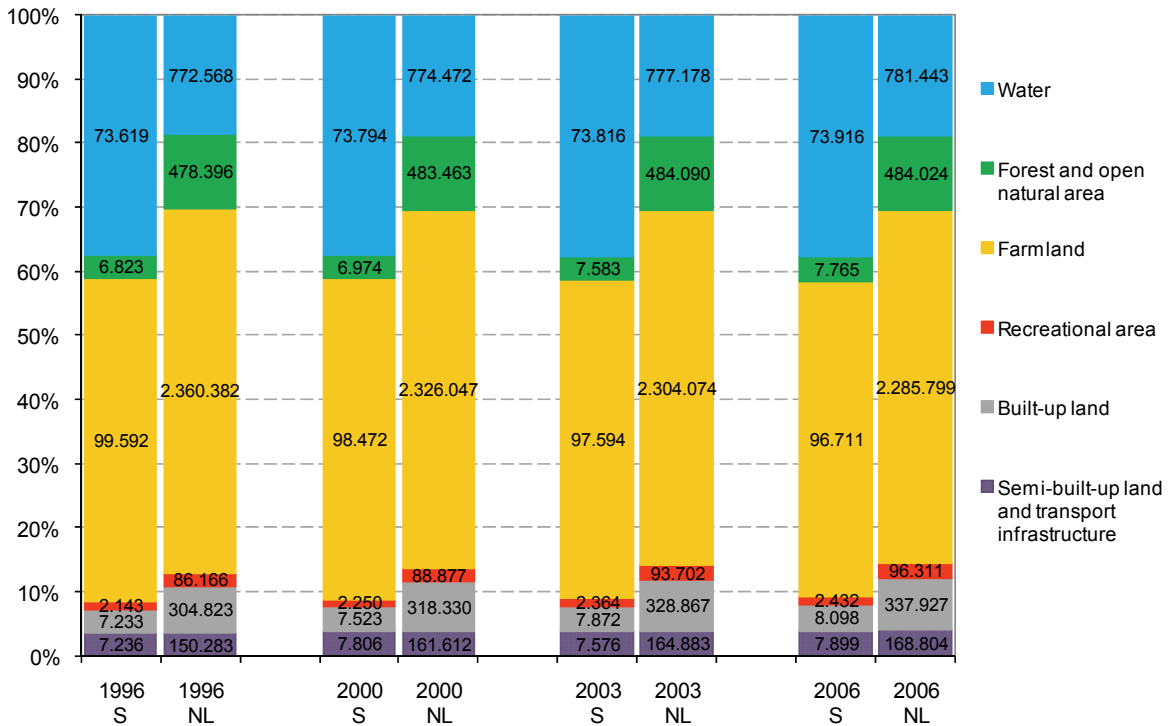
**Figure 5:** Area of built-up land in the Dutch and Flemish Scheldt municipalities (left) and percentage of built-up land relative to the total area of the Dutch and Flemish Scheldt municipalities together (right). For years with an asterisk there are no data available for the Dutch Scheldt municipalities and the data from the nearest preceding year were used. For the period 1996 - 1997, data of the Dutch Scheldt municipalities are from 1996 and data of the Flemish Scheldt municipalities are from 1997. Source: Statistics Netherlands (CBS), Directorate-general Statistics and Economic information (ADSEI), Administration of land registry (Administratie van het kadaster).

### Land use in Dutch Scheldt municipalities

Besides the fact that water takes up a high proportion of land use (> 35%) in the Dutch Scheldt municipalities, 49.1% of the land use consisted of agriculture in 2006 (see Figure 6). That agriculture has lost an area of slightly less than 3,000 ha (- 1.5%) in the period 1996 - 2006, while all other land use classes have (slightly) gained area. The strongest riser was the category 'forest and open natural area' (+ 0.5% or 942 ha), followed closely by 'built-up land' (+0.4% or 865 ha, see above). In the Netherlands the loss of agricultural land at the expense of other categories of land use was even bigger in the same period (-1.8%). The Dutch Scheldt municipalities contain relatively less space for agriculture, recreation, traffic, construction and especially forest and open nature, compared to the Netherlands as a whole, because of the large presence of 'inland' water.



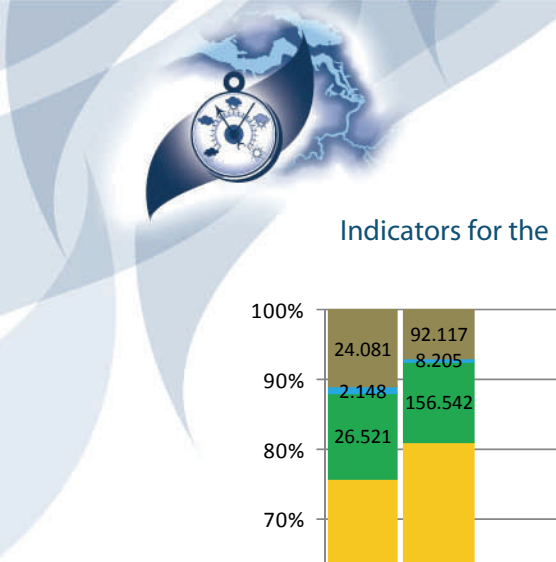
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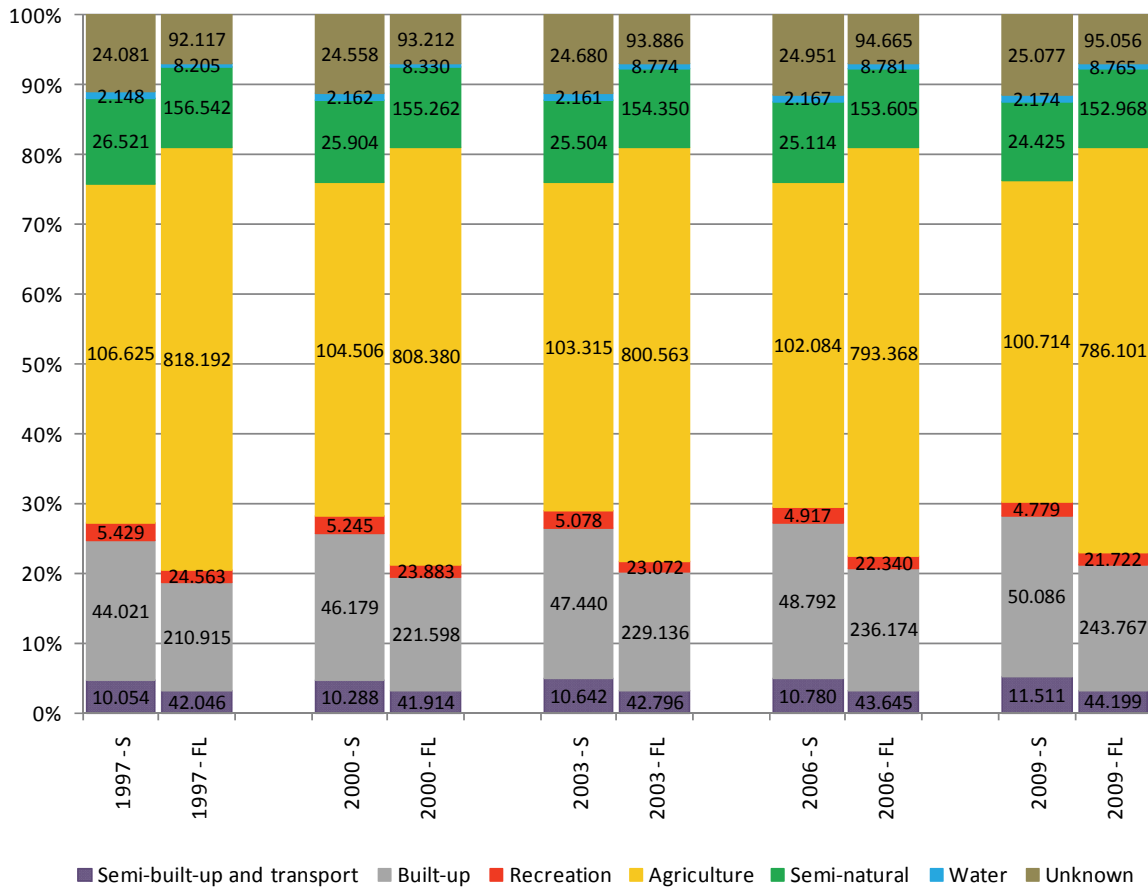
**Figure 6:** Area of land use as a percentage of the total area in the Dutch Scheldt municipalities (S) and the Netherlands as a whole (NL) (1996-2006), by land use class. The figures in the bars indicate the absolute area (ha). Source: Statistics Netherlands (CBS).

### Land use in Flemish Scheldt municipalities

In the Flemish Scheldt municipalities 5,910 ha (2.7%) farmland was lost in the period 1997 to 2009. In addition, about 2,100 hectares or 1% (semi-)natural area and 650 ha or 0.3% recreational area disappeared. Especially the area of built-up land increased in the Flemish Scheldt municipalities (+ 2.8% or 6,065 ha, see above) and also the area for traffic and semi-built-up land experienced an increase (+ 1,457 ha or 0.7%). The downward or upward trend in the relative percentages of different land use classes in the Flemish Scheldt municipalities are quite in line with that of the entire Flemish Region. The territory of Flemish Scheldt municipalities is relatively less occupied by farmland (12.1% less) but more with (semi-) built-up land and transport infrastructure (6.9% increase) (see Figure 7).



## Indicators for the Scheldt estuary



**Figure 7:** Area of land use as a percentage of the total area in the Flemish Scheldt municipalities (S) and the Flemish Region as a whole (FL) (1997-2009), by land use class. The figures in the bars indicate the absolute area (ha). Source: Directorate-general Statistics and Economic information (ADSEI), Administration of land registry (Administratie van het kadaster).

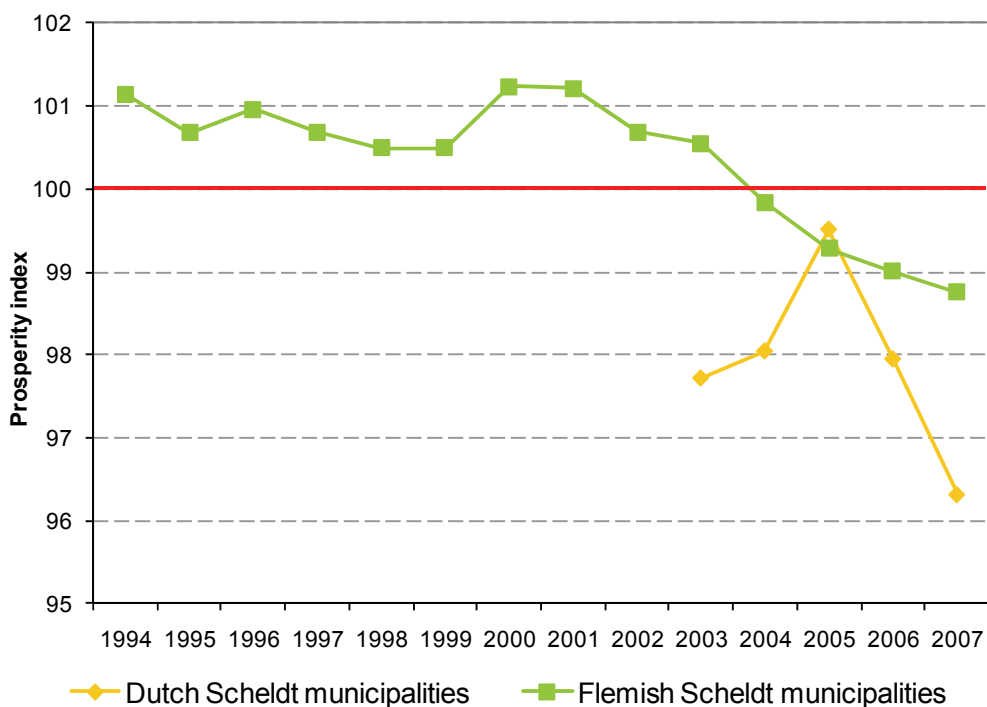
### Prosperity index in the municipalities along the Scheldt estuary

The prosperity index is defined here as the comparison of the average income per inhabitant of the Flemish and Dutch Scheldt municipalities with the average income per inhabitant of the Flemish Region or the Netherlands, respectively (= 100).

The Flemish income data are based on the declarations of personal income taxes. The Dutch income data are based on estimates from the Regional Income Survey (RIO). The definitions of 'income' differ between Flanders and the Netherlands. Flanders uses the net taxable income that consists of all net income minus tax-deductible expenses. These income data do not reflect the real disposable income because not everyone pays taxes or declares his real income to the tax authorities. The Dutch income data are based on an estimate of the true (but unknown) disposable incomes. For more information, consult the technical fact sheet of this measurement [8]. The prosperity index provides a relative value, which makes comparison between the figures of the Netherlands and Flanders possible.

## Indicators for the Scheldt estuary

The prosperity index in the Flemish municipalities along the Scheldt estuary has decreased by just over 2% since the beginning of the availability in 1994. Since 2004 the average income of a resident in the Flemish Scheldt municipalities is lower than the average income of a resident in the Flemish Region. The average income per person in the Dutch Scheldt municipalities was 0.5 to 4% lower than the national average in the period 2003 - 2007 (see Figure 8).



**Figure 8:** Annual prosperity index of the Flemish and Dutch Scheldt municipalities. The prosperity index is the average income per person in the Flemish and Dutch Scheldt municipalities compared to the average income per person in the Flemish Region or the Netherlands respectively. The latter are taken as value 100 in the prosperity index (red line in the graph). Source: Statistics Netherlands (CBS), Directorate-general Statistics and Economic information (ADSEI).

## Where do the data come from?

- Data on population, area of the municipalities and average income per resident in Flanders and the Netherlands are owned by the Directorate-general Statistics and Economic information (ADSEI) and Statistics Netherlands (CBS) respectively.
- Data concerning land use belong to the CBS, the ADSEI and the Administration of land registry (Administratie van het kadaster).

## Opportunities and threats

Population pressure and land use along the Scheldt estuary are closely linked. Economic development, the need for transport infrastructure and housing, define the intensity and patterns of urbanization. The use of open space for construction and transport is mainly at the expense of farmland and to a lesser extent of (semi)natural areas like forests.





## Indicators for the Scheldt estuary

An increase in the area of built-up land in the Scheldt municipalities has an important influence on the Scheldt ecosystem as a result of soil sealing. Changes in the area of built-up land can, besides e.g. canalization and other water management infrastructure, have an impact on the fresh water discharge in the Scheldt estuary and influence the salinity (variations) and the height of water levels (see indicator 'morphology and dynamics in the estuary'). Furthermore, intensive forms of land use also entail additional environmental pressure (noise, odor, pollution) (see also indicator 'loads of pollutant substances').

Road networks and transport infrastructure are the link between cities and the veins of economy. Nevertheless, they also contribute to the fragmentation of open space and natural areas (see indicator 'protection and development of natural areas') affecting the quality of the existing habitats and species (see indicator 'status of species and habitats').

The 'Spatial Structure Plan Flanders' [9] and the Dutch 'Note on Spatial use' (Nota Ruimte) [10] pay attention to the spatial contribution to a strong economy and viability of cities where the safeguarding and development of natural, scenic and cultural values is guaranteed. The creation of 'opportunities for nature' through measures such as a thorough treatment of the wastewater and environmentally friendly agriculture can continue to ensure the quality and use of natural resources in the future (see e.g. indicator 'quality of surface waters').

Sustainable development also requires efforts to eliminate or reduce the arrears and contradictions in social development within a community and between communities. The prosperity index gives an idea about the relative socio-economic status of the population in the Scheldt estuary, compared to the Netherlands and the Flemish Region. Like most indicators of welfare, this index provides only a limited view of reality.

The specifications of the measurements in this indicator further describe definitions, data and methodology, and their limitations. The fact sheets are available at: <http://www.scheldemonitor.be/indicatorfiche.php?id=1>

## Integration with other indicators/measurements?

Population numbers and densities together with the land use are some of the determining factors of flood risks along the Scheldt estuary. The population size is an important factor in the estimation of number of victims during a flood. To estimate the economic damage, land use is an important issue (see indicator 'safety against flooding').

The pressure from the population and other users also entails environmental burden (see indicator 'loads of pollutant substances').

The prosperity index or the average income of inhabitants in the Scheldt municipalities depends on many factors: employment rate and economic growth of important sectors for the Scheldt estuary (see also indicators 'socio-economic importance of ports', 'socio-economic importance of residential tourism'), level of social supporting subsidies, changes in housing markets, ...

## How to cite this fact sheet?

**Anon.** (2010). Population pressure. Indicators for the Scheldt estuary. Commissioned by the Maritime Access Division, project group EcoWaMorSe, Flemish-Dutch Scheldt Commission. *VLIZ Information Sheets*, 229. Flanders Marine Institute (VLIZ): Oostende. 10 pp.

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]

European Soil Thematic Strategy:

[http://ec.europa.eu/environment/soil/three\\_en.htm](http://ec.europa.eu/environment/soil/three_en.htm)

Proposal for a Directive of the European parliament and of the council establishing a framework for the protection of soil and amending Directive 2004/35/EC:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0232:FIN:EN:PDF>

[3]

Dutch soil policy:

<http://www.vrom.nl/pagina.html?id=9735>

Flemish soil decree (decreet van 27 oktober 2006 betreffende de bodemsanering en de bodembescherming):

<http://www.ovam.be/jahia/Jahia/pid/1858?lang=null>

[4]

European, Dutch and Flemish strategies for sustainable development:

[http://ec.europa.eu/sustainable/welcome/index\\_en.htm](http://ec.europa.eu/sustainable/welcome/index_en.htm)

<http://do.vlaanderen.be/>

<http://www.vrom.nl/pagina.html?id=10748>

[5]

Indicator 'Socio-economic importance of the ports':

<http://www.scheldemonitor.org/indicatorfiche.php?id=2>

[6]

[http://www.scheldemonitor.org/indicatoren/pdf/SIF\\_Bevolking.pdf](http://www.scheldemonitor.org/indicatoren/pdf/SIF_Bevolking.pdf)

[7]

[http://www.scheldemonitor.org/indicatoren/pdf/SIF\\_Bodemgebruik.pdf](http://www.scheldemonitor.org/indicatoren/pdf/SIF_Bodemgebruik.pdf)

[8]

[http://www.scheldemonitor.org/indicatoren/pdf/SIF\\_Welvaartsindex.pdf](http://www.scheldemonitor.org/indicatoren/pdf/SIF_Welvaartsindex.pdf)

[9]

Spatial planning in Flanders:

<http://www2.vlaanderen.be/ruimtelijk/index.html>

<http://rsv.vlaanderen.be/web/nl/>

[10]

Spatial planning in the Netherlands:

<http://www.vrom.nl/pagina.html?id=3410>