

THE SCHELDT ESTUARY DEVELOPMENT PROJECT

J. Claessens¹

ABSTRACT

The Scheldt estuary is the maritime access to the port of Antwerp, the 2nd largest port of Europe. The estuary is located partly in Flanders, the northern region of the federal kingdom of Belgium and partly in the Netherlands. Because of this the policy and management of the estuary is rather complicated. In particular improvements of the navigation channel on Dutch territory for the benefit of the Belgian port of Antwerp need a common agreement. Furthermore, the region is closely populated and consists of lowlands, so safety against flooding is essential. Finally, the European Bird and Habitat Directives require serious measures to improve the quality of the natural environment.

Therefore, the Dutch and Flemish governments decided in 1998 to set up a common Long Term Vision (LTV) for the Scheldt estuary. This LTV, which was approved by both parliaments in 2001, describes how the Netherlands and Flanders want the Scheldt estuary to look in the year 2030.

Immediately after the approval in both parliaments a Memorandum of Understanding was signed to set up a jointly formulated Scheldt Estuary Development Outline for the year 2010 as a first step in the realisation of this LTV. For this purpose, a special organisation (ProSes) was established and in December 2004 the Development Outline was presented to both governments. It contained dozens of resolutions covering how the two governments intend to improve the safety, accessibility and natural environment of the estuary. The shipping lane to the port of Antwerp can be deepened without damage to the environment. The Flemish programme for flood protection will be realised by increasing dyke heights and establishing flooding areas along the Flemish part of the estuary. And finally, a very ambitious nature development plan, based on more room for estuarine environments was drawn up.

Keywords: Integral, cross-border mutuality, public support, accessibility, safety against flooding, naturalness

INTRODUCTION

The Scheldt estuary development project is an integral, cross-border project between Flanders, the northern region of Belgium, and the Netherlands concerning the future of the estuary of the river Scheldt. This article deals with the complex governmental planning processes, which precede the start of river improvement. River improvement cannot be handled anymore in a pure sectoral way, having only eyes for one function like. In the last two decades of the past century, European Directives, such as the Bird and Habitat Directives appeared, forcing the European governments to preserve and improve their natural values, including the highly qualified estuaries. So, an integral approach is essential, just like social support. Indeed, the people living in the estuary have democratic rights too and their opinion counts. In this particular case of the Scheldt estuary, the complexity is even greater than elsewhere because the estuary is located in two neighbouring countries. This means that the procedures and working methods of both countries must be respected and geared to each other.

THE SCHELDT ESTUARY

The river Scheldt has a length of 360 km from source to mouth and about half of this length is tidal. The tidal part of the river is called the Scheldt estuary. Approximately 10 million people live in the 20,000 km² catchment basin of the river which lies in three countries: France, Belgium and the Netherlands. The estuary is located only in Flanders and the Netherlands. Figure 1 gives an idea of its location in North Western Europe.

The Scheldt estuary is the maritime access to the port of Antwerp, the second largest port of Europe with a throughput of more than 160 million tonnes per year. This port is situated deep inland, between 60 and 80 km upstream from the mouth of the river. Although Antwerp is a Flemish port, the shipping lane between the mouth of the river and the port of Antwerp runs 56 km through the Netherlands. Consequently, the management of the

¹ Civil Engineer, Flemish government, ProSes2010, PB 299, NL 4600 AG Bergen op Zoom, the Netherlands, T: **31164212821, F: **31164212801, Email: josclaessens@proses2010.nl

estuary, and in particular, the management of the shipping lane is rather complicated. Improvements of the navigation channel on Dutch territory for the benefit of the Belgian port of Antwerp need a common agreement.

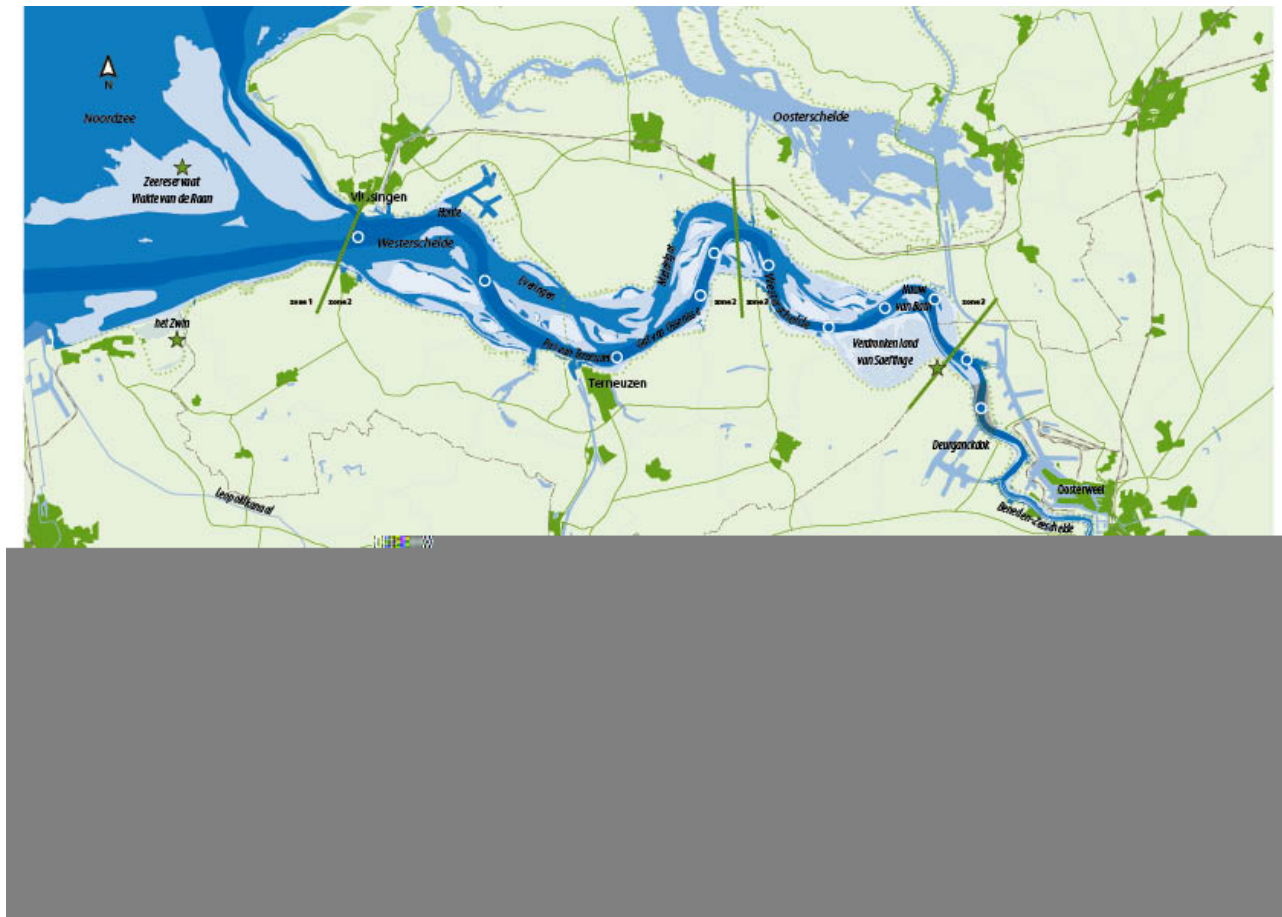


Figure 1. Map of the Scheldt estuary and it's location in N W Europe.

Furthermore, the region consists of lowlands and is sensitive to storm surges from the North Sea. For instance, in 1953 a severe storm caused catastrophic floods in the region with more than 1,800 casualties. This storm surge was the immediate reason for the famous Dutch Delta plan in the second half of the twentieth century. This fear of flooding from the sea is continuous in both countries: the Netherlands and Flanders. It will always be a major consideration when doing something in the estuary. Moreover it's a very emotional subject for the neighbouring inhabitants.

Finally, in this densely populated region, the nature of the estuary was seriously damaged during the last century. However thanks to it's location across the border of two countries, it still has great ecological value. Currently, the European Bird and Habitat Directives require serious measures to improve the quality of the natural environment. This will certainly be the case if measures are taken to improve the infrastructure.

THE LONG TERM VISION FOR THE SCHELDT ESTUARY

Because of all these complicated, though very important, developments the Dutch and Flemish governments decided in 1998 to set up a common Long Term Vision (LTV) for the Scheldt estuary. The aim of this LTV was an agreement between the two countries on how to manage the estuary in the future. The basic assumption was: "To develop a healthy and multifunctional estuarine water system, used in a sustainable way for human needs".

It was agreed to focus on the three basic functions of the estuary:

- Safety against flooding;
- Accessibility of the ports;
- Naturalness of the estuarine system.

The aim was to allow the co-existence of those three goals in a sustainable way. This LTV had to describe in a general way how the Netherlands and Flanders wanted the estuary to look like in the year 2030 in order to simplify decision-making in the future.

After two years of discussion between civil servants of both countries, this LTV was presented in January 2001 to the two governments. The essence of the LTV can be expressed by five objectives:

1. The physical characteristics of the estuary must be maintained. The estuary must remain able to fulfill all its present functions for the coming generations. Therefore, the complex and dynamic connection between a multi channel system with intertidal flats between parallel gullies downstream and a meandering riverbed upstream, mud flats and marshes, salt and fresh water, must be guaranteed. All functions benefit from maintaining this dynamic vitality of the system;
2. Maximum protection against flooding is a condition for the continued existence of both countries;
3. The accessibility of the ports will be optimal;
4. The natural environment will remain healthy and dynamic;
5. By 2030 both countries will co-operate intensively in relation to the policy and management of the estuary.

It's more or less Maslow's pyramid: first existence, then safety, followed by prosperity and welfare and finally something practical: how are we going to achieve all this.

Already in March 2002 a Memorandum of Understanding was signed to set up a jointly formulated Scheldt Estuary Development Outline for the year 2010 as a first step towards achieving this LTV. A special new organization ProSes, comprising civil servants and other experts, was established. ProSes's main task was to formulate a solid, broadly supported development outline, based on a Strategic Environmental Assessment and a societal cost-benefit analysis. The characteristics of the outline had to be: integrality, cross-border mutuality and public support. A very important precondition was that political decisions had to be taken before the end of 2004.



Figure 2. The three main functions of the estuary: safety, accessibility and naturalness.

PROBLEMS TO BE SOLVED

Safety Against Flooding

In the Dutch part of the estuary flood protection is adequate thanks to the Delta plan, established in the 1950s. The dikes are able to hold a 1 in 4,000 year storm surge. In the Flemish part of the estuary the situation is different. For the moment, safety is guaranteed for a 1 in 70 year storm surge. Works in execution will bring this chance to once every 350 years but even that chance is not acceptable for the long term, certainly with a rise in mean sea level predicted. Therefore a new project to assure safety against flooding in Flanders is needed.

Accessibility of the Ports

For the moment sea-going ships with a draught of 11.85 m can sail to Antwerp regardless of the tide. Deeper vessels, up to 15.5 m, must wait for a suitable tidal window to sail over the various bars in the navigation channel. The evolution over the last twenty years to ever bigger container vessels is still going on and in the future shipping lines will shift to even larger and deeper container vessels than today. They will also operate using tighter time schedules in order to reduce costs. Long waiting times fo

During the research process, parties involved in the development of the Scheldt, such as national and regional authorities and research institutes were consulted. Via joint fact finding existing research results were collected and new research projects were executed.

The preparation of the SEA, the societal cost-benefit analysis and the nature development plan were reviewed during the whole project by various groups. In these groups, representatives from universities, independent organisations and authorities of both Flanders and the Netherlands participated. The final result of the SEA was also assessed by an independent commission. A Dutch-Flemish scientific body assessed the societal cost-benefit analysis.

Advisory Consult

Advisory consult was given by social organisations, port managers and local and regional authorities from the area. The advisory consult was divided in two bodies: the stakeholder's council and the governmental board. The participants in the stakeholders council provided the Flemish and Dutch governments with independent advice on the development plan, presided over by two independent chairmen. The governmental board consisted of officials from principal authorities, who provided ProSes with essential information. Both the council and the board were involved through the process of formulating the problem definition to delivering the final development plan.

Communications

During the preparation of the Development Outline, interested parties made contributions during working meetings and in other manners. Such contributions could take the form of 'joint conceptualisation', 'joint knowledge', or 'joint participation'. Interested parties were regularly informed of the state of affairs by brochures, newsletters and a website, among other means.

THE SCHELDT ESTUARY DEVELOPMENT OUTLINE

Accessibility

To improve the accessibility of the port of Antwerp, Flanders and the Netherlands decided to deepen and to enlarge the navigation channel in such a way that ships with draughts of 13.10 m can sail to Antwerp independent of the tide. Why 13.10 m? The reason is obvious: such a deepening is limited to the river part of the shipping lane. Every extra cm. would require a deepening of the sea part of the channel, causing an exponential growth of the volumes to be dredged and consequently of the costs and possible environmental impacts. This deepening is a very cost-effective project: the societal cost-benefit analysis indicates the benefits to be 4 to 10 times higher than the costs. And, most surprising, one third of the benefits drop down in the Netherlands, while the port of Antwerp is located in Belgium.

The total amount of capital dredging comes to 14 million m³, equally divided over Dutch and Flemish territory. However 80% of the shipping lane lies in the Netherlands. The reason for this disproportion is that in the Netherlands only 9 bars need to be deepened (by 1.4 m). In Flanders 2 bars need the same deepening but the shipping lane also needs a widening of 120 m over 5 km between the Europa Container terminal and the brand-new tidal Deurganck Container dock. This enlargement is necessary to allow the largest containerhips to pass each other in this, for the moment, narrower part of the shipping lane.



Figure 3. Suction hopper dredger at work in the Scheldt estuary.

The maintenance dredging work is expected to grow by no more than 20 % to 13-14 million m³ per year. All this dredging work will be executed by trailing hopper suction dredgers (Figure 3).

The first objective of the Long Term Vision was to achieve the physical system of the estuary in optimal condition in order to maintain the vitality of the estuary and its network of multiple channels. The studies showed that dredging the bars and widening a short part of the navigation channel won't impact those physical characteristics or the ecology much. Dumping the dredged material is much more problematic. A first condition to keep the estuary healthy is to dump the dredged material back into the estuary, certainly in the Dutch part of the river and its mouth. Indeed, removing all the dredged material, which consists of fine sand, out of the river would cause the disappearance in the long term of the intertidal flats, would reduce the hydraulic resistance of the river and would strengthen the dissymmetry of the tidal cycle. This last event is to be strongly avoided in favour of every function of the estuary: high water would rise higher. Flood would shorten and consequently ebb would lengthen resulting in shorter tidal windows for the largest vessels. Water velocities will increase during flood and decrease during ebb meaning more sedimentation and less suitable habitats for the aquatic life. Therefore the dredged sand has to be dumped in the estuary itself. Only by doing this, the physical characteristics will not be endangered.

To achieve the optimal conditions in the estuary, a flexible dumping strategy is needed. The aim must be to avoid both silting up of the side channels and erosion of salt marshes or mud flats. This can be done by a careful selection of the dumping locations. Another article of these proceedings (Kathleen De Wit et al, 2007) deals with this flexible dumping strategy

So far studies have shown that deepening the channel will have little effect on the vitality and natural environment of the Scheldt estuary, under the condition that the dumping strategy is modified and ecological development takes place. However, this conclusion cannot be stated with absolute certainty. For this reason, a programme is established to monitor developments in the Scheldt estuary during and after the deepening of the channel. In deciding whether the measures are actually necessary, the authorities will also take into account the requirements of the European Birds and Habitat Directives. These European directives oblige countries to maintain existing environmental values.

Safety Against Flooding

As mentioned before, the dikes in the Dutch part of the estuary meet the legal objectives. Consequently, no measures are foreseen in this part of the estuary.

In the Flemish part of the river, there is still a lot of work to do. It was decided to increase the safety against flooding

by creating Controlled Flooding Areas (CFA). Where space for such areas is lacking, for instance in urban and industrial areas, the heights of the dikes will be raised. Already in 2005, shortly after the approval of the Development Outline, the Flemish government elaborated an update of the so called “Sigma plan”. This project identifies in detail the 1,650 ha CFA involved, including a time schedule until 2030.

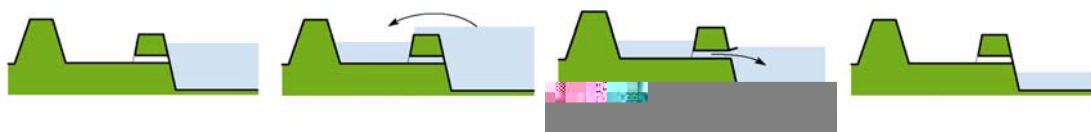


Figure 4. CFA in operation.

The idea of a controlled flooding area is shown in Figure 4. Around the CFA a new dike is built. The old dike is lowered and covered with erosion resistant material against strong water currents. Near the bottom of the CFA an outlet lock is constructed in the old dike to empty the CFA. When the river water reaches the top of the lowered old dike it begins flowing from the river into the CFA, resulting in less water in the river. In the Flanders Region the dimensions of the river are much smaller than in the Dutch part of the river, so a relatively significant amount of water is removed from the river and consequently the high waters upstream are lowered. During ebb tide the lock is opened and the water can flow back into the river.



Figure 5. CFA-RT in operation.

This way of working offers opportunities for a win-win situation with nature. Indeed, a CFA inundating once or twice a year is not very interesting for farming and has no ecological value. By realising some adjustments one can turn on a simply controlled flooding area (CFA) into a controlled flooding area with reduced tide (CFA-RT). By constructing a second lock into the old dike at a higher level a limited amount of water can flow into the CFA-RT by flood on a daily basis. Every tide at low water the water that came in by flood flows out through the first lock (see Figure 5). By working this way, an ecologically very valuable controlled reduced tide is created in the CFA-RT. In the same area a safety project and a nature development project are combined, saving valuable cultivated farming land.

Nature Development Plan

The problem setting for naturalness could lead to only one conclusion for the nature development plan: the creation of more space for estuarine environments like marches and mud flats (Figure 6). It was decided that at least 1,000 ha of new estuarine environment will be added to the Scheldt of which 600 ha in The Netherlands and about 450 ha in Flanders. In Flanders however another 600 ha of wetlands, not in connection with the river, will be protected and withdrawn from agriculture. About 600 ha of the new estuarine environment areas are situated on the borderlines between the two countries, increasing the existing nature reserves. It's a good interpretation of the cross-border mutuality.



Figure 6. Marshes and mud flats in the Scheldt estuary.

Other Measures

The complete Scheldt Estuary Development Outline consists of 34 political decisions. More than 20 of them involve actions to be taken. This can be large projects as described above but also organisational and legal measures. Discussing them would be beyond the scope of this article.

Costs and Timing

The cost estimation of all this beautiful work is impressive:

- | | |
|--|---------------|
| • Deepening and enlarging the navigation channel | €215M |
| • Safety project (dikes, CFA and CFA-RT) | €715M |
| • Nature development projects | €300M to 450M |

This leads to an estimated cost between €1,250M and €1,400M excl VAT, which is about 20 % in Europe.

Both governments accepted the Development Outline in March 2005 and decided to execute it as a whole. It is not a grab bag to choose whatever you like and forget about the remainder. It was decided that the first projects will start in 2007 and all projects will be completed or in execution by 2010. Of course, the completion of the Sigma plan update and the nature development plan will take many years but the deepening and enlargement of the navigation channel can be done in only two years.

CONCLUSIONS

The achievement of the Long Term Vision, immediately followed by the Scheldt Estuary Development Outline proves the old saying “where there’s a will there’s a way”. The Netherlands and Flanders, and with them, all the organised stakeholders and involved parties, came to a unanimous position in a difficult and emotionally charged challenge. This was not obvious at the beginning when strong and complete opposite points of view were exposed. Thanks to transparent scientific investigations and open stakeholder discussions water and fire were united. Of course, not everything is settled yet. The more concrete the projects become, the more opposition from the citizens is to be expected. Indeed, the safety and nature projects affect a serious number of them. Therefore flanking measures

were integrated in the total project. Being involved from the very beginning is very important for the co-operation and agreement of stakeholders and interested parties. I am sure this was the only way to come to a realistic and feasible plan satisfying as many partners as possible.

Summarised, the following statements are, in my opinion, essential to bring such a complicated project, with so many parties involved, to a favourable conclusion:

- Don't ever forget the human factor in complicated planning processes;
- In order to avoid distrust, be transparent and communicate well with everybody;
- Joint fact finding is paying. For instance, a jointly formulated problem definition by all of the stakeholders helps a lot. They learn to see and understand each others problems. The same advice concerns formulating the most suitable solution (based on your research);
- In case of involvement of two or more countries, there will always be different customs. Therefore, a tight team of competent and passionate collaborators working together in the same office is very important. In this team lobbying for the own country is unacceptable;
- Be sure your research is beyond doubt. Make use of second opinions and independent scientific assessments to justify the research results;
- Try to create win-win situations as much as possible in order to avoid losers or people thinking they are.

REFERENCES

- De Wit, K., Sas, M., Meerschaut, Y., De Brauer, D. and Verbeek, H. (2007). "Third Enlargement Program of the River Scheldt." Proceedings XVIIIth World Dredging Congress 2007, WEDA, Orlando, USA.
- Ministry of Transport and Public Works, The Netherlands, and Ministry of the Flemish Community, Belgium (2001). "Langetermijnvisie Schelde-estuarium" (Long Term Vision Scheldt Estuary). The Netherlands: Ministry of Transport and Public Works, Belgium: Ministry of the Flemish Community.
- ProSes (2005). "Ontwikkelingsschets 2010 Schelde-estuarium – Besluiten van de Nederlandse en de Vlaamse Regering" (The Scheldt Estuary Development Outline 2010 – Resolutions of the Dutch and Flemish Government). The Netherlands: Ministry of Transport and Public Works, Belgium: Ministry of the Flemish Community.

