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STRATEGIC INVESTMENT COASTAL FLOOD RISK MANAGEMENT –  
NORTH SEA SHORES

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## 1. Introduction

This is the report of a Safecoast colloquium and workshop that took place on 9 May 2007 in Amsterdam.<sup>1</sup>

***Main intention of the day***

- To proceed with the discussion within the framework of the Safecoast project concerning the interaction between coastal defence (management) and other stakeholders at the coast. Special attention was given to spatial planning, taking into account the possible impact of climate change.
- This dialogue and the exchange of knowledge and experiences in this area is intended to be a stimulant for the Safecoast partners.

The organisers were inspired by the report of the Dutch VROM-raad about smart strategic investments by the government (dec 2006, rapport 57).

***The organizers of the day***

The workshop was organised by the Dutch Ministry of Transport, Public Works and Water Management (Rijkswaterstaat/DWW), the Coastal Division and the Flanders Hydraulics Research of the Belgian Ministry of Transport and Public Works, the three of them are partners in Safecoast.

The workshop was organised for the purpose of Action 3: the execution of a trans national comparison of different coastal flood risk methodologies and Action 4: recommendations towards the set-up of a general master plan for the future coastal safety of all partner countries and a special master plan for Flanders.

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<sup>1</sup> The event was preceded on May 8<sup>th</sup> by a strategic Safecoast session and followed on May 10<sup>th</sup> by a half day excursion to a 'weak spot'.

### ***The participants***

Beside the different Safecoast members, experts were invited in the field of coastal risk management, ICZM (integrated coastal zone management) and spatial planning. The participants on May 9<sup>th</sup> came from the United Kingdom, Germany, the Netherlands, Belgium and France. A list of participants is available on request.

### ***The day programme***

During the *morning* four presentations were held:

'Future proof designs'	Wilfried ten Brinke	Rijkswaterstaat/RIZA
'Integrated approach land use coastal areas'	Kathy Belpaeme	Flanders Co-ordination centre on ICZM
'Financial-economical aspects'	Jules Verlaan	Rijkswaterstaat/Bouwdienst and TU Delft
'Implementation'	Stefan Nijwening	Royal Haskoning

In the *afternoon* the participants gathered in five mixed groups to prepare ideas for a coastal vision for the Belgian North Sea coast. Every group worked out solutions to guarantee the future coastal safety along the Belgian coastline.

## **2. Summary of the presentations**

### **2.1 'Future proof designs' by Wilfried ten Brinke, Rijkswaterstaat/RIZA - *Best defence is offence but do not overact* -**

#### ***Angle of this presentation***

Strategic investing in coastal flood risk management, in search of future proof designs (Dutch situation).

#### ***Analysis of the situation***

The Dutch flood defence system is not entirely future proof.

It is future proof on the following:

- compartmentalization;
- use of cost – benefit analyses;
- long-term spatial reservations for strengthening dykes when sea level rises.

It is *not* future proof because of:

- A reactive approach: safety standards are based on conditions of the past and do not take into account:
  - New, state of the art hydrodynamic conditions (longer wavelengths = more energy);
  - the rapidly changing society (i.e.: increase urban area; more investments behind the dykes);
  - the climate change and for this reason the more extreme weather conditions.
  - The lack of contingency plans for large scale floods at extreme circumstances, because most infrastructure and highly populated areas are below sea level. In the chain of safety the focus is very much so on prevention, which is all right, but the attention on pro-action, preparation, response and recovery is too poor.

### ***Which improvements are necessary?***

Combining the following three aims for strategic investments:

- strengthen parts of the dyke rings where flooding may cause most damage;
- spatial planning: restrict and/or relocate certain functions like agriculture/horticulture, housing, infrastructure, keep space to store flood water, optimise compartmentalization and combine infrastructure with all this if possible (e.g. evacuation routes on dikes);
- flood proof housing and infrastructure.

### ***Which main points stipulate a future proof design?***

A future proof design depends on:

- your time-scale ahead;
- your expectations for the future and therefore on your present knowledge;
- the present values.

### ***In short, what makes the flood defence system future proof?***

It is not only the climate change. With the cost-benefit analysis as a starting point take also into account the scenarios of societal change. Thereby spatial reservations have to be made to achieve a no-regret policy.

Question (Niels Roode): Is it possible to have fixed, legal safety levels while you want flexibility at the same time? Answer: You may reconsider them every now and then.

## **2.2 'Towards integrated land use in coastal areas'**

**by Kathy Belpaeme, Flanders Co-ordination centre on ICZM**

**- Coastal defence does not stand alone! It is a matter of cooperation**

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### ***Angle of this presentation***

Safety comes first, but coastal defence does not stand alone. Every type of coastal defence has its influence on the varied number of users of the same coastal area. It is all about thinking in a creative way taking into consideration all interests and effects, in search of a win-win solution.

### ***Analysis of the issue***

In the coastal zone of Belgium you can easily name ten different activities in the same area (recreation, fishery, nature, building activities, windmills etc.). It is no longer possible to develop one certain activity at the coastal zone without taking into account all the other activities that are around. Coastal defence management requires integrated planning. Besides the need to restore the carrying capacity when already exceeded, it means also:

- the cooperation of different sectors;
- understanding all public and private sectors in their perception of coastal defence and coastal activities;
- the need to take a long-term view;
- the search for opportunities to combine functions.

***What is the main change in the coastal defence approach? A quick inquiry:***

<b>Belgian experts say:</b>	<b>Dutch experts say:</b>
Shift from 'hard to soft' coastal defence. For example beach nourishment, which change the dynamic of the area with new opportunities for nature.	The understanding and predictions of the behaviour of the coast and the impact of defence works is improved during the last decades.
The notion of the need to plan on long-term conditions.	The notion has grown, that shutting off the estuaries has had an inverted impact on the ecosystem.
Shift to integrated planning.	The provincial government is preferred as a planner because of its more integrated approach than the national government, which is sectorially segmented.
A shift from passive involvement towards real participation of private sectors and citizens, including proper information and communication.	A shift from passive involvement towards real participation of private sectors and citizens.
Much more awareness of (and money for) maintaining coastal safety because of the tsunami, Katrina and Al Gore.	Crucial are the cost-benefit considerations and participation.

New instruments are available such as:

- Environmental impact assessment (EIA) for bigger construction works, which means compensation of negative results;
- Spatial planning can be an instrument for coastal defence;
- Strategic project sites like in Zeebrugge;
- New possibilities for public private partnerships into coastal defence master plans.

### ***Some food for thought***

Positive effects of integrated planning could be new choices, for instance for tourism, wave surfing, new fishing opportunities, housing integrated in the dykes and new possibilities for animals.

Some examples of creative thinking:

- A pedestrian bridge over a sea inlet or on top of the dam.

CONT'D



Artist's impression of an architect: a pedestrian bridge over a sea inlet

- Houses integrated in the dykes;
- The use of different kind of stones in a groin, which could be interesting for certain new animals in that area;
- Relocation of a camp site to safer grounds and transfer the old camp site into a nature area.

Integration is all about listening to each other, understanding each other and trying to make the best of it altogether. It is happening already, but the time is right to take a next step.

Comment Kees van Ruiten: When you want to erect a coastal defence system that takes resilience into account, how to design a no regret situation? Remark Stefan Nijwening: the long term perspective and the short-term perspective may coincide because investments are mostly for a 30 years period, roughly the same length of time of spatial planning policies.

Once more Kees van Ruiten: Our safety standards are based on 'values within the dike-rings'. Isn't it unwise to built below sea level? Wouldn't it be better to build above sea level? I guess that with a 10% extra spending on flood proof designs you will have a much safer environment.

## **2.3 'Financial-economical' by Jules Verlaan, Rijkswaterstaat/Bouwdienst and TU Delft - Cost-benefit analysis and Life Cycle Costing suit the Safecoast projects –**

### ***Angle of this presentation***

This presentation is about the economic point of view of strategic coastal investment. Some economic aspects are highlighted. Good economists deliver smart information for decision makers. That means they deliver the right information, on the right time and at the right place. This presentation is about a search of approaches to get this accurate information.

### ***Analysis of the issue***

Within the dynamic control strategy value, price as well as costs are relevant factors. The economic principle points out that an increase of costs could be advantageous for both parties when the value rises disproportional. The other way around, a slight decrease of value can lead to a relatively big decrease in costs. To manage those processes information is needed.

#### **? Investing and financing**

##### **? Investing:**

- is related to saving or deferring consumption
- all pro's and all cons --> net value
- no matter who benefits or who pays
- future cashflow is discounted to present value

##### **? Financing:**

- is related to raising, allocating and using resources
- Where is the budget come from ? Sponsors !
- What are the life cycle costs ?

***(initial investment + maintenance / operation)***

Distinguish investing and financing as two rather different processes.

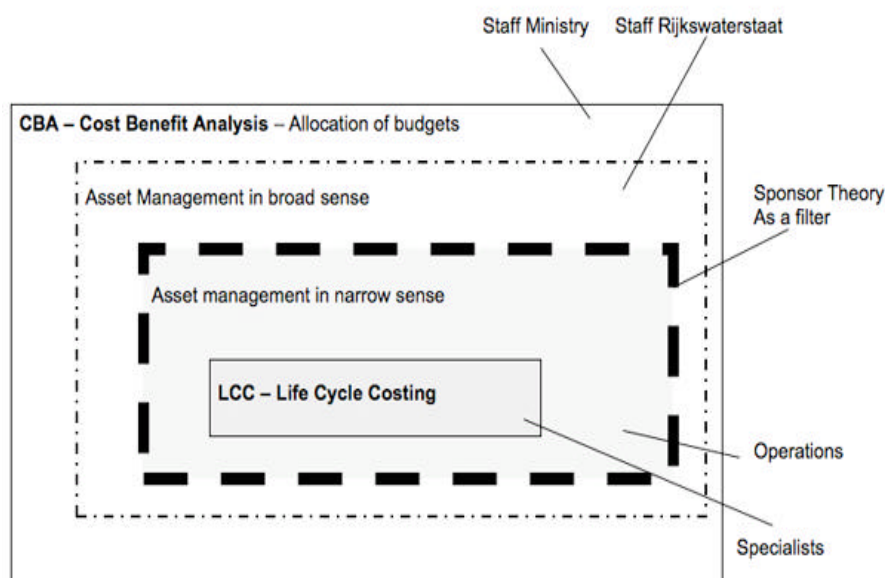
Contrary to cash accounting, where costs are seen as once-only expenditures, Rijkswaterstaat uses more and more Life Cycle Costing (LCC) and accrual accounting, where expenses are matching values (revenues), to lower the cost per unit and be more cost-effective.

What, how and where should the smart information be generated and delivered, so that the activities can be planned and organised? How are values and costs to be calculated? It is all about dealing with unlimited wants en limited resources.

### **Sponsor theory**

The economist's job is to facilitate decision makers. Thereby the economists perform roles at three levels: the strategic level (investments, cooperate with stakeholders), the tactical level (asset management, budget) and the operational level (contracting, monitoring).

The Sponsor theory works as a filter and makes the following assumptions:



sponsor theory

- Cost-benefit analysis occurs on a strategic level and is meant for investment decisions. Is a project feasible or not?
- On the tactical level it is about asset management in a narrow and broad sense. The latter is interesting for Safecoast. How to finance the project and to allocate the budgets? In a narrow sense the aim is to keep the assets in optimal condition. For Rijkswaterstaat that is usually the main issue. But in a broad sense this task could be extended by the following question: 'does the organisation have the right assets?' Thereby the LCC (life cycle costing) specialists are important advisers about the long term costs. You can calculate the costs per period which is suitable for the Safecoast purpose. This provides more accurate financial information, especially relevant for strategic investments.

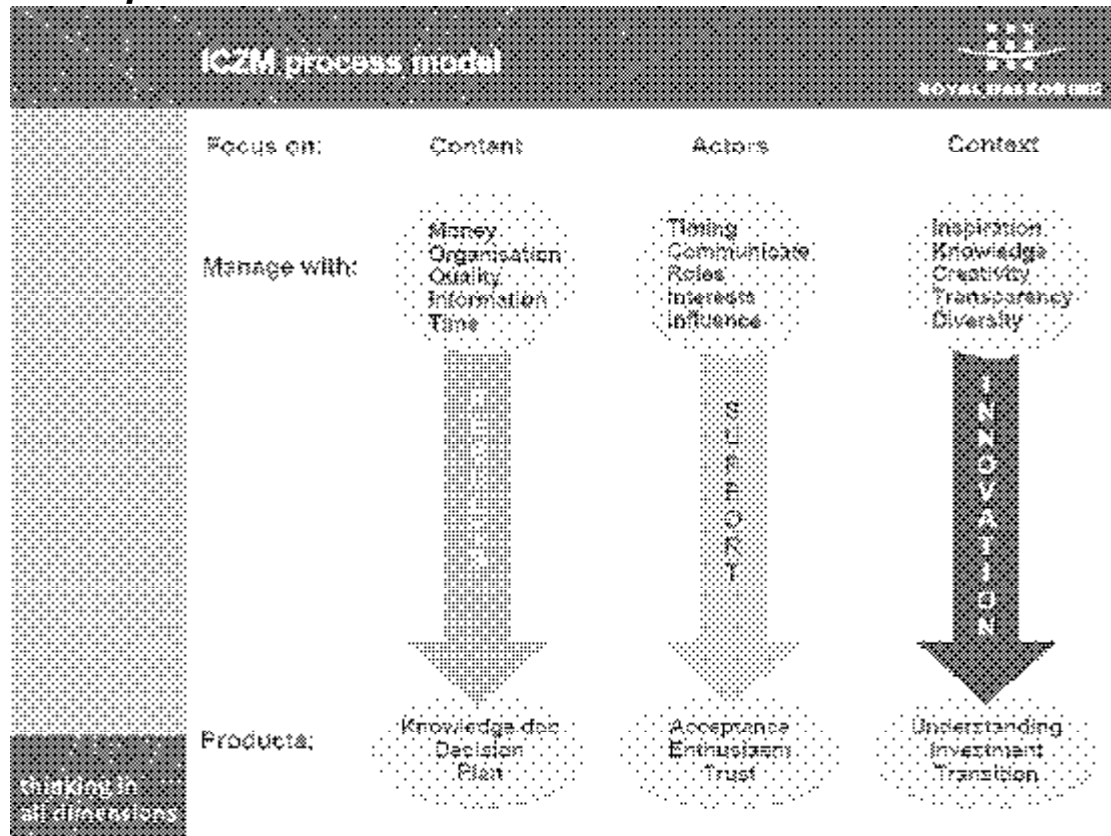
Question (Niels Roodde): Do you think that there are possibilities for private financing of major coastal reconstruction schemes? Answer: Economists provide information for anyone who wants to invest. Apart from public funding, banks and other investors will eagerly invest once a business plan will be profitable.

Question (Kees van Ruiten): How do one assess benefits like 'a better view' or 'a better nature'?

Answer: Intangible assets are not easy to assess indeed. These costs, however, do occur on both sides of comparisons like costs-benefits comparisons (higher costs of precautionary measures versus higher benefits of less loss of lives).

## 2.4 'Implementation' by Stefan Nijwening, Royal Haskoning

- **Technical studies are a part of the process and not the core of the process -**



### **Angle of this presentation**

Because of the increasing pressure on coastal zones it is clear that integrated coastal zone management (ICZM) is highly needed. Thereby it is a challenge to successfully combine different activities. There are certain tools and instruments that can help to manage this complex process of cooperation. Royal Haskoning will publish in the summer of 2007 a Roadmap or guideline to assist project managers and policy makers in this process. This ICZM process model will become available for Safecoast. This presentation reflects the intellectual framework of this (draft) model.

### **Analysis of the issue**

Safety of coastal zones is a hot item these days. But how can we implement the integrated spatial plans in that area? Because achieving awareness and dealing with among other things the law, politics, public administration and financing is a challenge. ICZM means a joint effort that includes a shared understanding of the issues at stake. It is about creating a shared view, designing a solution that is beneficial for all and not disadvantageous for anyone, and acquiring additional resources if necessary. Working with the ICZM process model could be a useful and structured method to set up the necessary formal strategy towards an integrated spatial plan. It is an alternative way of looking at the challenge. It widens the scope of

possibilities and provides a set of tools. It is like looking through a looking glass for a better understanding of the ICZM processes.

### ***The framework of the ICZM process model***

The (draft) ICZM process model is the result of a cooperation between Royal Haskoning and Rijkswaterstaat. The experiences of different coastal zone projects, in particular the ComCoast projects, will provide input to this model.

The process model assumes three pillars to focus on: 1) results, 2) support and 3) innovation whereas in project management the focus is mainly on results. Each pillar contains the possible types of management and tools.

- Focus on RESULTS (content): is mainly about (the well known) project managing with features as focussing, making SMART, analysing, organising and implementing. It is all about management aspects like resources, organisation, quality, information and planning. Tools are among other things a decision model, lifecycle management, balanced Score Card, Business case. The outcome must be knowledge, decisions and a plan.
- Focus on SUPPORT (actors) is mainly on acceptance of the endeavour by society: the managing features are informing, initiating, interacting, negotiating and taking position. It is all about timing, communication, roles, interests and influences. Appropriate tools are for instance a stakeholder analysis and round table meetings. The outcome must be acceptance, enthusiasm and trust.

Focus on INNOVATION (context) is mainly on overcoming barriers which are technical in nature, but also might have to deal with legislation, the institutional framework and participation, e.g. public-public and public-private partnerships: It is the issue of allowing and managing creativity. If prerequisites are made there is more possible than one thinks at first sight. Management features are: developing, learning, experimenting, confronting and innovating. It is all about inspiration, knowledge, creativity, transparency and diversity. How to facilitate the knowledge, use networks. Spread knowledge instead of keeping it exclusive! The outcomes are understanding, investment and transition.

An example: different public and private organisations examine the feasibility of an artificial reef in the coastal zone in Holland. Rough calculations were promising. This cooperation is an example of one of the useful tools named 'Community of Practice'. It allows you to share different thoughts and ideas. Other tools are for instance benchmarking and reflection sessions.

Question (Niels Roodé): About stakeholder involvement: the huge projects in the world – like the Chinese wall - where projects without stakeholder involvement. It seems difficult to me to have that involvement in those kind of projects, because there is the danger of a paralysis in decision making by seeking the best choice for everyone. It is like steering a ship by staring at your steering wheel. Can you mention huge projects where stakeholder involvement was a success?

Answer: By all means you have to deal with a lot of parties. In Holland we need solutions that are accepted. Decision making must stay exclusive, but you have to inform the environmental groups, the public et cetera. In Holland we need solutions which are at least accepted and if that means compromise or a longer planning period, so be it.

Stakeholder involvement could mean the involvement of at least four public parties and one private one. With those five parties you start the process. A good example of a huge project with stakeholder involvement is the Oosterscheldedam. I agree that it is a challenge to manage those stakeholders and we hope that the ICZM process model with its tools and instruments will proof its practical utility in that perspective.

## 3. Protecting the Belgian coast – an interactive process

### 3.1 Regional scale mapping

In the afternoon five mixed groups (various professional backgrounds and countries) are working together in interactive sessions. They provide integrated solutions to protect - on the long-term - the Belgian coast from the sea, taking into account the impacts of climate change and socio-economic developments.

The groups used the methodology of the RESPONSE Project<sup>2</sup>. This project provides a framework for understanding and preparing for the impacts of climate change around the European coastline. The RESPONSE methodology is a technique, which produces regional-scale mapping of coastal evolution and risks. A beautiful book about it was available. These maps allow the potential impacts of climate change and the future of the coastline to be communicated to decision makers and planners, based on an understanding that the coastline has always evolved and will continue to do so.

#### *From potential risks to integrated solutions*

Belgian Safecoast members gave information about the current state of the Belgian coast as input. Katrien van der Biest (Flanders Hydraulics Research) explained the aim of the exercise. She provided information about the coastal landforms and processes, the coastal defence management types and practices, the current and historic coastal natural hazards, the coastal assets and population, the coastal behaviour systems and the hot spots of potential coastal hazards and an elevation map of the coastal zone.

The groups had to fill in 3 summary maps for a non-scientific public. The first map contained the potential coastal risks, the second map dealt with the most significant hot spots of activity and of future coastal hazards. It could also contain information about the possible implications on the defence structures and the assets. The third map was meant to fill in the integrated solutions on coastal planning, taking into account all the hazards (= threats) and risks (likelihood X (damages and casualties)) filled in on the previous two maps. Hazards focus on man mainly, risks focus on a man and the value that man appreciates on the functioning of society, order, nature and the investments made.

Afterwards there was a plenary feedback of the group results. Below follow the most important planning approaches and solutions and several remarks concerning the subject.

### 3.2 Outline of the group experiences

The feedback of the five groups shows more or less a similar approach. The main issues were:

- Safety first – people first. The main point is that flooding is the problem in a perspective of holding the line (and no headlands).
- The Belgian coast could be divided into areas with a small dune belt and those with a broader dune belt. Especially the latter, combined with higher hinterland, need less attention. That is roughly at the Western side of Nieuwpoort, where

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<sup>2</sup> The RESPONSE Project is a three-year Project, financed by the LIFE Environment Programme of the European Union. ('Response' stands for 'Responding to the risks from climate change on the coast'.) The project is led by the Centre of the Coastal Environment at the Isle of Wight in the United Kingdom with the collaboration of nine partner organisations in the UK, Italy, France and Poland. It provides a framework for understanding and preparing for the impacts of climate change around the European coastline.

healthy sediment management could for instance reinforce the natural character. At these areas do not interfere too much, so no hard defences as dykes (only as a last resort).

- Mostly at the central part and eastern side of the Belgian coast the most developed areas/coastal towns have to be protected from the sea. There the hazards are quite high, like erosion in the small dune areas with quite a lot of buildings on the dunes. Important values to consider are the population density, industry, infrastructure and accessibility, agriculture and nature. The groups gave tourism no priority: 'beach loss is not as important as the safety issue'.
- Especially the highly developed areas are suitable for future developments, but wherever there are estuaries and rivers, do not develop further. Do not develop buildings near the shoreline.
- The groups mentioned from three till six impact zones, among others especially Oostende, Zeebrugge and Knokke.
- 'Out of the box' solutions, which have been mentioned, are a large new beach in front of roughly the whole coastline with palm trees in a few areas or a large canal in front of Knokke with possibilities for short sea shipping. Several groups spoke about an island before the coast.
- On the other hand one group proposed a more conventional solution: to strengthen the sea defence in the eastern part of the coast, like raise the dykes, nourish beaches, extend groins, break waters. Although these hard sea defence structures are not so popular. And for the western De Panne and Koksijde there was a proposal to re-plan the narrow strip (100 meter wide) at the coast line to create a buffer.
- Small towns like Middelkerke in the urban area at the Western part of the coast: relocate their essential services like a hospital to the highly developed zones, because in a 100 years these small towns are gone.

Other remarks worth mentioning:

- Make a distinction between season-related population and population outside the summer season. Risks because of climate change are mostly relevant in the winter.
- Planning is one, but decision-making is something else. You can think 'out of the box', but the politicians make the decisions and other stakeholders are also very important. That is why lobbying is an important instrument in the planning process. In the Belgian case for instance lobbying in Knokke is necessary, where the mayor has great impact on decisions because of the economic significance of the tourism in his town.
- Spatial planning has to be more integrated in coastal defence planning. Nowadays it is still separate.
- Every integrated project, so beyond the protection goal, has to repay itself.
- About influencing the decision making process: there is a green line that is the official decision and the red line that is what happening underneath. Be aware of the conversion between those two!

### **3.3 Outline of general reflections regarding the Response model**

- There is a lack of information about the kind of buildings and the magnitude of the hazards.
- The Response model is a simplified model. It is only suitable for making basic assumptions. E.g. there is a need for a wider scope than only the 3 km shore line. (The Dutch partners emphasized this point.)

- A severe limitation is the fact that the model does not count with future assumed risks. It is based on the actual situation only. One has to review the map every five or ten years anyway.
- Do we need to know first what and where we want something to happen at the coast and then apply this model or can we use the model to create immediately a future vision of the coast? That means the map is more a vision than a planning guidance.
- We will always need expert judgement; the model is no dogma but a means.

#### 4. Retrospection on the day

In the final wrap up Wout Snijders thanked all the participants because of their enthusiastic contributions. In particular he thanked the speakers during the morning programme and the Belgian Safecoast partners for all the work concerning the workshop in the afternoon. It is the quality of all the contributions that counts! Wout: 'It is an inspiration for further cooperation within the Safecoast project.'

List of participants of the Safecoast session on May 9 <sup>th</sup> , 2007 in Singelkerk, Amsterdam			
Name		Organisation	Country
Mr Niels	Roode	RWS/RIKZ	The Netherlands
Mr Wout	Snijders	RWS/DWW	The Netherlands
Mr Kees	Van Ruiten	RWS/RIKZ	The Netherlands
Mrs Evelien	Van Eijsbergen	RWS/RIKZ	The Netherlands
Mrs Carola	Van Gelder	RWS/RIKZ	The Netherlands
Mr Jules	Verlaan	RWS/Bouwdienst en TU Delft	The Netherlands
Mr Stefan	Nijwening	Royal Haskoning	The Netherlands
Mr Wilfried	Ten Brinke	RWS/RIZA	The Netherlands
Mr Ronald	Rense	Student Van Hall / Larenstein	The Netherlands
Mrs Rani	Kapoerchan	RWS/RIKZ (?)	The Netherlands
Mr Herman	Wilmer	RWS/RIKZ	The Netherlands
Mrs Kristien	Bluekens	IMDC, Resource A nalysis, Antwerpen	The Netherlands
Mr Koen	Trouw	IMDC, Resource Analysis, Antwerpen	The Netherlands
Mrs Tina	Mertens	Flanders Coastal Division	Belgium
Mr Toon	Verwaest	Flanders Hydraulics Research	Belgium
Mr Wouter	Vaneuville	Flanders Hydraulic Research	Belgium
Mrs Katrien	Van der Biest	Flanders Hydraulic Research	Belgium
Mrs Kathy	Belpaeme	Flanders Co-ordination centre on ICZM (Integrated Coastal Zone Management)	Belgium
		Flanders Hydraulics Research	Belgium
		Flanders Hydraulics Research	Belgium
Mr Frank	Thorenz	NLWKN/Lower Saxony	Germany
Mr Holger	Blum	NLWKN/Lower Saxony	Germany
Mr Steven	Worrall	Environment Agency	United Kingdom
Mr Rodney	Hicks	Environment Agency	United Kingdom
Mr Koen	Couderé	Resource A nalysis, Antwerpen	Belgium
Mr Harrie	Schelfhout		The Netherlands

Mr Hugo	Niesing	RWS/RIKZ	The Netherlands
Mr Francois	Clerc	Cellule Prévision des Crues, Hydrologie et Risques Naturels DIREN Nord - Pas de Calais	France
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Mrs Aukje	Van der Hoek	Pro Communicatie	The Netherlands