

Cross-sectoral long-term port and estuary visions

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“Puis il lui expliqua la côte en face, là-bas, de l’autre côté de l’embouchure de la Seine – vingt kilomètres, cette embouchure – disait-il. ... Puis il traita la question des bancs de sable de la Seine, qui se déplacent à chaque marée et mettent en défaut les pilotes de Quillebeuf eux-mêmes, s’ils ne font pas tous les jours le parcours du chenal”

“Then he described the nature of the estuary. ‘Look over there at the opposite bank of the mouth of the Seine. Behold a delta of some twenty kilometres wide’ he continued... Then he spoke of the sandy shoals, which shift at every tide, and beach the keel ships attempting to make the passage. Only the most experienced and talented skipper of Quillebeuf is capable of navigating its channel.”

From : Guy de Maupassant, “Pierre et Jean”, Editions Libro, Paris, page 25



Illustration: Garden at Sainte Adresse, 1867, Claude Monet (1840-1926), MET, New-York

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1. Executive Summary

The principal objective of the NEW! Delta Project is to promote sustainable development in the North-West European coastal, estuary and port areas. The NEW! Delta project was conceived with two criteria in mind: 1) preserve the natural environment and 2) maintain durable economic growth of ports.

Given these criteria, the aims and results delivered by “cross-sectoral long-term port and estuary visions” were to provide, on the basis of experience and practice gained in several countries and estuaries, a generic approach applicable to all North Western European estuaries.

Case studies were undertaken of four major NWE estuaries: Humber, Rotterdam, the Scheldt and the Seine. Each case study presents the current geographical, ecological and socio-economic characteristics of the estuary. In addition, the case study identifies elements of ongoing trends, develops the context of planning processes (over land and water), and offers some best practices for long term analyses and the development of strategic vision(s) for the estuary.

Major cross case study findings were identified and classified in four different domains:

- The important role of a long-term strategic vision in estuary management
- Methodological approaches and tools
- Implementation processes and governance
- Long term vision and sectoral management (natural protection, port activities, land uses, etc.)

The general findings of the Project on Long-term Port and Estuary Vision (LTV) result in the following recommendations:

- An LTV process must be initiated by a single “leading” and respected authority of significant political weight;
- It is imperative to define clearly, from the beginning, the general characteristics and components of the process (stages, programme, etc.), though they will very likely need to be adapted throughout the course of the project;
- It is usually better to develop an open, sequential, process with rather broad goals than a closed process with detailed objectives. Doing so facilitates an exploratory process and results in a more fruitful project;
- It should be stated that the “stakeholders” – whether economic actors or NGOs- must be prepared to make concrete decisions that will be taken on the basis of the analyses of the project findings, some of which be submitted before the end of the process;
- It is up to each local actor, in each situation and each estuary, to define what should (and will) be the time frame of the long-term analysis, based on the local issues and priorities;
- The length of the LTV process, with its different stages (start, analysis, findings, valorisation and potential decisions) could last as long as two to three years (including final valorisation and dissemination of results and findings);
- The LTV needs updating regularly and carefully analysed during the final phase of the LTV process.

On the basis of the four case studies and experiences gained during the program, the central finding of the project may be summarized in the following sentence:

“ It is in the common interest of all estuary actors to explore the possible futures of an estuary together, in order to help define a long term estuary vision (political process and product), which takes into account all sectoral local and global interests, as well as existing sectoral visions.”

In doing so, LTVs, and in particular their formal exploration of possible futures, may develop fruitful information and common understanding among different stakeholders, and feed efficiently the overall Integrated Coastal Zone Management (ICZM) programs. LTVs are also a way to give information access to all kinds of stakeholders at a regional, national and international level.

The subsequent implementation of long term visions could therefore strongly contribute to level playing field in all estuaries by giving a secured approach to the future of nature protection and port efficiency and development.

2. Introduction : Context, Objective, Target Groups

2.1. The context of cross-sectoral long-term port and estuary visions in the New! Delta Project

The objectives of cross-sectoral long-term port and estuary visions must be seen in the context of the overall scope of the New Delta project, particularly the international essential implications of nature protection in estuaries and the challenges put forward by the need for acting on the long-term action in social and economic areas and for nature protection. Pollution and other pressures on the environment and ecology have no frontiers. Fauna and flora in one country may depend on the situation in other countries i.e. birds that at a certain time are to be found in the area of the port of Antwerp move at an other time to the Zilk dunes area in The Netherlands.

Cross-border, trans-boundary and trans-national approaches and constructive co-operation between different countries are necessary in order to respond effectively to such challenges (see report about cooperation tools). This is also underlined by the so-called Natura 2000 network which has not seen a response of transnational co-operative actions so far but only action at fragmented and individual Member State level.

2.2. Aim, objectives and output

The overall aim of the project is to promote sustainable development in North-West European coastal, estuary and port areas in a way that best serves nature conservation. The project seeks to foster the protection of the Natura 2000 sites within a coherent ecological network while at the same time providing opportunities for social and economic (including maritime) benefits.

In other words, the partners will seek to **strike the right long-term balance between the protection and improvement of the environment on the one hand and economic competitiveness of ports on the other.**

The New! Delta partners will focus on the improvement of internationalisation of nature protection requirements in the structure of their organisations. In order to achieve the above-mentioned aim, partners have set the following strategic objectives:

- To produce commonly acceptable, generic and practically applicable methodologies
- To develop transferable management models
- To contribute to territorial planning
- To provide practical examples and concrete show cases
- To raise public awareness.

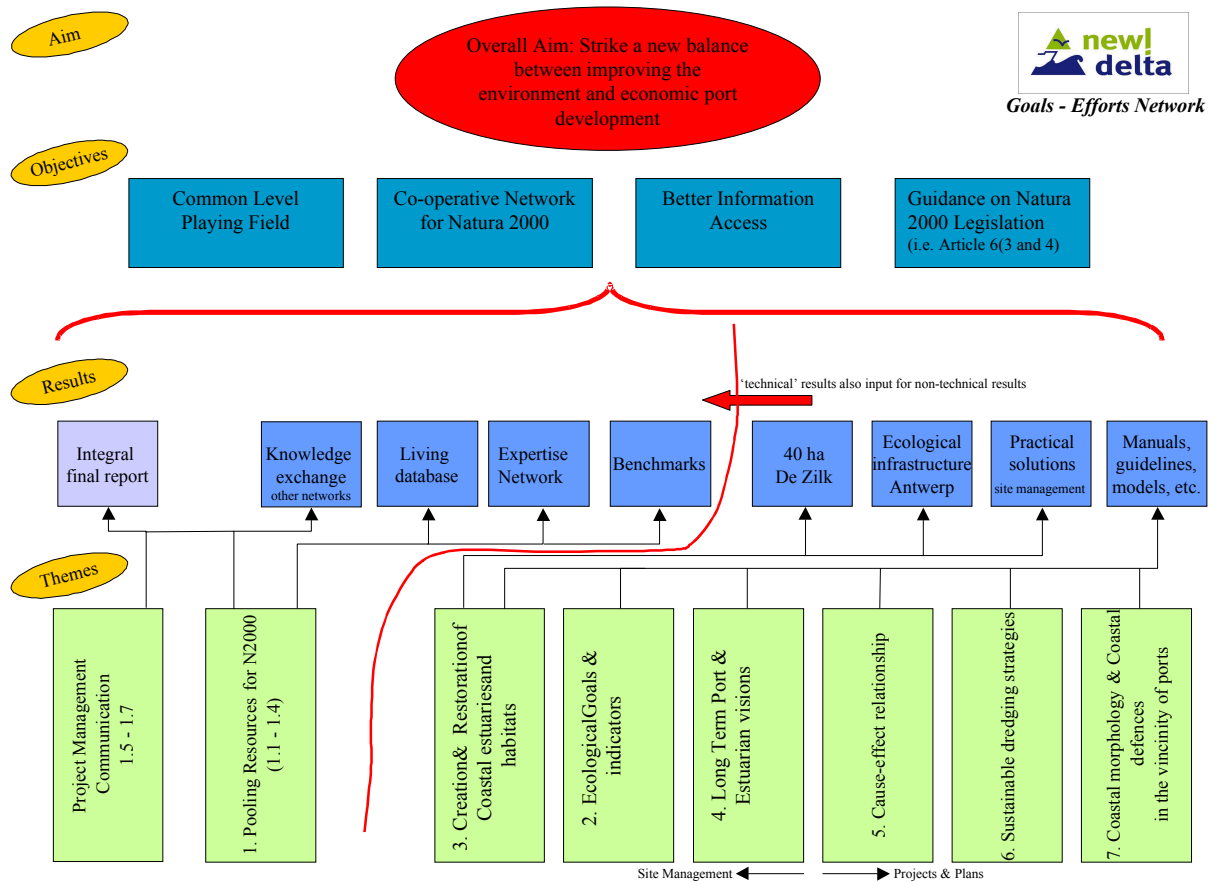
The concrete results delivered are: **Provide, on the basis of experience and practice gained in several countries and estuaries, a generic approach for long-term port and estuary visions, applicable to all North Western Europe estuaries.**

2.3. The target groups for the results

The following targets and reasons for their choice have been put forward by the project partners.

Targets	Reasons
Public authorities at regional and local level	Planning law and physical planning activities
Port authorities *	Major influence of Port projects and activities on (estuary) development, ecology, recreation, ...
Ecological sector	Organised interest
National authorities	National law, influence and contribution to European law
European Commission	Guidance for European policies

* Port authorities may in some countries be "Public authorities at local level" (such as the Antwerp Port Authority)



2.4. The analytical framework used

2.4.1. The “three plus one” questions

The analytical framework in operation and used for this final report is structured around three major questions:

- What are the major characteristics of nature resources state and issues (in particular with reference with long-term concerns) in estuaries, which have a strong influence on the tools needed for their planning and management?
- What are the specific characteristics of forecasting¹, which may be of particular interest to nature resources management in estuaries?
- What are the experiences and practices achieved in four major estuaries and ports of North West Europe of the use of forecasting for long term planning of estuaries and natural resources?

... to end up with a fourth question:

- Which leading recommendations relating to the role and the use of forecasting could be made to target groups (see table above) involved in nature protection in European estuaries over the long term?

2.4.2. Some of the major characteristics of nature resources state and issues in estuaries

The necessity of an international scale of analysis and management of natural systems: most components of natural resources in estuaries are dependant on very large geographic natural systems. Many examples can be given to support this central point: upstream water basins situations determine the quality of water in estuaries, migratory birds belong to both areas far away in the south where they spend their winter as well as to the northern estuaries where they rest and nest during summer.

The necessity of a long term view in:

- The analysis of the natural resources protection in estuaries. The state of natural resources depends obviously on physical, chemical, biochemical, and more globally ecological factors and conditions, but also on socio-economical conditions and/or pressures exerted by human activities and policies.
- the analysis of trends and issues in human activities located in or near the estuaries, including the catchment areas; a large number of these activities - and development related to them - need a long term approach in order to understand their dynamics (changes in market situation for marine transport, urban development dynamics, changes in tourist demand patterns...), and to identify their environmental consequences on nature resources and wildlife.

The central role of uncertainty for example as regard future trends in socio-economic development, incomplete understanding of ecology. Long term effects on the natural resources of socio-economic trends and policies...

The central role of actors in the state and trends of estuary development and natural resources situation: actors drive some of the key factors which impact the state of environmental resources and nature condition in the estuaries; port authorities drive infrastructure developments, local inhabitants drive the demand for tourist infrastructure and equipments, local authorities drive planning documents orienting housing and other land uses developments...

¹ Or “long term studies”; see Glossary in Annex.

2.4.3. Some of the specific characteristics of forecasting

Forecasting is more a practice than a truly scientific field of knowledge that can be precisely and uniquely structured. Nevertheless there is some general agreement, at least in the European context and practices, on some of the key aspects of forecasting or long term studies ²

- The need for a global approach across the whole range of economic, social, environmental dimensions and factors, including actors,
- The usefulness of a balanced view on quantitative as well as qualitative views and analysis,
- The need to identify a hierarchy among the factors (major driving forces or parameters of the future),
- The participatory process, trying to associate in the system analysis (identification of factors and their relations) a large set of actors and interested parties, each of them having both a part of the expertise and knowledge, as well as a part of the power to impact on the system,
- The essential need to explore several alternative and possible futures, in order to integrate fully uncertainty and solid trends together in the same thinking process, as well as alternative structural changes in the system dynamics.

(See Glossary of key words in forecasting practices and tools on next page)

2.5. Content of the report

The report is structured as follows:

- chapter 3 summarises the synthesis of four case studies of existing long-term visions or forecasting exercises concerning:
 - Humber estuary
 - Rotterdam (Rhine-Maas) estuary
 - Scheldt estuary
 - Seine estuary

The case study summaries are based on national contributions to the program, and have been drafted by representatives of the port or public authorities operating in the estuaries. They more or less follow a common framework.

- Chapter 4 presents the major findings concerning the nature, role, and outcomes obtained from long-term analysis and long term visions developed in the four European estuaries studied.
- Chapter 5 presents conclusions and recommendations on a generic approach to long-term visions on estuaries and guidelines on how to implement it.
- The Annexes present:
 - A glossary of major terms used in forecasting and visions exercises
 - The full case studies relating to Humber, Rotterdam, the Scheldt and the Seine.

² See references in the bibliography of Glossary: CNAM (Paris), Futuribles (Paris), EU Forecasting unit, World Future Society, ... Naturally, from the basis of this “common understanding” of forecasting, there may be (and there are) significantly varying implementation and experimentations in different countries or by different actors.

Glossary of Forecasting and Strategy Terms

(See complete Glossary and References in Annexe 1)

Foresight (2)

[1] The ability to anticipate and assess future events as well as to strategize to avert future dangers and grasp future opportunities. A person demonstrates foresight by being able to develop successful long-term strategies and by being well prepared for likely contingencies. (...) (Ref: World Future Society-WFS).

[2] Foresight is an independent, participatory, interactive and systematic process, developed with collective and trans disciplinary methods. Foresight is used up to identify the questions of the present and of the future, on the one hand in considering them in their holistic, systemic and complex framework, and, on the other hand, in inserting them in temporality.

Future, alternative

One of a number of potential futures that may be envisioned for a person or thing. The term alternative futures stresses that there is not a single inevitable future toward which people move through time, but a number of possible futures that are yet to be decided. In our thinking about the future of something, it is often useful to describe several mutually exclusive scenarios. These alternative futures help to clarify the options available to the decision maker(s) (WFS).

Megatrend

Movement affecting a phenomenon over a long period, in such a way that its development in time can be predicted (Godet). See Weak signal

Proactive

Oriented toward dealing with possible problems before they become crises or with opportunities before they are seized by competitors. After proactive managers identify a significant challenge or opportunity, they prepare for it. Reactive managers ignore emerging problems and opportunities until they become obvious, when the time for dealing with them effectively may have passed (WFS).

Prospective, strategic

Concept in which the prospective attitude is applied to strategic action and the corporate vision. In this way, strategic prospective acts as a management tool from anticipation to action through appropriation (Greek triangle) (Godet).

Scenario (3)

[1] A description of a sequence of events that might possibly occur in the future. A scenario is normally developed by: (1) studying the facts of a situation, (2) selecting something that might happen, and (3) imagining the various ways for that development to occur and the sequence of events that might follow. (...) (WFS).

[2] Coherent sets of hypotheses leading from a given original situation to a future situation (Godet).

[3] A *hypothetical sequence of events constructed for the purpose of focusing attention on causal processes and decision points* (Kahn, Wiener, 1967).

Vision

A vision is a shared picture, described in distinct terms, of the desired future. The vision is made up of the ultimate aims and of the optimal goals which could show the long-term direction that should guide the common strategy of the decision makers, the stakeholders and the citizens.

Weak signal

Factor of change which is now barely perceptible but may make up tomorrow's heavy or mega trends (Godet). In fact, a latent variable, "a seed event, or a miniscule sign given current dimensions but immense in its virtual consequences." (P. Massé). See Mega trend.

3. Synthesis of case studies

***Preliminary warning:** due to local situation, local policy structures and available expertise, the four case studies differ in scope, though they have been prepared on the basis of a same framework. Therefore, information available for the cross studies findings is not always strictly comparable.*

(See full reports in annexes 2 to 5)

3.1. The Humber estuary case study

3.1.1. Introduction

This case study describes various initiatives aimed at long-term planning relevant to the Humber estuary, UK. As a result of the division of institutional responsibilities in the UK, there are a large number of actors with statutory responsibilities for long-term planning. However, this does not include port and harbour authorities. Nevertheless, port and harbour authorities have opportunities to contribute to other actors' long-term planning initiatives.

3.1.2. Present situation

Physical characteristics

The Humber estuary is a large macro tidal plain estuary on the east coast of England (Figure 1). It drains 20% on the land area of England. Much of the surrounding area has been reclaimed from tidal and freshwater marshes dating back to the period of Roman occupation. Water collected from the catchments (24,472 km²) flows to the estuary, through many rivers and tributaries, the largest of which are the Aire, Derwent, Don, Ouse, Trent and Wharf. The Humber estuary is a coastal plain type, formed when pre-existing valleys were flooded at the end of the last glaciation. The estuary is macro tidal with a tidal range of up to 7m.

In plan shape, the Humber estuary has a meandering funnel shape widening towards the mouth, where a southerly orientated spit has formed in response to littoral drift processes and geological controls. The funnel shape is demonstrated by the exponential decrease in estuary area, width, and depth from the mouth to the head. The estuary is constrained predominantly by flood defences, so as sea levels rise the regime relationship for the estuary will have to change. The estuary would also appear to be sensitive to the amount of storage over the inter tidal area (ABP R&C, 2001).

The Humber estuary is very dynamic in its morphology, particularly in areas where there are no constraints, either geological or man-made. This dynamism manifests itself in cyclical variations in the positions of channels and banks throughout different regions of the estuary, with many of these regions showing an interconnectivity of process. The dominant influences on morphological change are tides, waves and freshwater flows, tidal surges and biological activity. These influences produce changes in suspended sediment concentrations, deposition rates, bed composition and ultimately channel/bank configurations (ABP R&C, 2001).

Habitats and Species

The estuary is of high nature conservation importance, with habitats and species within the estuary protected under national, European and international legislation. The following designations apply (Figure 2):

- National Site of Special Scientific Interest (SSSI) under the Wildlife and Countryside Act 1981;
- Special Protection Area for Birds and Special Area of Conservation under the Birds and Habitats Directives (designation covers all sub tidal areas including navigation channels)

- Ramsar Site under the Ramsar Convention.

It should be noted that the extent of the Special Areas of Conservation (SAC) and Special Protection Areas (SPA) on the Humber have been subject to recent amendment. The sites originally designated as SPA and SAC were extended to cover a number of areas including the entire sub tidal.

Human Uses

It is the country's largest port complex with major facilities at Grimsby, Immingham, Hull, Goole (the four main ports in the estuary owned and operated by ABPmer) and North Killingholme. There are a number of other terminals within the estuary owned by other operators. The Humber has 40,000 ship movements per year and its ports and wharves handle 14% of the UK's international trade. Industrial facilities alongside the estuary include chemical works, oil refinery complexes and power stations that dominate areas of its shores.

Around third of a million people live in areas at risk from tidal flooding from the estuary. The estuary therefore has extensive flood defences along both shores, as depicted in Figure 3. Land claim and shoreline reinforcements represent the main pressures potentially influencing the hydro morphology of the Humber estuary. Additional pressures on the Humber include point sources of pollution (e.g. ammonia), TBT (a diffuse source of pollution), dredge material disposal, alien species and cooling water abstraction (ABPmer, 2006).

3.1.3. Institutional and planning context

There are a wide range of different stakeholders with statutory responsibilities for the management of the Humber estuary. In general these include:

- Regional Government Office for Yorkshire and Humberside with responsibility for leading the development of Regional Spatial Strategy;
- Six local planning authorities that have responsibility for spatial planning on land and down to the mean low water mark of the estuary (MLWM) ;
- Port and harbour authorities with responsibility for the maintenance of safe navigation within port and harbour authority limits;
- Environment Agency with wide ranging environmental protection responsibilities. The Agency is also the competent authority for river basin management planning;
- Natural England with responsibilities for nature conservation including national, European and internationally protected sites and species;
- Water authorities with responsibilities for the supply of drinking water and treatment of wastewater;
- Sea Fisheries Committees with responsibility for the management of most aspects of inshore fisheries (to the 12 nautical miles limit);
- Internal Drainage Boards with responsibilities for the management of land drainage.

The main plans that are produced relating to the planning and management of the estuary include:

- Regional Spatial Strategy for Yorkshire and Humberside ;
- Local Development Plans (now called Local Development Frameworks);
- The Humber Estuary Management Strategy – a voluntary initiative of relevant stakeholders prepared in 1997;
- The Humber Estuary Shoreline Management Plan prepared by the Environment Agency which sets out long term plans for the management of flood defences on the estuary. This includes the Humber Estuary Coastal Habitat Management Plan (CHaMP);
- The Humber Estuary Management Scheme which provides for the ongoing management of the Humber Estuary Special Protection Area (SPA) and Humber

Estuary Special Area of Conservation (SAC). The scheme has been prepared by the 34 relevant authorities with statutory responsibilities in the estuary;

- The Humber Estuary Local Biodiversity Action Plan (non-statutory) which sets out local actions to contribute to the achievement of international commitments under the Convention on Biological Diversity 1992 was prepared by a partnership.

From 2009, much of the planning for the water environment will be co-ordinated through the river basin management planning process under the Water Framework Directive.

There are no statutory requirements for port and harbour authorities to prepare formal plans for the management of safe navigation, apart from oil spill contingency plans. This possibly reflects the more limited role of port and harbour authorities in the UK compared to other partner countries. In the UK, all major ports are in private ownership (notwithstanding that they have statutory responsibilities as port and harbour authorities).

3.1.4. Planning issues and long-term concern: situation and major findings

There are a number of different actors with responsibility for long-term planning in the UK, and thus there are a number of different experiences in the production of such plans. On the private side, the nature of the ports industry in the UK means that there are no particular drivers for port and harbour authorities to lead long-term planning initiatives. However, port and harbour authorities do have opportunities to influence the long-term planning led by other organisations.

Perhaps, the most significant long-term planning initiative is the development of Regional Spatial Strategies. Such Strategies are the highest level regional plans that are being developed and are thus required to seek to integrate different sectoral requirements. The completion of these Strategies are likely to provide a robust framework for future economic development in the region (because they are statutory documents, but also because they will have broad stakeholder support) although some uncertainties remain about how future proof such plans will be. While the Strategies are primarily focused on land development, inevitably have a strong influence on the development of the Humber estuary as well, because of the close interaction between land and sea.

The Humber Estuary Shoreline Management Plan and the Humber Estuary Management Scheme also have a strong statutory basis which facilitates their implementation. In contrast, initiatives such as the Humber Estuary Management Plan and ABP's Humber Strategy have suffered from a lack of buy-in. Both initiatives were essentially voluntary and were thus inherently weak in a statutory planning context. Indeed, general experience in the UK has shown that plans with a statutory basis are likely to be far more influential and be delivered successfully, than non-statutory plans.

Because of the multiplicity of planning initiatives in the UK, it is imperative any new initiative seeks to integrate with existing initiatives to avoid possible conflicts between policies.

Public participation is increasingly recognised as being fundamental to the success of any planning initiative. There is considerable UK guidance available on this topic and strong public participation requirements have been built into the requirements for the developments of Regional Spatial Strategies (RSS) and Local Development Plans (LDPs). The development of the RSS, the Humber Estuary Shoreline Management Plan (SMP) and the Humber Estuary Management Scheme has all involved extensive consultation with the relevant stakeholders. The requirements of the European Strategic Environmental Assessment (SEA) Directive also draw attention to the need for a strong stakeholder consultation on the environmental effects of such plans and programmes.

Where decisions are dependant on specific technical issues, sound science can contribute to the development of stakeholder consensus, for example, this was very important in the development of the Humber Estuary SMP. However, it is increasingly recognised that scientific assessment and prediction can often be uncertain and it is generally more important to seek

consensus amongst stakeholders on options acceptable to them rather than over-rely on science. In this sense, negotiation with other stakeholders can be very important in realising an acceptable outcome. Strategies therefore tend to be risk based, taking account of uncertainty and the precautionary principle as appropriate.

There is limited experience in the UK of managing revisions to key strategies in the face of changes out with those predicted to occur within a planning time frame. Clearly, should strategies and plans require frequent and major revisions? This would damage the credibility of long-term planning efforts and cause a loss of confidence in such processes.

The limited role of UK port and harbour authorities in long-term planning initiatives causes some difficulty in ensuring that possible future development requirements are properly taken into account in the planning process. The more participative approaches that are being adopted to the development of Regional Spatial Strategies provide an opportunity to address this in part. However, because of the commercial nature of the ports industry in the UK, there is an understandable tendency to be reactive to development requirements. However, increasingly, it will be important for the ports industry to think about possible future requirements and take steps to safeguard strategic needs.

3.1.5. Conclusions

- UK port and harbour authorities have a limited role in long-term planning reflecting structural differences in the nature of the industry compared to mainland Europe;
- Nevertheless, it is important for UK port and harbour authorities to engage in strategic planning and to contribute to initiatives led by others;
- Particular success criteria that can be identified from other (non-port led) planning initiatives in the UK include:
 - The success of strategies/plans is enhanced if the initiative has a statutory driver (strong legal basis);
 - New plans need to take account of other relevant plans and seek to integrate with them;
 - Effective public participation is essential to achieve stakeholder buy-in; such plans are also likely to be subject to EU SEA requirements;
 - Future uncertainty can be managed in the planning process through techniques such as futures analysis/scenario planning;
 - Sound science can help to promote consensus amongst stakeholders on particular technical issues, but this needs to be set in the broader context of stakeholder participation/negotiation.

Figure 1: Location of the Humber estuary

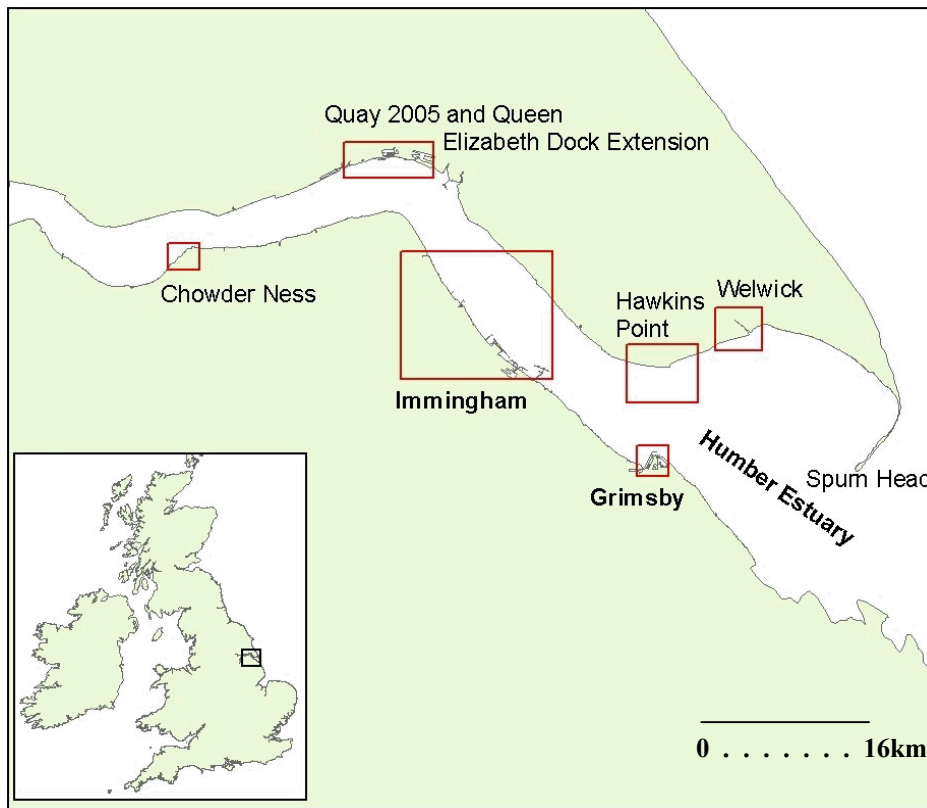


Figure 2: Location of Select Humber Designations

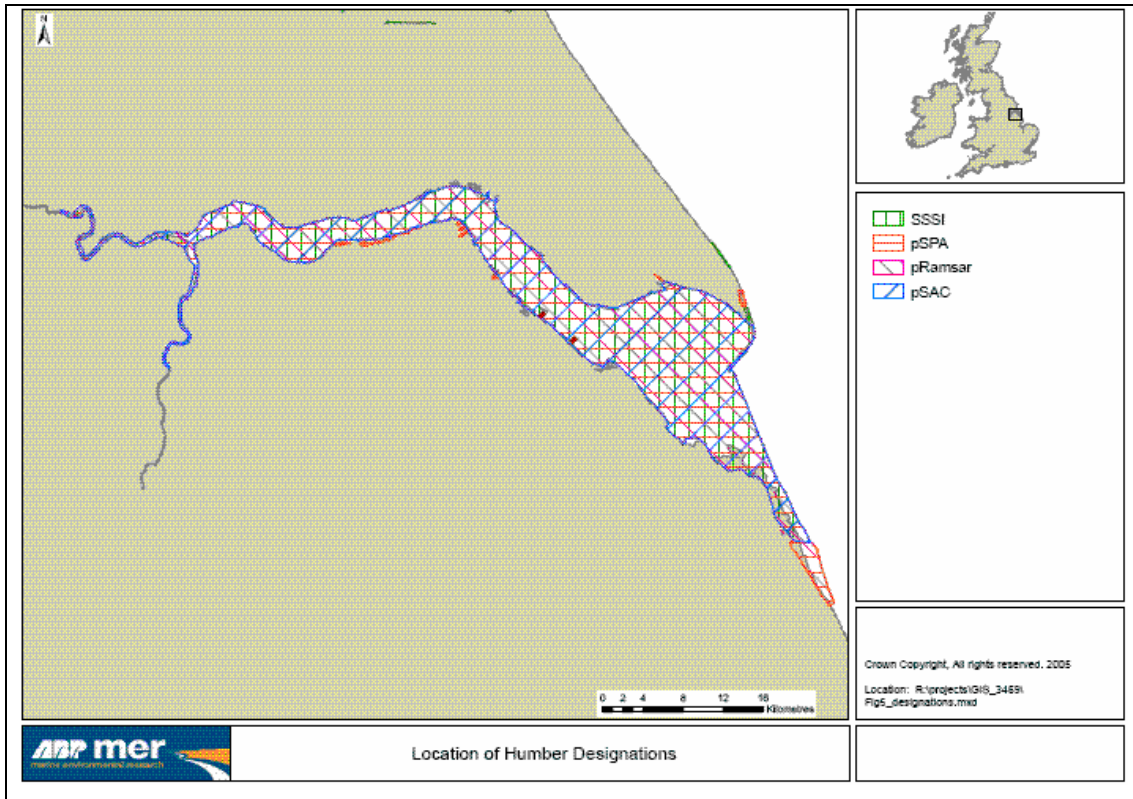
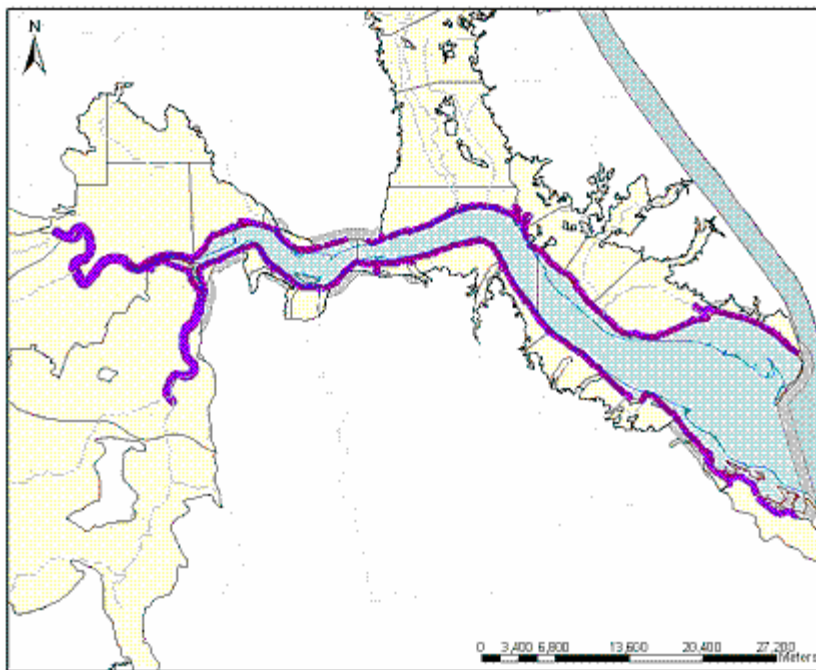


Figure 3: Extent of Shoreline Reinforcement in the Humber estuary



3.2. The Rotterdam port and estuary case study

3.2.1. Introduction

The port of Rotterdam is located in the Province of South Holland. The main Waterway "Nieuwe Waterweg" is of great economic value to the Dutch economy. Therefore the Port of Rotterdam and the area is part of the main Port Strategy of the Dutch Government. The port is located within the North border of the so called "Voordelta". The delta is formed by three rivers (Rhine, Maas and Scheldt) and covers around 90.000 ha of shallow coastal water in the North Sea.

The main entrance of the port of Antwerp is located at the south of this delta. Therefore, the delta hosts one of the busiest waterways and generates, because of two major ports of Rotterdam and Antwerp, an enormous economic output. The delta is known for its recreational values; it also serves as a major fishing ground and as such can be seen as a productive system in an ecological and economical perspective.

3.2.2. Present situation

Physical Characteristics

See below Port development and human uses.

Habitats and Species

The Rhine-Maas estuary is besides the Wadden Sea one of the most important wetland areas in the Netherlands, but since the Middle Ages, it has been subjected to excessive influence from human activities, such as the growth of the harbour of Rotterdam over the last century. The biggest change is due to the Delta works, an ambitious plan to prevent flooding of the lowland. Most of the estuaries have been closed by sluices or dykes. Wetlands have been converted into concrete and the estuary has become heavily polluted.

However, since the late 1970's water quality has improved, and therefore habitat rehabilitation has become effective. Throughout the entire estuary habitat rehabilitation has been implemented. Experiences within the Port of Rotterdam have shown that even completely artificial areas can be re-colonized by species within a few years. It is possible to swiftly generate valuable new wildlife areas, especially for opportunistic and mobile species such as shore birds. Given the small scale of these areas, they are still prone to external influence, and often require management on an annual basis or relocation in case of port development.

Port development and Human Uses

(Source: <http://www.port.rotterdam.com>)

Rotterdam is Europe's largest logistic and industrial hub. The port is the gateway to a European market of 450 million consumers. More than 500 scheduled services link Rotterdam with over 1000 ports worldwide. Throughput in 2005 amounted to 370 million tonnes.

The port of Rotterdam is situated directly on the North Sea. The very largest ocean-going vessels have unrestricted access around the clock, seven days a week. The port has a depth of 24 metres (75 feet) and Rotterdam has no locks. The many maritime service providers guarantee rapid turnaround times.

The port and industrial area stretches over a length of 40 kilometres and covers 10,000 hectares. Companies can find all imaginable facilities here for cargo handling, distribution and industry. A lot of auxiliary services are also on hand. Rotterdam is, for example, Europe's

biggest (cheapest) bunker port. Due to the size of the operations, the port offers significant advantages of scale.

3.2.3. Institutional and planning context

There is a wide range of different stakeholders with statutory responsibilities for the management of the Rotterdam estuary, and involved in producing management or planning documents in the area. These include:

- at the county level: Policy plan Green, Water and Environment 2006-2010, Ecological main structure (green and wildlife areas), Regional Plan Rotterdam 2020 (elaborated in 2005);
- At the regional and municipality levels: Port vision 2020 (Municipality of Rotterdam), Port Nature plan 2004 (elaborated in 2004, steering committee).

ROM Rijnmond³ appears to be complementary to these plans or programs. ROM Rijnmond is a partnership between several ministries (planning, economy, transport, agriculture...), concerned provinces, metropolitan regions and cities, as well as the Rotterdam Chamber of Commerce. This unique co-operative venture between the public and private sector was set up in 1988 and has a twofold aims:

- To enhance the Rotterdam main port region,
- To improve the quality of life and the environment in the region.

The partners are jointly responsible for a wide range of projects, including the redevelopment of old port and industrial sites, the creation of new nature reserves and recreation areas, and measures for combating traffic noise. The agreement between the partners with regard to co-operation and project implementation are set out in a policy covenant. This covenant was signed in 1993 and will expire in 2010.

3.2.4. Planning issues and long term concern

Port Vision 2020

The Port of Rotterdam is set to expand throughout the next fifteen years. More goods will arrive, more companies will set up their business in the port and there will be more demand for specialized knowledge and services. An expansion that benefits the country, the region and the city, demands that choices be made. The municipality of Rotterdam and the Port of Rotterdam make these choices in Port Vision 2020, a vision of the future of the Port of Rotterdam. "Quality" is the key to this plan.

Port Vision 2020 has three objectives:

- To reinforce the international competitive position of the port and industrial complex,
- To help strengthen the economic structure of the city and the region,
- To contribute to better residential and living environment in the region.

Port Vision 2020 is a plan that outlines key areas and offers a framework for the spatial and economic developments that are needed for the future. Economic basis Transport and distribution, and therefore Schiphol Airport and the Port of Rotterdam, are of the utmost importance for the Netherlands' international competitive position. The city's location on the Rhine gives Rotterdam excellent access to a large, densely populated and intensely productive part of the European market that extends well into Central Europe. The port and industrial complex is an essential link in high-volume transport, and the associated industrial production and distribution in the Netherlands and the rest of Europe.

³ ROM is the Dutch acronym for Spatial Planning and the Environment.

Among the important components of Port Vision 2020 are the following:

- Constructing a port extension into the sea;
- Bringing together the port, housing and work in the City Ports (Waalhaven, Eemhaven, Merwehaven / Vierhavens);
- Improving the accessibility of the port by water, rail, road and pipelines;
- Strengthening the existing business clusters in the port;
- Devising creative solutions for uniting the port, industry, housing, natural amenities and recreational facilities on the right and left bank of the River Maas.

Quality appears also to be a significant dimension of future ports' performances. The six "targets" of Rotterdam Quality Port in 2020, are:

- a multi-facette/comprehensive port;
- a sustainable/innovative port;
- a smart/intelligent port;
- a fast/safe/secure port;
- an attractive port
- a clean port.

Project Main port Development Rotterdam

It has been estimated that (*see above the Port 2020 Vision*) the port will need almost another 2000 hectares in 2020 for the expected expansion in goods handling, distribution and industry. Only part of this space can be found within the existing port and industrial area. In response, the national government, the provincial government of South Holland, the municipality of Rotterdam, the Urban Region of Rotterdam and the Port of Rotterdam set up the Rotterdam Main port Development Project to elaborate a solution.

The Project Main port Development Rotterdam (PMR) was therefore set up to investigate the further development of the Rotterdam Port. Within the framework of this development, the aim of the project was to improve the quality of the living environment in the Rijnmond region, the Delta and the river Maas. The objective is to ensure that, as a port, it takes care in dealing with materials, energy, water, biodiversity, mobility and space.

PMR resulted in three projects:

- A land reclamation of 1 000 hectares (net) suitable for allocation (Maasvlakte 2), including measures to compensate for natural assets that will be lost in the process;
- The execution of several projects in the existing port and industrial area, to facilitate more intensive use of the space and to improve the quality of the living and working environment;
- The construction of 750 hectares of new recreational and natural areas near Rotterdam.

The purpose of the new port area is the transfer and distribution of deep-sea containers and for any new large-scale petrochemical operations. Connections for shipping should meet the current safety standards of the Rotterdam Port Authority. Regarding the roles of the different parties in this process, the port is responsible for land reclamation. The national Government is responsible for the development of the Marine Protected Area and Dune compensation projects. The 750 hectares of nature is the responsibility of the Province of South Holland. The other projects are meant to improve the local living conditions and to make the efficient use of the existing harbour area. For this so-called Existing Area Project, the municipality and port of Rotterdam are the main responsible parties.

Integral management plan North Sea 2015 (IMPNS 2015)

(Though this section is not directly concerned with estuary planning and long-term vision, it may be useful to briefly explain this North Sea Plan, as it complements the estuary visions and plans in the Rotterdam Port area).

Fishing, sand extraction, wind farms, shipping and nature – the North Sea has many attributions and is the object of a wide range of interests. For a proper management of these attributions, guidance through spatial planning is required. That guiding policy is there now, in the form of a 'North Sea paragraph' in the Spatial Planning Policy Document. The North Sea paragraph takes relevant international agreements and obligations and national policy frameworks into account. The next step is to organize the implementation, enforcement and other management tasks in such a way that the North Sea management framework is able to implement the policy effectively, efficiently and in accordance with existing policy frameworks. The Integrated management Plan for the North Sea 2015 sets out how the North Sea will be managed in the coming ten years.

The Spatial Planning Policy Document contains the following integral primary objective: "To enhance the economic importance of the North Sea and maintain and develop the international ecological and landscape features by developing and harmonising sustainable spatial-economic activities in the North Sea, taking into account the ecological and landscape features of the North Sea."

Spatial developments: how busy can we expect the North Sea to become?

So-called opportunity maps have been drawn up for the attributions that are expected to show the strongest growth and are also bound to a fixed location – wind farms, extraction of surface minerals and conservation. The maps show the locations that have the most potential within the established parameters of policy. The overview map combines the opportunity maps and current usage (as far as it is location-based).

IMPNS 2015 describes the policy comprehensively in context and outlines the scope for new initiatives as referred to in the Spatial Planning Policy Document. The plan is therefore process-oriented and defines the parameters of policy. In order to achieve effective, efficient and integrated management, a number of substantive details and adjustments need to be addressed, primarily regarding spatial management and the protection of area-based ecological features. It covers four domains:

1) *Vision of spatial management*: controlled freedom for the market In the Spatial Planning Policy Document the government opted for a spatial policy that prescribes location-based uses at sea wherever necessary, but gives market players the scope to develop their own initiatives and make spatial choices within certain limits.

2) *Integrated assessment framework*: spatial management through permitting. Permitting was already and will continue to be an important instrument for regulating activities in the North Sea. However, IMPNS 2015 introduces an additional element in the form of an integrated assessment framework for the entire North Sea that applies to all activities for which a permit is required, as well as for prolongation and expansion of existing activities.

3) *Management to foster a profitable sea*: The North Sea has great economic significance. Some economic activities are related to the sea directly (e.g. oil and gas extraction, fishing), and others indirectly (e.g. harbours, industry and recreation). The North Sea is also important for transport activities (shipping, telecommunication, and energy distribution) and functions for which there is insufficient space on land (wind energy, sand extraction). The economic objectives are highly sectoral in nature. This also applies to the management instruments that are available, which are generally sufficient. Profits can be found via integrated consideration of the use of space, through spatial monitoring, and by applying the integrated assessment framework.

4) *Coordinated management focusing on effectiveness, efficiency and better customer service*: A number of central government organisations are active in the North Sea. They work together closely in preparing policy, enforcing rules and regulations and providing services.

Figure 1: Port of Rotterdam

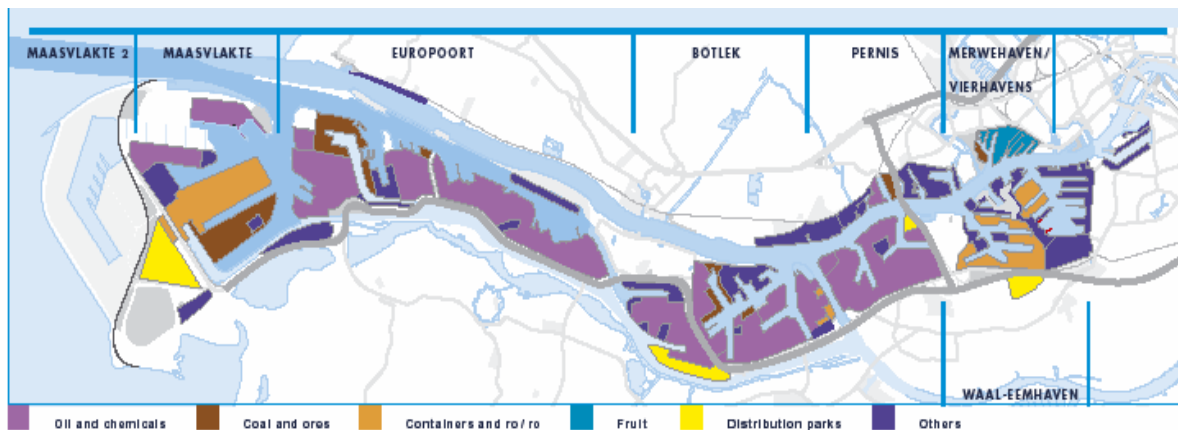


Figure 2: Overview of the Port of Rotterdam neighbouring Natura 2000 sites



Figure 3: Port of Rotterdam long term plan 2020

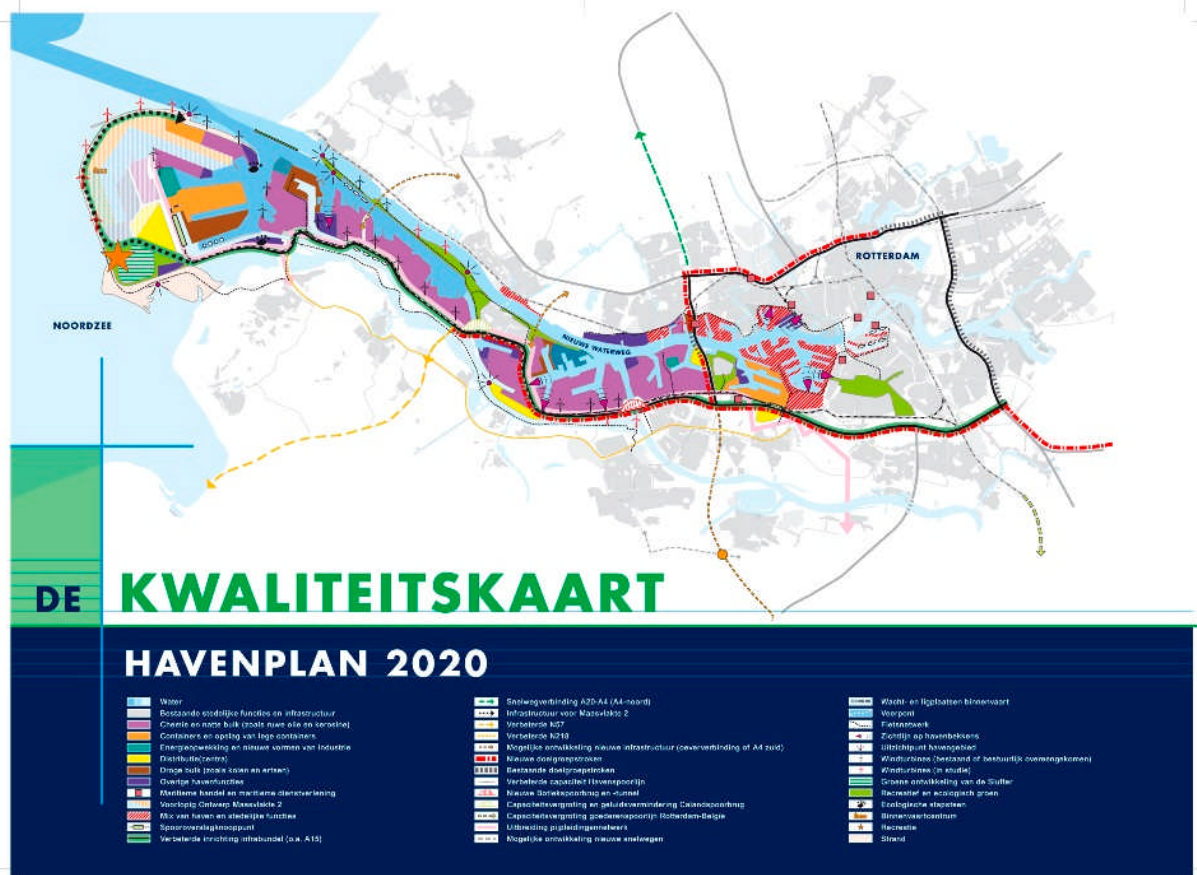
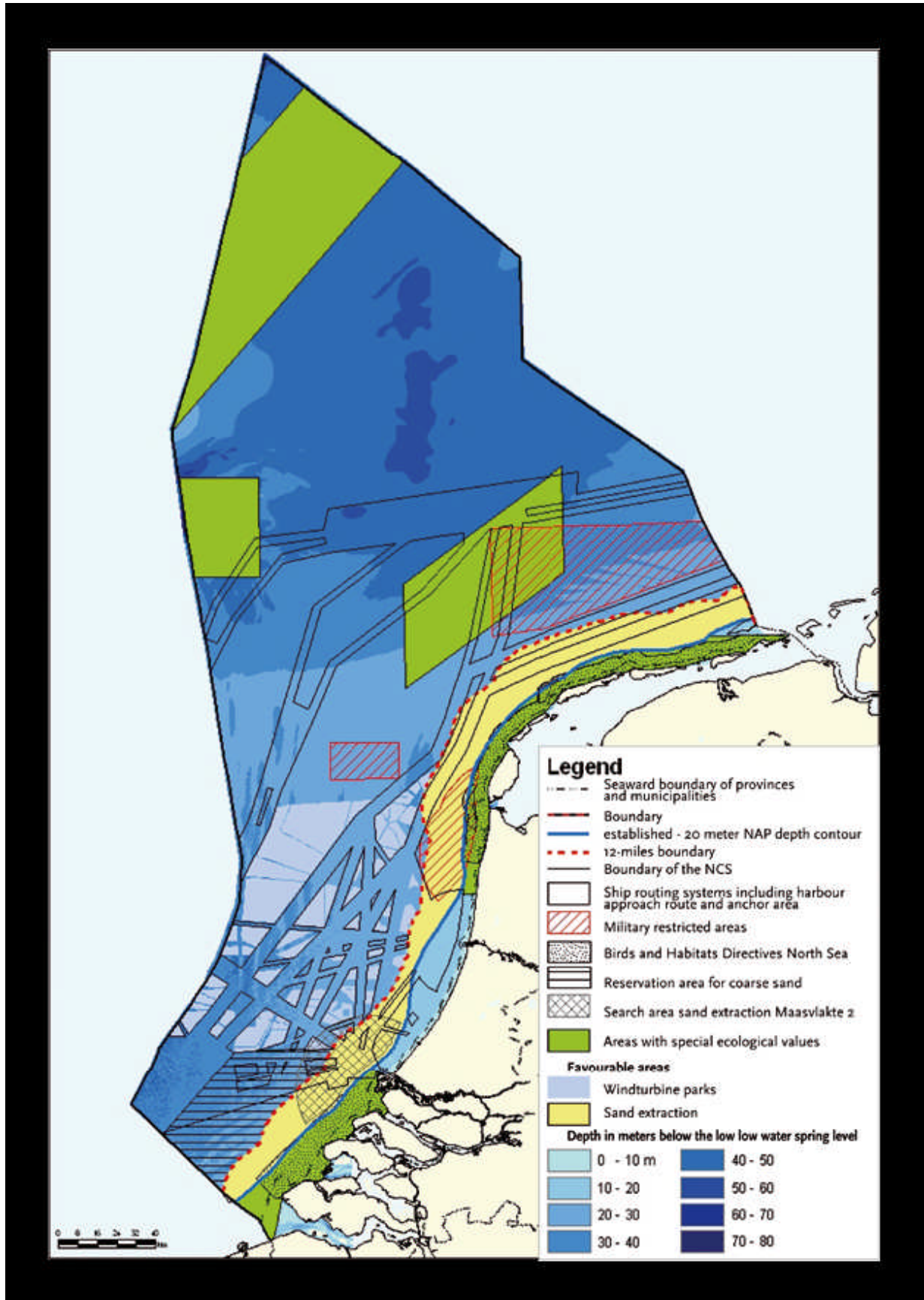


Figure 4: Integral management plan North Sea 2015 (IMPNS 2015)



3.3. The Scheldt estuary case study

Scheldt estuary situation is specific, being shared by two countries (Belgium and The Netherlands). This implies both specific institutional organisations and/or processes in order to ensure full integration of all interested parties, as well as a natural need for formal transparency of studies, analysis and decision-making.

3.3.1. Introduction: Institutional and planning context, actors in the management of the Scheldt estuary

The governments have after the preparations described in 2 below, signed a Memorandum of Agreement (in March 2005) in which (among other things) they specify the financing of the resolutions. They have also anchored the most significant resolutions in the Development Outline in a treaty. In addition, the authorities have formulated a treaty regarding how they will further proceed to attain the target situation in 2030. These treaties were signed in December 2005.

The overall management is a joint board of high officials from both the Netherlands and Flanders (the Technical Scheldt Commission). The ministries of Infrastructure, Transport and Waterways as well as the ministry of Agriculture and Nature are represented in this Commission. The Dutch Province of Zeeland is a new member.

The governments have also established a joint project organisation in order to ensure a coordinated approach during the subsequent stage (ProSes2010). The task of ProSes2010 is to coordinate the various measures and procedures and clearly communicate information⁴. Specific implementation of the individual projects is carried out in the regions in question in cooperation with the directly involved and affected parties.

3.3.2. Present situation

Physical Characteristics

The river Scheldt has a length of 355 km from source to mouth (the line Vlissingen-Breskens). The source is situated in the north of France (Saint-Quentin) about 110 m above sea level and the estuary becomes much wider beyond Vlissingen (The Netherlands), where the mouth of the estuary gradually turns into the North Sea. The total catchments area is approximately 21,863 km². About 10 million people (477 inhabitants/ km) live in the river basin. The Scheldt is a typical rain fed lowland-river.

The inner estuary extends from Vlissingen (km 0) to Ghent (km 160), where sluices control the tidal wave (fig. 1) in the upper Scheldt. The tidal wave also enters the major tributaries Rupel and Durme, providing the estuary with approximately 235 km of tidal waters. A single ebb/flood channel, bordered by relatively small mudflats and marshes (28% of total surface), characterizes the Zee Scheldt (105 km), the Belgian part of the estuary. The surface of the Zee Scheldt amounts to 44 km².

Agglomerations, cities and industries are historically developed close to the riverbanks of the Zee Scheldt. The inter tidal zone is often absent (e.g. quays, docks and wharfs) or very narrow. Upstream of Dendermonde, the estuary is almost completely canalised.

The middle and lower estuary, the Dutch part of the estuary called the Westerscheldt (58 km), is a well mixed region characterized by a complex morphology with flood and ebb channels surrounding several large inter tidal flats and salt marshes. The surface of the Westerscheldt amounts to 310 km², with the inter tidal area covering 35%. The average channel depth is approximately 15 – 20 m, with some deep pits of 40 m.

⁴ New websites for this purpose are available: www.proses2010.be and www.proses2010.nl.

The mouth of the estuary, beyond the line Vlissingen –Breskens, is the largest part, with a marine environment. The two main entrances to the river (the fairways to Antwerp and Vlissingen) are separated by a large sub tidal flat, the Vlake van de Raan. The surface of this part of the estuary amounts to 950 km².

Biodiversity

Bad water quality severely affected benthic invertebrates and fish. The freshwater part of the estuary harboured less species than normally expected (Remane's curve). Despite the geomorphologic changes in the lower estuary and the bad water quality in the upper estuary, the Scheldt estuary is one of the most important estuaries along the NW-European migration route for water birds, maximum numbers reaching up to 230,000. The Scheldt has international importance for 21 water bird species.

Natural environment

Environmental habitats: the total area of salt marshes, mud flats and shallow water has decreased dramatically during the last century. The estuary has too little space and too much tidal energy to allow such areas to develop or allow existing areas to be maintained. This is the result of the poldering (building dykes in the salt marshes) of the estuary since the Middle Ages. This causes a decline in the environmental diversity of the Scheldt estuary.

Flora & fauna: salt marshes, mud flats and shallow water are important to many species as feeding areas, breeding areas, and rest areas. The living conditions of a wide variety of species diminish when such shore regions are lost. As a result, important links in the food chain are threatened.

The natural environment of the Scheldt estuary is not sufficiently robust to enable it to absorb the impact of new human interventions. All of the remaining salt marshes, mud flats, shallow water and gullies in the Scheldt estuary fall under the protection of the European Habitats Directive and the Ramsar Convention

Belgium context

- National, regional and local institutions:

Belgium is a federal state since several state reformations in the period 1980-1990. As a result, the three regions of Belgium, Flanders, Walloon and Brussels, have large competences and autonomy. The Flanders region has a government, ministers, a parliament etc... It can make its own decrees for its domains of competence. Flanders is competent for nature, port policy and spatial planning. All relevant documents and decision related to the strategic plan for the port were thus Flemish.

The Flemish government, ministers and other structures are supported by a large administration that recently (April 2006) was reformed in order to respond better to current needs. The former Department of Environment and Infrastructure is now split up in three different departments (Mobility & Public Works, Environment, Nature & Energy and Town and Country Planning & Housing).

- Port Policy

The Flemish Port Decree of 1999 regulates all aspects of ports. Ports in Flanders are municipal according to the hanseatic tradition. It used to be an integral part of the Antwerp municipality but in 1997, the Port Authority became an autonomous municipal company.

According to the port decree, the port authority is the manager of the seaport area. It is competent for all related matters. The Flemish administrations remain however still competent

within the port area (for instance for roads of Flemish importance, nature, etc...). The locks are managed and subsidised by the Flemish government, as is the dredging in maritime access.

The dredging of the river Scheldt both in The Netherlands and in Flanders is a responsibility of the Flemish Government (Department Mobility and Public Works).

3.3.3. Planning issues and long-term concern: situation and major findings

Finding solutions: ProSes (Scheldt Estuary Development Project) into action

To guarantee sustainable development in the future, a target for 2030 was set and subscribed by the Dutch and Flemish governments in 2001 (the Long-term Vision Scheldt estuary). It focuses on five objectives:

- preservation of the geomorphology,
- safety against floods,
- optimal accessibility of the ports,
- a healthy dynamic ecosystem,
- trans boundary cooperation.

However, the target of 2001 does not propose elaborated projects. To define more precise projects, ProSes was established in March 2002. ProSes' main task was to make a solid, broadly supported development plan, so that a step towards the target for 2030 will be achieved.

The project management was focussed on being an intermediary between the various interests and ambitions, aiming to present proposals that can count on both political and social support and understanding.

Method and process

The approach in preparing the development plan was two-pronged: research and advisory consultation. Both routes, research and advisory consultation, have resulted in political decisions on the Scheldt Estuary Development Plan by the Flemish and Dutch governments in 2005. Hereafter, the development plan formed the basis for further decision making on the implementation and realization of the chosen measures and projects.

Research included:

- Comparing the desired situation with the situation without extra measures: the problem analysis;
- Drawing up projects and measures to solve the bottlenecks emerging from that comparison;
- Describing the effects of these projects and measures in a Strategic Environmental Assessment (SEA) and a societal cost-benefit analysis;
- Drawing up a nature development plan; this plan has provided the SEA and the social cost-benefit analysis with nature projects and measures; it has also served as a building block and touchstone for the development plan;
- Testing the projects and measures against the European Birds and Habitats Directives to protect valuable natural life;
- Morphology is an important research-issue; such research is also the base to examine the effect on nature; salt marsh erosion and related processes being morphological processes.

Different types of consultation included:

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

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

Social organisations, port authorities and local and regional authorities gave advisory consulting from the area: The advisory consultancy was divided in two bodies, the stakeholders' council and the governmental board. The participants in the stakeholders' council provided the Flemish and Dutch governments with independent advice on the development plan, over two independent chairpersons. The governmental board consisted of officials from principal authorities, who provided ProSes with essential information. Both the council and the board were involved from the process of formulating the problem definition to delivering the final development plan.

Communications: During the preparation of the Development Outline, interested parties contributed 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 via brochures, newsletters and the website, among other means.

The development plan 2010 for the Scheldt estuary

The governments of the Netherlands and of Flanders recently approved the 'Scheldt Estuary Development Outline 2010', which contains dozens of resolutions regarding how the two governments intend to improve the safety, accessibility and natural environment of the estuary.

The basic principal for both governments is to maintain and improve the dynamic characteristics of the Scheldt estuary. Here 'dynamic' means a constantly changing pattern of channels and inter tidal flats, regular variation in salinity, and the formation of new salt marshes and mud flats while old ones disappear. Safety, navigability, and the natural environment all benefit from maintaining the dynamic vitality of this system.

The Development Outline does not deal with all of the problems in the Scheldt estuary. For instance, it does not address the issue of improving water quality. This issue is already being dealt with jointly by Flanders and the Netherlands, along with the other Belgian regions and France, in the International Commission for the Protection of the Scheldt;

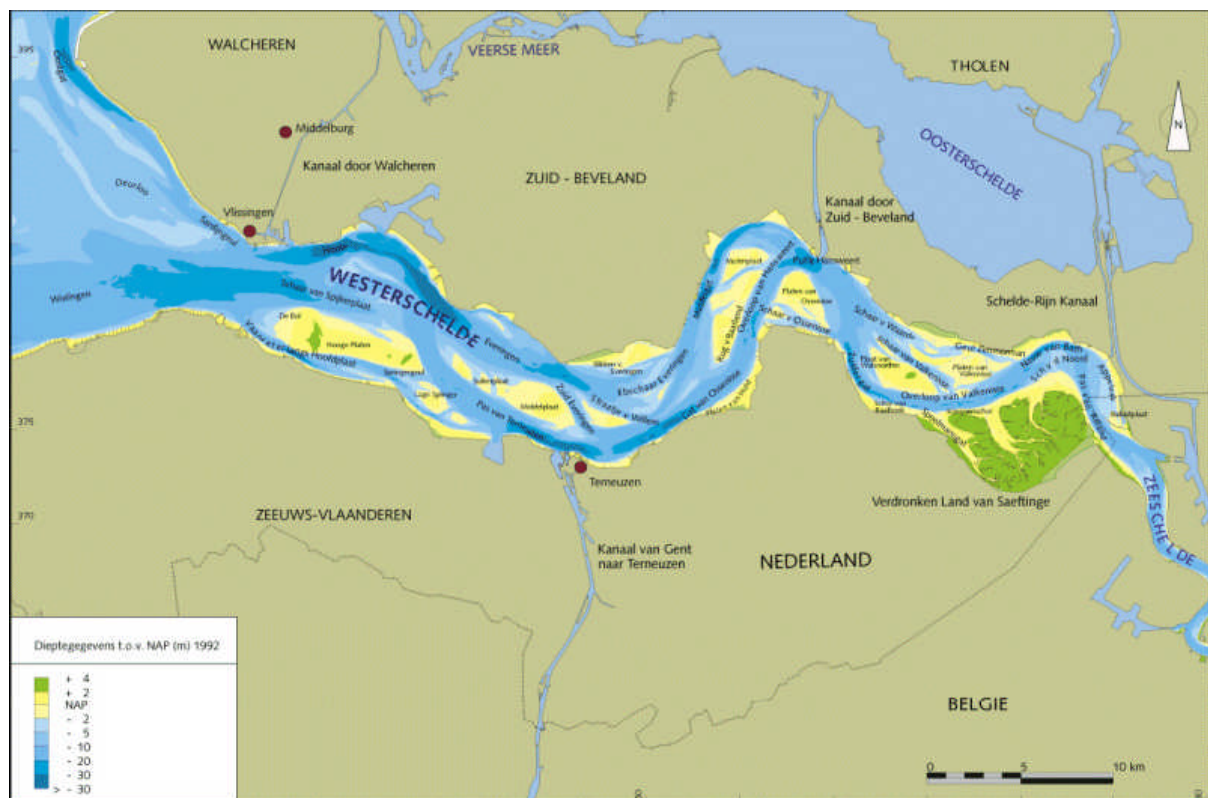
Long-term vision for the Antwerp port area

In the government agreement of 1999, the Flemish government stated that for all four Flemish seaports a Strategic Plan had to be made. The Flemish government in 2004 repeated this aim (elections => new government). The predecessor of Strategic Planning in Flanders was the ROM-process for the Port of Ghent (since 1993). ROM stand for Ruimtelijke Ordening and Milieu (Spatial Planning and Environment) and it is the same kind of process as in Rijnmond-Rotterdam. For the part of the Port of Antwerp on the left bank of the Scheldt, the establishment of a Strategic Plan was one of the requirements for the building of the Deurganckdock (decision of 1998).

That is the reason that since the end of the 1990s a Strategic Planning Process is running for the Antwerp port area. In this process different stakeholders (administrations of waterway, nature, environment, municipalities, Nature NGO's, farmer's organisation, Port Authority...) sit around the table to discuss the future and the designation of the Antwerp harbour. So the preparation for a new zoning plan (Spatial Implementation Plan) which will designate the Antwerp Port Area and which will contain provisions for the surroundings is part of the Strategic Planning Process for the Port of Antwerp.

The Strategic Planning Process handles different environmental problems (noise, mobility, nature, air quality...) which are investigated in a Strategic Environmental Assessment. Nature is an important part of it and the strategic approach similar to the stepwise guidelines of the theme 3 report. This Strategic Planning Process exists next to the process of the development of a long-term vision for the Scheldt estuary. For the aspects of Nature and mobility, there is some sharing between the two processes.

Figure 1: Western Scheldt Estuary



3.4. The Seine estuary case study

The Seine Estuary case study is significantly different from the other three case studies being largely based on a comprehensive forecasting exercise of anticipating possible futures for the state of ecological resources and functions in the estuary in 2015, with a strong participatory process associating all interested parties. It is a leading example of the value of forecasting in long term integrated planning and management of estuaries, fully including nature protection as an initial target.

3.4.1. Introduction

The Seine estuary is one of the three major French estuaries together with the Loire estuary and the Gironde (Garonne estuary). As many other estuaries in France or in Europe, it is a rich but sensitive, degraded and highly artificial site confronted with major issues.

Port activity in the estuary was already mentioned in 50 B.C., for maritime relation with England. The port of Rouen existed already in 629 A.D. The port of Le Havre was created in 1517. In the 19th and 20th centuries, meanders of the mouth of the estuary were destroyed to create the navigation channel of the port of Rouen.

The Seine estuary is now a complex area with nature and human activities coexisting and sometimes conflicting. It is in the mouth of a 75000-km² catchments area and includes key economic activities. The estuary itself includes many human activities: the first French petrochemical complex and many other industries, two ports (Le Havre and Rouen), highways, main roads, and two towns that have more than 200 000 habitants.

The natural part of the estuary is a leisure area for the local population walking, hunting and doing other sports. Agriculture is also present as well as reed cutting. The consequence of human activities is that water quality is quite bad although better than it was ten years ago.

In spite of its artificialisation, the Seine estuary is a rich nature area and as such, is a part of the Natura 2000 network, as it includes a SPA and a future SAC. It is characterized by a much diversified nature gradient from the sea to the land: marine areas, inter tidal sandy or muddy areas, salt marshes and schorres, shifting dunes, temporary and permanent pools, reed marshes, woods, salted and fresh wet grasslands, and forest. It hosts many protected species at a national or European level, especially birds, as it is on a main migratory path of the Atlantic area.

A regional natural park of 80.000 hectares has existed since 1974. It was created to become a "green lung" between the towns of Rouen and Le Havre.

In 1997, a national reserve, which is the highest nature protection level under French law, was created. It was extended in 2004, as a compensatory measure for the extension of the port of Le Havre, called "Port 2000". The reserve is now 8528 hectares in area and includes a part of the natural park. It covers both banks of the Seine from Le Havre to the Tancarville bridge and a large marine area.

3.4.2. Present situation

Presentation of the estuary

The estuary is defined by the zone of influence of the dynamic tide, which affects the Seine as far upstream as the first dam, at Poses at kilometre 202 (km no 202), 160 km from the English Channel.

The salinity only partially penetrates the estuary, up to km no 325, i.e. Vieux-Port (the limit being defined in relation to a salinity of 0.5 PSU). It is possible to distinguish three zones:

- The upstream estuary or river estuary: from Poses to Vieux-Port,

- The middle estuary: from Vieux-Port to Honfleur - i.e. the salinity gradient,
- The downstream estuary or marine estuary: Honfleur and the Seine bay – permanent saltwater area.

The Seine estuary is a site of recognized biological wealth with a hydro-sedimentary system that is difficult to comprehend. It is characterised by the following:

- It constitutes the discharge system for a catchments area containing one third of the population of France and 40% of the national economic activity. It constitutes the destination for industrial, urban and agricultural wastes. The level of microbiological and chemical contamination (the presence of certain metals, aromatic hydrocarbons and various organ chlorinated compounds) is high;
- Due to the presence of the ports of Rouen and Le Havre, for more than a century the main focus has been on maintaining the navigability of the river, resulting in extreme channelling of the estuary;
- The presence of the Paris area upstream, and the population density in the catchments area, compared with the clearly insufficient flow of the Seine, has led to a chronic occurrence of oxygen deficits during the summer period.

A sensitive site

Two characteristics of the estuary have a major impact on the coastal economy of the area:

- The freshwater - seawater mix,
- The sand - mud distribution. In the case of the Seine, the deposits are particularly unstable: muddy sediment is liable to occur temporarily everywhere, but rarely in a permanent way.

A certain number of functionalities of the estuary are sensitive to this instability:

- The storage of contaminants is not permanent. Expulsion out to sea of the silt plug and contaminants, the residence time of which in the estuary has become increasingly short, is likely to be more frequent;
- The instability of the substrate is not favourable to the development of the macro fauna. This point is all the more critical in that the Seine estuary and its direct access constitute a highly favourable environment for the young of many halieutic species;
- In the same theme, if ornithological wealth constitutes part of the interest and the assets of the estuary, maintaining that wealth means safeguarding or re-creating areas with high biological productivity, capable of ensuring the food supply of wintering or migratory species.

3.4.3. Institutional and planning context

The Seine estuary is the junction of two regions and three “*departments*” (subdivision administered by a Prefect, but local authority level as well). It covers several tens of local authorities (the communes).

Major ports, in France, have a public status and are under control of a central civil service but are financially autonomous and in competition with other French and European ports. There are two ports in the Seine estuary, located in the two most important towns: Le Havre and Rouen.

Port of Le Havre

The port of Le Havre is located on the north bank, in the mouth of the estuary. It is the second largest French port. Its activity is mainly focussed on containers and it is the fifth largest European port for container trade with a possible capacity of six million twenty feet equivalents. Its activity is of international importance and has a direct influence on 16000 jobs.

Its recent extension, called “Port 2000” was partly built on the sea. It was inaugurated at the end of 2005 and has currently four berths for ships unloading. The aim is to have 12 berth places, to be implemented as needed by the traffic evolution. Because of the extension’s

significant impact on environment and especially on Natura 2000 protected sites, an important environmental program was implemented at the cost of more 45 million euros.

Many studies were carried out for this project and monitoring will go on until 2010. It is a very important source of knowledge about the Seine estuary.

Port of Rouen

The port of Rouen is located 120 km upstream of the river Seine. Different port installations are distributed on both banks of the Seine valley from the mouth of the river to Rouen.

Rouen's location places it in an area with 20 million people within a radius of 200 km. Its activities are orientated on industrial bulk cargo, grain (largest European port for grain export), agrifood, timber products, containers, general cargo and cruises.

One of the main issues faced by the port is to maintain the depth of the navigation channel. Many studies, modelling, monitoring and maintenance have been done or are in progress in relation to this issue.

Port strategy and long-term visions

Port strategy is usually not public because of competition conditions, but general trends have been already identified and can be included in a long-term vision.

Trade in finished products placed in containers will increasingly generate new opportunities for port activity. The port system consisting of Le Havre and Rouen will then be able to contribute to strengthening the local and regional economic vitality under certain conditions:

- Continue efforts to improve the level of service, reliability and competitiveness of the port chain as a whole;
- Develop the port technical facilities, in accordance with the Port 2000 project and also the development of other containers terminals in the Rouen urban area;
- Sharply improve multimodal access; the competitiveness of each unit of port space results from the complete cost from door to door;
- Develop synergies within the Le Havre/Rouen port complex in order to eliminate the effect of excessive competition, to pool resources better and to establish a joint commercial approach;
- Handle and process cargoes better in order to create more jobs and wealth locally.

3.4.4. The Seine Estuary long-term forecasting exercise: "Restoration scenarios for 2025"

The Seine Estuary Council, a group formed of high-level authorities (State, local authorities, Ports authorities) required the forecasting exercise on the Seine Estuary.

Objectives

The purpose of this exercise was to become a guide to individual and collective choices for the restoration of environmental functions of the estuary, with particular regard to investments. The approach used was designed to meet the characteristics of the context and the specification, namely:

- The main objective of the intervention: the gradual restoration of the environmental functionalities of the estuary;
- The aim was to produce a shared Long-term vision of the wishes expressed by the various actors of the state of the estuary in 2025.

End products

The work ended in the production of a collective vision of the environmental functions of the estuary by 2025. Four scenarios were drafted in reply to the following strategic questions:

- What are the consequences of a *“laissez-faire”* policy on environmental functions?
- Can we restore the functions to the 1980 level? Under what conditions?
- What would be the conditions and the consequences of a catastrophic scenario, such as a major economic crisis?
- How far can we go with determination and local resources alone?

By exploring these four scenarios, the study ended on the following strategic lessons:

- **a scenario based on the “Risks of laissez-faire”**, focusing on the socio-economic and political situation, the behaviour patterns and arbitration of local actors, does not improve the situation of the estuary: it leads to the gradual degradation of the environmental functions and certain socio-economic functions provided by the estuary;
- **a scenario based on the “Pro-active restoration”** of the environmental functions as they were at the end of the Seventies is only possible if a major, collective, ecological engineering project is decided and put into operation. Such a project can only be designed with the full support of all the actors in the catchments area and of the State (taxation, finance etc.) and the European Union (Framework directive on Estuaries etc.);
- **a scenario based on a “Major economic crisis”**, affecting the activities of the Port of Rouen Authority in particular, clearly shows that, if the maintenance work of the navigation channel suddenly ceased due to lack of resources and sea traffic on the Seine, it would have negative consequences on the state of certain environmental and socio-economic functions of the estuarine system; if the estuary were returned to its natural dynamic, given that its morphology has largely become artificial over the last fifty years, it would inevitably silt up, and the phenomenon would undergo a marked acceleration; this would modify its hydraulics and would lead to the disappearance of a certain number of existing functions;
- **a scenario solely based on “Local initiative”**, in which all the regional actors (private and public) act together and share the resources required to materialize and manage a global collective project for the estuary, would enable limited but significant restoration of environmental functions. It can only be envisaged as part of a collective approach to the sustainable management of the estuary, integrating the preservation and the restoration of the environment as part of the economic and social development of the area, in particular the increased competitiveness of the ports, so that they meet the growing world demand for transport by sea.

3.4.5. Major positive results of the long range planning exercise

The long-range planning adopted collectively by local actors in order to restore the environmental functions of the Seine estuary by 2025 has produced three major results:

- It has fostered better understanding and integration of the operation of the estuarine system by the local actors (mutual awareness of the geographic dimension and relationships within the components of the estuary; Recognition of the dependence of the local actors on external factors that are decisive for the state of estuarine functions)
- It has helped construct a collective vision of the future possibilities for the environmental functions of the estuary by 2025:
 - it helped to develop concrete and operational dialogue between “hard” science and “soft” science;
 - It enabled dispassionate dialogue between the actors about their common future;
 - it showed the value of the strong scientific knowledge acquired through the Seine Aval scientific program over ten years of work
 - the analysis enabled the working group to specify the opportunities for action by the local actors, as well as the limits of the impacts of their initiatives.

- It highlighted and forced admission of the fact that prolonging the current trends is unacceptable for all: it is therefore essential to change certain practices, operating modes and arbitration processes.
- It has underlined the need to continue a concerted analysis in order to construct and follow-up the implementation of an overall management project to restore the environmental functions of the estuary. In addition, not only proceed merely by successive efforts of compensations based on proposed economic development, in particular for compensating the need of harbour to remain competitive over the long term.

3.4.6. Major shortcomings of the exercise

The communication of results of the exercise was not considered as an integral part of the study therefore no significant effort was devoted to this.

There has been subsequently some lack of rapid follow up of the exercise: the economic and environmental efficiency assessment of proposed actions (appearing in the two restoration scenarios: "Pro-active restoration" or "Local initiative") analysed only started almost two years later.

The specific characteristics of the Long Term Seine Estuary Study

The Long Term Seine Estuary Study can be considered as unique among long term planning or forecasting exercises undertaken in European estuaries. Three specific aspects can be put forward to illustrate this:

- The study report is the result of real collective thinking and analysis, performed by a Steering Committee of fifteen members where most of social, political and environmental actors of the Estuary were represented: The Port authorities, Local authorities (Region and Communes), Central government ministries and technical agencies, environmental NGO's, economic chambers (agriculture, industry...), professional fishermen association...;
- The analysis was based on a collective representation of the global estuary system, including social, economical and environmental factors, whether they were internal to the site or external to the site, including world scale factors such as maritime transport;
- The study produced a collective long term set of alternative futures for the estuary, according to different hypotheses based on possible trends of majors factors: four different scenarios up to 2025 were therefore produced, which helped the Steering Group to identify collectively the major long term issues arising of the four strategic questions concerning the long term restoration of the environmental functions of the estuary.

By doing so, this study helped all estuary stakeholders to fully integrate both uncertainty and strategies into their collective analysis and understanding.

Figure 1: The Seine estuary

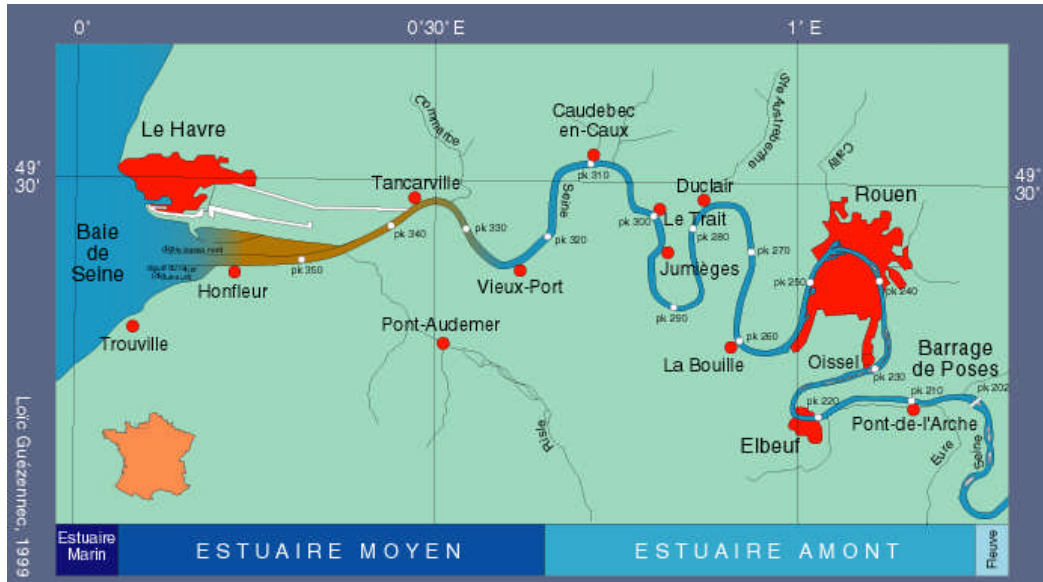


Figure 2: One hundred years of port and dikes development in the mouth of the Seine estuary

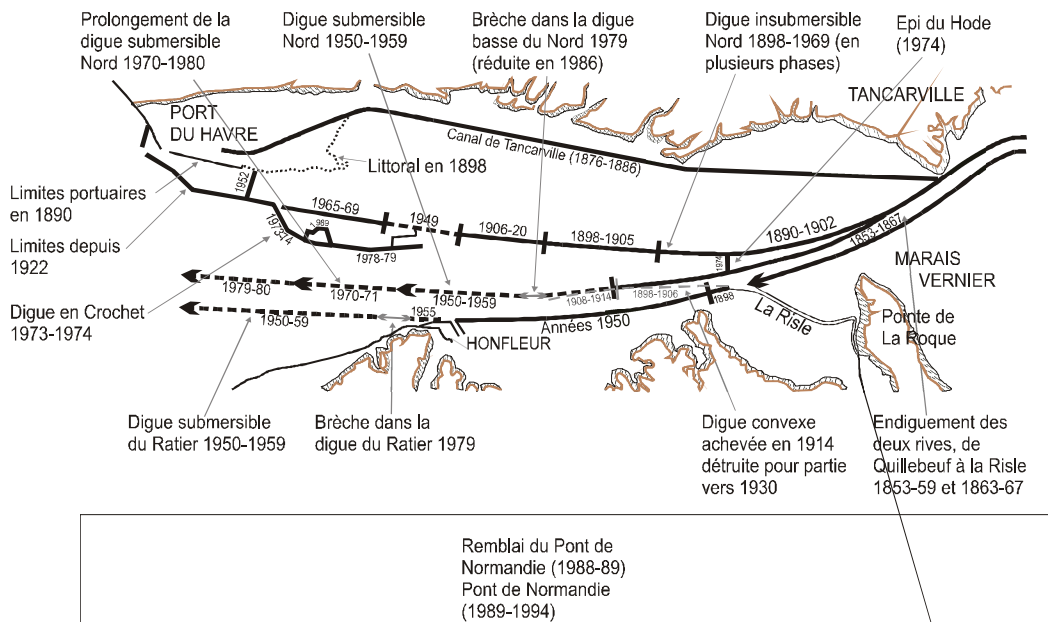


Figure 3: A diagram for a collective understanding of the estuary planning and management in a long term approach: the “Seine Estuary System” and its keys components

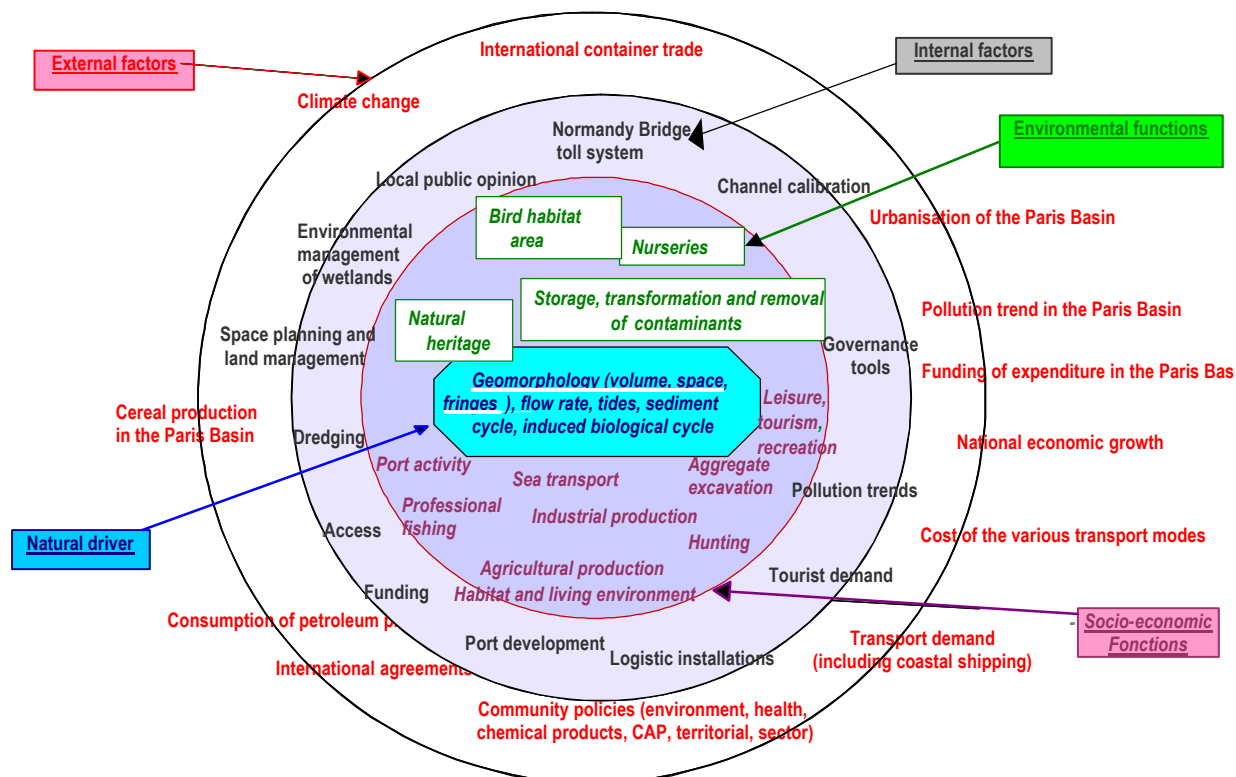


Figure 4: Participants in the Seine estuary forecasting exercise

**Members of the Steering committee
(Representatives from)**

Regional Tourism committee
I.N.R.A
Chamber of Agriculture
Total Refinery
Seine-Normandy Water Board
Port of Rouen Authority
Haute-Normandie Regional Chamber of Trade and Industry
Honfleur Town Hall
Maison de l'Estuaire (reserve manager)
DRIRE Haute-Normandie
Local fishing committee
SOS Estuaire (NGO)
A.C.D.P.M. (hunters association)
IFREMER
Ministry of Environment (DIREN)
Port of Le Havre authority

**Members of the Technical Group
(Representatives from)**

Seine-Normandy Water Board
Ministry of the Environment – Haute-Normandie Regional Division (DIREN)
IFREMER
Haute-Normandie Regional Council
Downstream Seine Public Interest Group
Ministry of Ecology and Sustainable Development – D4E

Consultants

BIPE
Gerpa

4. Cross case studies findings

The project partners analysed the different case studies in order to establish findings relating to the nature and value of cross-sectoral long-term port and estuary visions. These findings have been structured along the following four items:

1. The need and value of long-term vision in estuary management,
2. Methodological approaches and tools for long-term port and estuary visions,
3. Implementation processes and “governance” for long-term port and estuary visions,
4. The benefits of long-term estuary visions for sectoral management (nature protection, port activities, land uses...),
5. The contribution of long-term port and estuary visions to the main objectives of New! Delta.

4.1. The need and value of long-term visions (LTV) in estuary management

The need for long term thinking in estuary management stems clearly from three basic elements:

- First, the time frame for the environmental changes and protection of estuaries is definitely long or very long-term: many ecological changes including natural responses to human activities pressures, occur in the long-term;
- Second, a wide variety of physical planning, strategic exercises are of middle to long-term nature: regional structure plans, local plans, nature protection strategies, harbour development projects...;
- Finally man made infrastructures that are developed in the estuaries, many of them for maritime transportations purposes, are clearly established with a long-term perspective and will remain for many years.

In order to develop this long-term thinking, several aspects have to be addressed:

- The relations of LTV with European regulations,
- LTV and general estuary systems understanding,
- LTV and the understanding and integration of actors' views and interests,
- The value of LTV as a tool for exploring options and analysing their potential consequences,
- The interest of LTV as a tool for defining orientations and policy framework.

4.1.1. The relations of LTV with European regulations

These relations occur in parallel. European regulations in the environmental protection area which concern estuaries (e.g. Birds and Habitats Directives, Water Framework Directive) have very strong and positive impacts on estuary planning and management, as they provide a legal framework, pushing and helping countries to define policies supporting integrated coastal management. European regulations are as a strong expression of social demands. They also help to provide guidance for resolutions among conflicting land issues arising of conflicting actors demands.

LTV, through some of its basic characteristics such as system approach, identification of alternative action plans, construction in some cases of scenarios describing alternative actors strategies, helps to better identify major issues for nature protections over the long-term, and help to ensure and to better comply with some European demands (Natura 2000 for instance).

4.1.2. LTV and general estuary systems understanding

Due to its components and characteristics (see above chapter 2), LTV has major benefits on the improvement of the common understanding of the functioning of such complex systems:

- LTV helps to work at the estuary level, seen as a socio-economical-ecological system, including factors and actors, natural and socio-economic dimensions and interests...;
- LTV helps to understand how the ecological system has developed in the past and can maintain itself, which means understanding physical and ecological processes;
- It helps to understand how people have used the system, and how they plan to do it in the future;
- LTV includes exploration of future trends and options. By such a long-term component in the analysis, it is possible to develop a common understanding – shared among political and economic actors of the estuary, as well as by representatives of inhabitants and more generally by stakeholders - of the functioning of the estuaries. This may include in particular the following: identification and documentation of key factors, listing of major and minor ecological and socio-economic functions enabled by the estuary, identification of interactions or mutual effects between factors, exploration of past and future trends on these factors, and the interrelatedness of different functions and activities.

“Long term vision construction process appears to be a very efficient tool in order to articulate, in a “systemic” way, information and knowledge coming from a very large set of expertise, scientific bodies, public agencies, public authorities, economic actors as well as from stakeholders. A wide range of scientific knowledge (from many scientific domains, physics, chemistry, biology, ecology, but also social sciences or economy) can thus be put into relation with political, social as well as economic actors’ thinking, formal contributions or projects.”

4.1.3. LTV and the understanding and integration of actors’ views and interests

LTV helps to develop the knowledge of the roles and interests of each actor involved:

- Through a better analysis of the activities to influence or drive some of the factors (see above),
- Through a better understanding of their interests in the different socio-economic functions of the estuary.

Therefore, other functions and stakeholders, besides the traditionally most present or powerful (public authorities, port authorities and economic activities), are much more taken into consideration in long-term planning.

LTV also facilitates cooperation between different authorities, through the improved common knowledge, and this better mutual understanding of issues and interests. Therefore, LTV helps to move from today’s conflict solution process to long-term optimisation of functions.

4.1.4. The value of LTV as a tool for exploring options and analysing their potential consequences

Following the initial steps of systems’ description and actors’ understandings, LTV can, in the following step of its development, be seen as a tool for exploring options and analysing their potential consequences. This is achieved through several dimensions:

- Long-term visions help to better identify - through its initial steps of systems documentation and actors views’ understandings - range of options for economic development, social improvement and natural environment protection and restoration, and where to leave options open,

- LTV helps to identify new options or solutions, which would not have been explored with more “continuous” or “trend” type of approach,
- LTV helps to structure the analysis of long-term effects and issues, for instance environmental effects of infrastructure development, consequences on natural areas of cultural or social practices and demands, consequences of natural factors changes on ecological dimensions....,
- Long-term analysis helps – and in fact clearly makes unavoidable - to integrate formerly uncertainty over the future, whether this uncertainty comes for instance from scientific knowledge on long-term effects of new infrastructure, or long-term actors demands which remains largely unexpected.

4.1.5. The importance of LTV as a tool for defining orientations and policy framework

Through the development of long-term visions, several results can be obtained, which contribute to a common understanding of issues, as well as exchanges of views and arguments behind the study (and sometimes selection) of options⁵:

- Actors which are involved in the estuary planning and/or development processes can better identify, develop (and also present) more strongly their goals and priorities,
- These actors also can explain more explicitly why they made their choice (identification or key factors or values to be put forward),

Therefore increasing the collective capacity to have a better view of key factors (actors interests) driving the future of the estuary.

LTV allows actors to more easily and explicitly relate long-term planning with short-term issues, and for instance helps to provide a framework for short-term physical planning policies and decisions (development permits...)

From a port point of view – central to the long-term economic as well as natural state of the estuary - LTV helps to provide a frame for future investments and developments, and improve certainty over the local socio-economic context of future activities.

On the meaning, and use, of the word “vision” or “visions”

The word “**vision**” appears in different documents, but its sense may in fact be varied: ranging from a mere exploration of possible future histories of an estuary, to a strong and documented port industrial and services strategy over the long term.

It shows also that it is more useful to speak of visions (plural) than vision (singular), due to the fact that different actors will certainly develop different views or visions of the future, which may or may not end in the agreement of a common single final vision, via a formal democratic process.

It is useful to stress that one has to be careful about the sense (and use) of some words, especially with a strong forecasting content.

On the meaning of vision, different approaches from different actors or from processes show three general steps or components:

- exploratory vision: i.e. what could happen,
- strategic vision: i.e. what an actor (or a group of actors) wants to achieve for itself,
- management vision: i.e. the way this actor (or this group of actors) intends to do it.

⁵ See in the box below the different meanings and uses that this word “vision” may have. In this section and report, we shall use vision as including both steps of exploratory dimension of the system, its future trends, as well as the exploration (and sometimes assessment) of strategic options or programs.

4.2. Methodological approaches and tools for LTV

Long-term visions, whatever meaning the term may have in different countries or practices, rely nevertheless on a few major steps, which would ideally all be present in the process to formulate a vision, provided that **they should occur in the following given order**:

- 1) Description of the system components: factors, interactions between factors, dynamics and trends concerning these factors (both past and future), level of uncertainty regarding factor's future trends⁶...;
- 2) Identification of formal hypothesis based on the key factors that will mainly drive the future of the estuary (for instance: economic forces, environmental policies, social demand...);
- 3) Identification and documentation of explicit scenarios, which may present alternative futures of the estuary, derived from the different hypotheses based on the key factors (see below);
- 4) Identification of major global issues⁷ faced by the environmental system and by individual actors and their interests...);
- 5) Synthesis of commonly agreed issues, leading to a common vision for the future (LTV); this vision can therefore be used as an input into the planning process.

Relating to point three above (scenarios development), LTV development should consider multiple scenarios, each one corresponding to a coherent set of hypothesis concerning the key factors of the future these should be based on very different options or assumptions (see definition in the box below).

Drafting alternative scenarios (stories) helps to raise collective consciousness on future trends, and understand possibilities of "dead end" scenarios: identify where the estuary could go, and chose where actors would like to go (collectively).

It must be remembered that, developing long-term scenarios, it is of high importance to integrate a formal and strong stakeholders and/or public participation in the process of scenario building, in order to achieve a "no fundamental objections to ..." attitude, these scenarios are useful tools for issues arising and therefore for strategic building. This means that none of these different stakeholders - having been associated in the scenario building process - could later argue that for instance:

- "Scenario "A" is impossible!"
- "Scenario "X" has no value for anyone stakeholder present!"
- "Factor "Y", essential for the understanding of the estuary's future, has been forbidden! "

Reminder: Definition of "Scenario"

[1] A description of a sequence of events that might possibly occur in the future. A scenario is normally developed by: (a) studying the facts of a situation, (b) selecting something that might happen, and (c) imagining the various ways for that development to occur and the sequence of events that might follow.

[2] Coherence sets of hypotheses leading from a given original situation to a future situation (Godet).

[3] A hypothetical sequence of events constructed for focusing attention on causal processes and decision points (Kahn, Wiener, 1967).

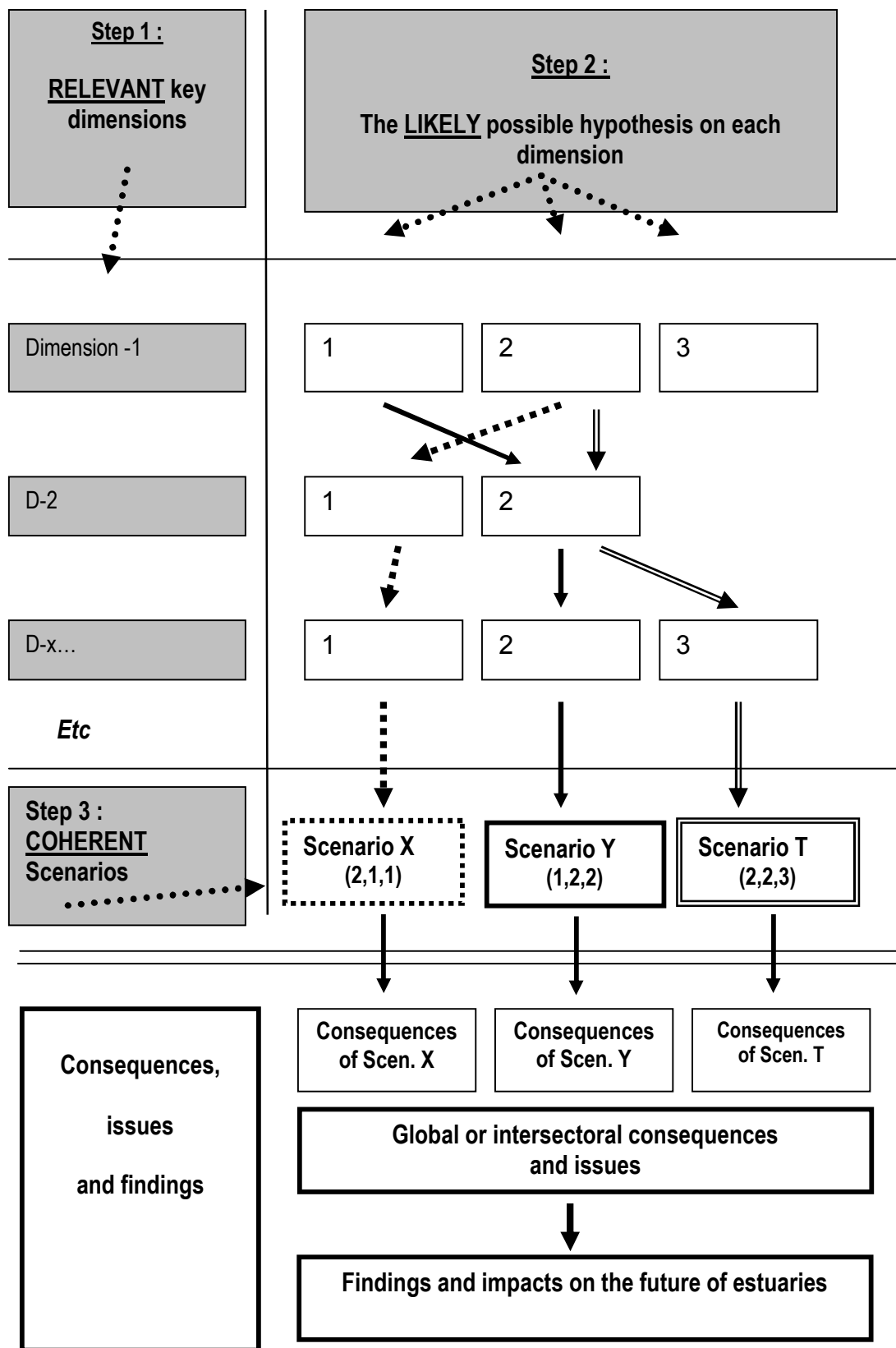
(See glossary in annex)

⁶ For instance scientific uncertainty, economic trend uncertainty, as well as judicial uncertainty

⁷ This may include the possible long term negative effects of existing European or national laws, including their form and content

Figure: The three steps of developing scenarios ensuring Relevance, Likelihood and Coherence, using Morphological analysis

(Source : adapted from GODET M. et DURANCE Ph. « La prospective stratégique, problèmes et méthodes », in Cahier du LIPSOR N°21, Cnam, Octobre 2006)



There should be a credible system of monitoring, evaluation and adaptation (corrective action) of the LTV, which helps to “update” the process and products developed during the elaboration of the initial vision. This should ideally concern all steps of the vision:

- Selection and documentation of factors,
- Changing hypothesis concerning selected factors,
- New potential scenarios or existing scenarios become invalid,
- Updated issues and findings (for planning and/or strategies).

Nevertheless, the question concerning the conception of the process remains: is it preferable (or even in some cases merely possible) to implement a formal detailed procedure or to rely on a soft and evolutionary process? The answer is not an easy one:

- In some cases, it appears efficient to look for formal procedures to guide the process (such as in the case of the Environmental Impact Assessment...),
- In other cases, it appears that, due to local circumstances, situations or actors' interactions and motivations, it is safer to move from a “statutory” process to a “soft” process (respecting advantages and disadvantages).

4.3. Critical success factors at different stages of the processes and “governance” of LTVs

Factors to take into consideration in the conception and the monitoring of the process in this LTV domain appear (in no particular order of importance):

- Existing state of institutions and actors and their relations,
- The need to be area/estuary oriented in the scope of the work,
- The capacity to cross governmental (local or national) layers, the need and value of formal decisions to be made by official bodies,
- The balance to be found between formal and informal process (and their impact on the possible loss of creativity),
- The capacity to ensure involvement of participants, the need to introduce formal stages in the process with intermediate validations,
- The production of syntheses and result,
- The responsibility of one actor or institution to “*hold the course*”, the central value – may be **the** central requirement – of a cross sectoral approach.

Case studies analysed tend to show that the success of an LTV through different examples provided in the case studies, can be based on several aspects detailed below.

4.3.1. The need for a strong initial political “sponsorship” for an LTV

There must be a strong statutory basis for these LTV exercises. The local, regional and national public authorities involved, with all appropriate forms of combinations when needed, should formally establish this basis - acting as the political legitimacy.

The compliance with European directives (Birds and Habitats Directives – but also the Water Framework Directive) appears to be a strong yardstick, which helps to legitimate the

launching of the process, and mobilise all interested parties. European directives therefore act as structural axes for the process of estuary long-term visions and management.

Nothing is possible at the estuary scale – considering their extremely complex structure involving economic, social and environmental dimensions, as well as the long-term issues, and long-term uncertainties - unless there is formal and clear governance system and/or processes adapted to the estuary issues, including different stakeholders. Naturally, the exact form of the participating of different stakeholders in this complex process has to be locally established, considering estuary situation and political context.

4.3.2. Critical success factors in LTV during the forecasting processes

Several critical success factors for long-term visions for estuaries have been identified throughout the four case studies, relating to several components or stages of the forecasting processes implemented:

Morphology as a common language: the key to solving issues is a common language, for instance for the word “morphology”. One of the tools used in order to achieve a successful planning process is to find a common language. In different estuaries, this language is “morphology”. “Morphological Dredging” is a key concept in the solutions for the Scheldt estuary; in Hamburg they call it “dredging with nature”. The use of these concepts indicates that shipping/dredgers/engineers and environmentalists often settle on common terms. For shipping, mastery of estuary morphology is critical. In this case, shippers must take into account water currents, water depth, shifting sediment, tidal waves, etc. All of these properties must be taken into account in order to pass through the estuary. From a more natural point of view, morphology is important because it covers the dynamics of mud flats and salt marshes (tides, accumulation and erosion), water currents, shifting sediment, etc.

In the Seine estuary long-term study, the **participation of all interested parties** (including those that - in a recent past – had shared strong operational or even judicial controversies), has created strong credibility for the work done, and for the value of major findings.

More generally, the capacity to **model an estuary as a system**, simplistic in its form, has enhanced the political process of estuary management. The benefits of a system model are: (a) to share factual understanding of the components and dynamics of the estuary, and (b) to be able to develop collective alternative possible futures for the estuaries, therefore enabling participants to identify the key issues for the future.

Furthermore, the Seine case study shows that drafting of **alternative scenarios**, in accordance to the four key strategic questions and of interest to the “stakeholders” involved, has helped to develop a sense of solidarity, at least a sense of shared interests.

Long-term strategic thinking may appear to be cumbersome or **time** consuming, but experience has shown that the time spent during these forecasting exercises ultimately saves time in the long-term, since they dramatically reduce the risk of subsequent conflicts and legal procedures.

4.3.3. The value of intermediate or final agreements

The general purpose of long-term visions for estuaries is to help to develop strategies and subsequently concrete development policies. Taken this into account, it is appropriate to highlight:

- **The value of a signed document** between participants (statement of findings, or statement of views, or principles for further policies or process); these types of tools leading to later public political types of pressure appears often more useful than very formal and legal one; they act as yardsticks against which actors can question other actors’ integrity: “*Do you respect what you have said and signed?*”;
- **The possibility of “intermediate” partial agreements**, which bypass the sometimes cumbersome political process may be useful, if they lead to concrete actions on specific issues act as a template for subsequent formal agreements.

4.3.4. The importance of a specific step of sharing of results of forecasting

The valorisation and investiture of the results of a forecasting study is an essential step, which should follow the end of the process, and enlarge the number of people and institutions that will share the issues and findings, as well as the vision. This stage will increase the potential for concrete use of the result by subsequent planning processes or political or private decisions.

4.4. The benefits of long-term estuary visions for sectoral management (nature protection, port activities, land uses ...)

4.4.1. LTV appears as a tool for widening individual scope and understanding, develop fruitful interchanges with other stakeholders

LTV is of critical value for improving mutual understanding and relations between stakeholders, which in many cases do not currently cooperate, or were formerly in conflict. Therefore LTV creates the potential for future forms of cooperation and prepares stakeholders for a smoother process of exchanges, cooperation or even common projects (for instance as in the rehabilitation program for environmental functions in the Seine estuary).

LTV appears as a tool for elaborating more meaningful comparisons of impacts, benefits, including natural or social dimensions (using “physical” indicators, in addition to merely economic ones), therefore improving further the capacity for dialogue and understanding amongst actors.

LTV may provide a platform for some actors to present their case and interests, which might otherwise (for various reasons including financial or technical inadequacies) be impossible.

LTV helps also to provide a framework for developing a forum and communication channels between “hard” sciences and “soft” sciences, therefore bridging the gap of understanding, and tools, between these two types of knowledge, both of which must be mobilized in order to understand complex estuary systems.

LTV therefore appears to be an essential component of an Integrated Coastal Zone Management (ICZM) process, by pushing all the actors to explore together alternative futures, in order to enlarge their common knowledge and exchange on the long-term estuary issues.

4.4.2. LTV as a tool for improving or better securing the context of individual activities or business

LTV appears to have positive and concrete consequences on several aspects central to the development of economic and other activities:

- It operates concretely as a way of reducing conflict,
- It is a way of securing the socio-economic context (increased certainty, enlarged security) for the development of individual (public or private) projects,
- It develops the capacity to elaborate “win-win” situations or perspectives (e.g. flood protection together with natural protection and improvement),
- It has the capacity to elaborate and document “cumulative effects” situations, feeding the development of “win-win” situations and projects, and reducing the potential of failure of projects for lack of global complex approach.

4.5. The contribution of long-term port and estuary visions to the main objectives of New! Delta

Level playing field

As different as culture, legal systems and transposition of the Birds and Habitats Directives in national law may be in the different European countries, only a comprehensive approach and a clear vision of the future can lead to an integrate coastal and estuarine zones management.

The implementation of long-term visions can strongly contribute to level the playing field in all estuaries by giving a secured approach of the future for nature protection and port efficiency and development including the general systems understanding, all actors' views and interests.

Practical guidance

Based on the experience of the four partner countries, New! Delta "long term port and estuary visions" provides guidance – and give concrete examples – on how to incorporate ecological dimensions and dynamics in an integral, multi-sector systems approach for long-term planning. It also shows practical ways to incorporate long-term uncertainties via scenarios building.

European partner network

The creation of a European partner network is not "long-term port and estuary visions" major contribution because its findings are based on different experiences that have no direct links one with the others. A first step was made by sharing case studies and beginning to know each other's practice and experience. Further steps should be implemented, like site visits, exchanges, workshops, to ensure a real cooperation on long-term vision at European level, and on concrete use of forecasting.

Information access

The comprehensive and integrated approach we promote in long-term visions requests the availability of scientific, economic and social information to be implemented. In that way, long-term port and estuary visions contribute to give information access to all kind of stakeholders at national and international level.

5. Conclusion and Recommendations

5.1. Central conclusion

It appears clearly from the work achieved, and throughout case studies, that the structuring time frame for the environmental protection of estuaries is definitely long-term (and even very long term):

- Ecological changes, many of which are in response to human activities and pressures, appear or have consequences and impacts (be they economic, social or environmental) in the long-term and affect the proper functioning of any given estuary,
- Infrastructure development operates on long-term time horizon, be they harbour, road transport, leisure, or more generally urban infrastructure,
- A wide variety of planning or strategic exercises are of middle to long-term nature: regional structure plans, local plans, nature protection strategies, harbour development projects, etc...

Therefore a key question as far as the future of estuary management and planning is concerned (and within it environmental protection and improvement) is the following: how to articulate all the major factors (social, economical, environmental, etc.) and their past and future trends, how to attract the participation and implicate all concerned actors, and how to develop formal relations between long-term estuary and individual strategies and/or projects?

Based on a thorough analysis of four cases studies concerning major European estuaries, the central finding of the New!-Delta long-term port and estuary vision can be summarized in the following:

“ It is in the common interest of all estuary actors to explore possible futures (of any given estuary) together, in order to help define a long-term estuary vision (political process and product), which takes into account all sectoral, local and global interests, as well as existing sectoral visions. “

In this long-term port and estuary vision (LTV) development, European regulations in the environmental protection, which concern estuaries (e.g. Birds and Habitats Directives, Water Framework Directive) will play an important role. They do provide a strong legal framework for environmental policies, pushing and helping countries to define policies supporting integrated coastal management. European regulations appears there as a strong expression of societal demands. They also help to provide guidance for resolutions among conflicting land uses arising from conflicting actors demands.

On the other hand, LTV, through some of its basic characteristics such as system approach, identification of alternative action plans, construction of scenarios describing alternative actors strategies, helps to better identify major issues at stake for nature protections over the long-term, and helps to ensure and to better comply with some European demands (Natura 2000 for instance).

In this perspective, and as defined above, long-term port and estuary vision, and within it in particular the management of future uncertainty in the planning process through techniques such as analysis/scenarios development, are clearly an integral part of the more global approach known as Integrated Coastal Zones Management (ICZM).

5.2. Recommendations and guidelines: a generic approach to LTVs and how to implement them

Based on the four cases studies, of their comparative analysis, and as a concrete consequence of the central conclusion above, a set of implementation recommendations can be made for the concrete implementation of LTV for estuaries:

- A LTV process can only be initiated with a political weight of a single “leading” and respected political authority. Examples appear clearly in case studies on the Seine estuary – where the Haute Normandie regional Prefect established the informal “*Conseil de l’estuaire*”- or in the ProSes case for the Scheldt where both the government of The Netherlands and the Flanders region started the process.
- It is important to clearly define from the start the general characteristics and components of the process (stages, programme, etc.), and to make clear that this process will probably need to be adapted (both in terms of detailed content and steps).
- It is likely that different actors (port authorities, nature protection agencies, local authorities, economic sectors ...) or stakeholders do develop (explicitly or not, publicly or not) their own personal long-term vision for an estuary. The analysis of case studies– and in particular the Seine estuary case study – shows that it is possible for all these actors to work together, through a global long-term exploration of possible futures. Through such a process, they can exchange their views and projects for the future and on this basis identify and agree collectively on major issues for the long-term development of the estuaries, including social, economic as well as environmental interests.
- It is usually better to develop an open, sequential process with a rather broad goal (rather than a closed process with detailed objectives). Doing so facilitates an exploratory process and results in a more fruitful exercise. Furthermore, some of the findings may be unexpected, as they rely upon a systemic approach concerning all its functions, and not simply transport and wildlife protection issues, but rather all socio-economic uses, and overall types and scopes of improvements, which could be made.
- As far as processes are concerned, the case studies analysed have shown that “open” types and “planned” type of approach do exist in the practice. It does not seem that there are oppositions between those two approaches. “Planned” types may be more appropriate for developing long term views for sectoral approaches (for instance economic sector approach), while “open” types are likely to be more appropriate for large multidimensional systemic analysis, and more adapted to the identification of long-term complex and shared vision among different actors.
- It should be stated from the start that there may well be intermediate results of LTV; “stakeholders” – whether they are economic actors or NGOs- must be aware that concrete decisions could well be taken on the basis of their analyses and findings, of which some may be submitted before the end of the process.
- It is up to each local actors, in each situation and each estuary, to define what should (and will) be the time frame of the long-term analysis; the vision could be generally established with a 25/30 years perspective, with possibilities of exploratory analysis at 100 years for some subjects ... or indeed at different other time horizons; the choice of the time horizon orientates the type of analysis, the nature and scope of the factors most involved, the type of issues that can be tackled as well as the approaches that can be used.
- The length of the LTV process, with its different stages (start, analysis, findings, and valorisation and potential decisions) could cover generally about two to three years (including final valorisation and dissemination of results and findings). There is no use to develop a longer process. On the other side, shorter process would not generally be fruitful, leaving not enough time for the collaborative process to establish between actors that do not have generally the opportunity to work together. Nevertheless, it can be argued that it might be possible in the future, with better governance and a systemic approach in European estuaries’ management, as well with progressively

better information of different actors and stakeholders, to implement a long-term visions process in less than two years.

- There is a clear need for updating the LTV regularly. This must be carefully analysed, especially during the final phase of the LTV process, and be decided on the basis of monitoring, and assessment by a management committee (which could be backed up by existing collaborative forum or inter authorities agency or program).

In doing so, long term analytical processes and the establishment of Long-Term Port and Estuary Vision will help to achieve and implement these five objectives :

- To produce common acceptable, generic and practically applicable methodologies,
- To develop transferable management models,
- To contribute to territorial planning,
- To provide practical examples and successful case studies,
- To raise public awareness.

5.3. Recommendations for further progress and works to be done

Finally, we also recommend further steps, which may be implemented in order to establish an ongoing working relationship relating to estuary management in Europe.

We suggest more detailed exchanges amongst participants, whether they are port managers and planners, local/regional planning authorities, people in charge of conceiving forecasting exercises, NGO's in nature protection, scientists, etc. This could occur through lengthier site visits, exchanges, workshops, etc. This would help to develop a European culture on the long term planning and management of European estuaries, taking concretely into account economic, social as well as environmental objectives.

ANNEXES

Annexe 1: Glossary (full text)

Annexe 2: Humber Estuary (full report)

Annexe 3: Rotterdam Port and Estuary (full report)

Annexe 4: Scheldt Estuary (full report)

Annexe 5: Seine Estuary (full report)

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