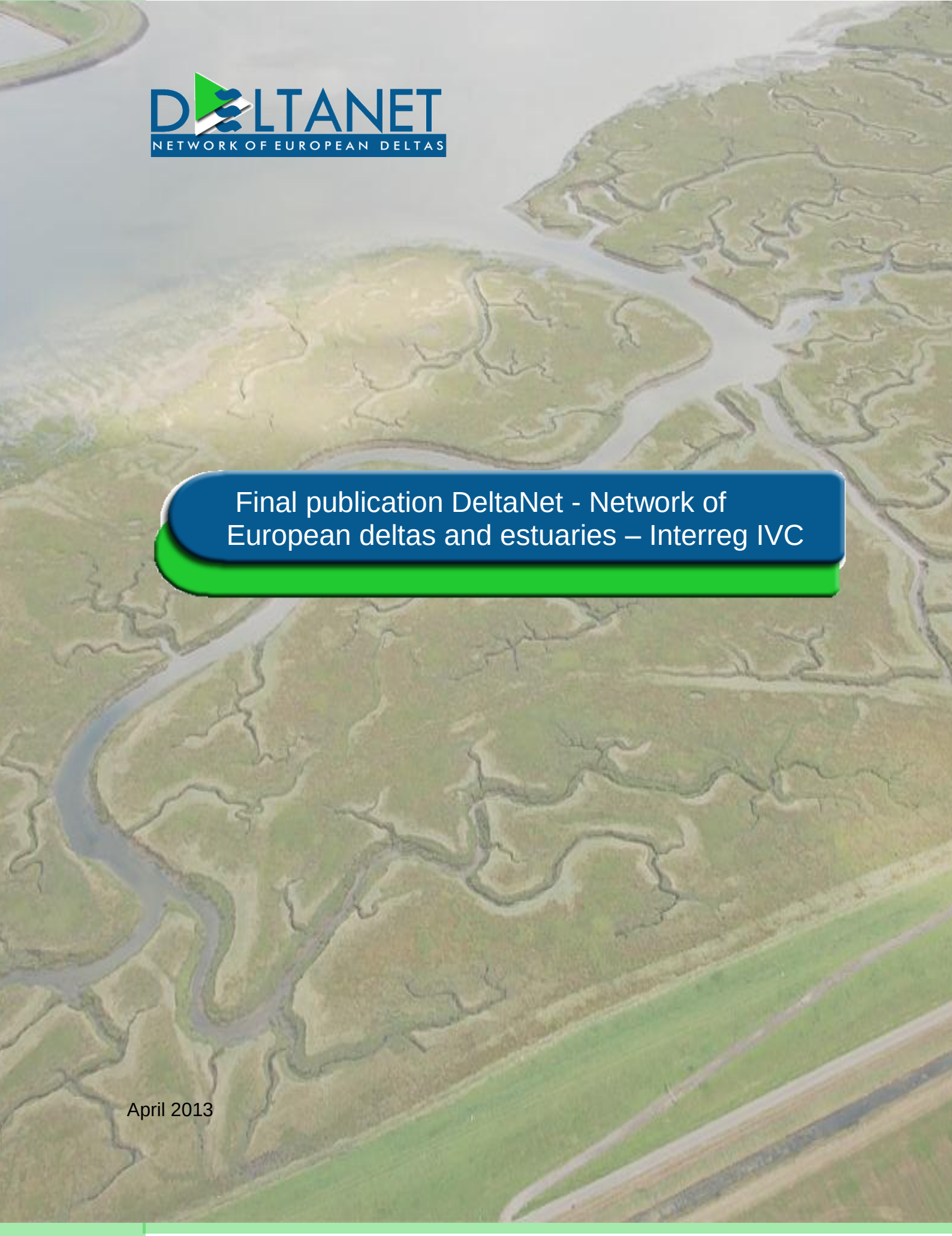


DELTANET
NETWORK OF EUROPEAN DELTAS

Final publication DeltaNet - Network of European deltas and estuaries – Interreg IVC

April 2013

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

European Union
European Regional Development Fund

Foreword

Dear friends of DeltaNet,

The DeltaNet partners are very pleased to present the final publication of the European INTERREG IVC project DeltaNet.

The eight partners started this interregional network on initiative of the meanwhile deceased Max Roksnoer, manager of the Rhine Scheldt Delta. After extensive preparation and meetings the project DeltaNet started in March 2010 and was finalised in May 2013.

Eight deltas and estuaries from seven EU member states decided to exchange experiences and improve the regional policy instruments, methods and approaches by joining in DeltaNet. The overall objective of DeltaNet is to improve the effectiveness of regional development in deltas and estuaries through interregional cooperation in the areas of environmental risk prevention, specifically through the development of appropriate coordinated spatial planning procedures in geographically sensitive areas. Sub objectives are to enable exchange on:

- Better integrated delta approach;
- Improved flood risk and sediment management;
- Improved environment;
- Higher delta awareness;
- Better coordinated delta policy;

For each of the above mentioned topics there were expert workshops and conferences in the different deltas.
It resulted in an overview of good practices, policy recommendations for the EU, deltas and estuaries in general and the specific deltas and estuaries involved. Through this publication DeltaNet informs you about its progress, achievements and developments in the deltas and estuaries.

Sincerely yours,

Geert Versnick
Member of the Provincial Executive of East Flanders – Belgium
Lead Partner DeltaNet

Contents

0. Executive Summary

A. Deltas and estuaries share joint issues

During the last decades, there has been a growing awareness of the existing problems in European deltas and estuaries. This has been gradually translated in the attempt to develop and implement integrated management plans to achieve the sustainability of these sensitive areas. The classical engineering approach is emerging as not being economically, environmentally and technically sustainable. Therefore, new tools, methodologies and policies based on novel ideas have to be developed to at least mitigate the current impacts and prevent further pressures that deltas and estuaries will face.

Therefore during 2010-2013 eight European deltas and estuaries cooperated in the learning and policy network DeltaNet, supported with INTERREG IVC Funding. The Rhine Scheldt Delta (Lead Partner), the Severn Estuary, the Elbe Estuary, the Vistula Delta, the Danube Delta, the Ebro Delta, the Minho Estuary and the Tagus Estuary exchanged in 17 international workshops and 5 international conferences similar characteristics, challenges and opportunities they face when dealing with the development and strategic management of their deltas and estuaries, such as:

1. Unbalanced delta approach: Competition between economic developments, e.g. for the ports and the specific ecological value of the delta and estuary areas.
2. Flood and sediment management: Deltas and estuaries are sensitive to flood risk from the sea and often face imbalanced sediment regimes.
3. Deteriorating environment: Habitats, wetlands and biodiversity are endangered due to intensive use of the deltas and estuaries.
4. Lack of delta awareness: The current regional policies often do not recognise sufficiently the specific characteristics of deltas and estuaries and there is a lack of clear communication and public participation.
5. Lack of sustainably coordinated delta policy: The current regional policies are often not recognising sufficiently the need for a coordinated approach. A coordinated policy helps to have a balanced and sustainable development of the delta or estuary.

The partners exchanged knowledge on these five challenges through five themes: 1) Integrated Delta Approach, 2) Flood & Sediment Management, 3) Environmental Healthy Deltas, 4) Delta awareness and 5) Sustainable Coordinated Delta Policy. For each theme the following activities were undertaken: 3 interregional workshops, 1 interregional conference, 1 good practice study, and for each involved partner a work plan.

The overarching challenge of today's deltas is to mitigate the risks of both anthropogenic and natural origins such as coastal erosion, rising sea level (Themes 2 & 3) in such a way that economic and environmental objectives are considered and balanced (Theme 1). Instruments to tackle this challenge are to be prepared to cope with the complexity of natural system and to mobilize all relevant stakeholders to advance in the coordinated fashion (Themes 4 & 5). Results of the project can also be found on the project website: http://www.deltanet-project.eu/.

Recommendation

1. Even though the deltas and estuaries each have their institutional, natural and cultural settings, they are having similar issues in dealing with sediment management, flood risk management, integrated policy, healthy and sustainable delta and estuary management and participatory planning. It is recommended that deltas and estuaries continue to learn from each other on how to manage most effectively and efficiently their delta or estuary.

2. Working together on current common challenges provides innovative insights in how to balance the different demands in regional policy and achieve improved policy instruments. Therefore it is recommended to create (and consolidate) national and international networks to improve the effectiveness of regional development policies in deltas and estuaries by exchanging experiences, improving policy instruments, optimising the current situation in their deltas and estuaries, developing common governance methodologies and tools, etc. Having politicians and policy makers involved is crucial for actual improvement and implementation.

B. Sediment management & wetlands

European deltas and estuaries are among the most severely degraded systems worldwide. Uncontrolled development, industry and tourism have destroyed and degraded near-shore habitats and assemblages and deeply modified coastal landscapes and seascapes. As a result, these systems are facing increasing human pressures. Simultaneously to the human impact, the associated irreversible alterations to the environment are also expected to grow.

Sediment Management important issue in deltas and estuaries

Sediment imbalances can cause coastal erosion, changes in the biodiversity, accumulation of contaminated sediment, decrease of storage capacities of dams and reservoirs (and in turn, lower their effectiveness in flood control) and difficult conditions for ports and navigation.

The effects of sediment retention are apparent not only downstream but also pose serious challenges upstream. The sediment retention decreases the storage capacity of dams, thus, diminishing their flood protection capabilities. It is important to stress, that sediment imbalances and contamination are caused by activities all along the whole river basin. Therefore cooperation among all stakeholders is necessary to achieve tangible results.

As sediment management often is a costly process, a visionary approach for the Elbe shows opportunities to find a balance with economic and societal benefits. The possible synergies between the management of sediment imbalances and other environmental objectives should be pursued.

Recommendations

General recommendations on sediment management

3. It is recommended not to view the sediment imbalance as an issue isolated to deltas and estuaries. It requires wider involvement and cooperation among all key actors along the river basins, especially with operators of water reservoirs and main pollution sources.
4. Moreover, given the impact of sediment imbalance to the evolution of deltas and estuaries, sediment management plans should be implemented. As the sediment management is a costly process, it should be balanced with possible economic and societal benefits.
5. It is recommended to define general and specific management plans where flood risk and sediment management actions should be coordinated. In most of the cases the sediment imbalances are leading to an increase of flood risks or coastal retreat because of sea level rise, the gradual compaction of the land (subsidence) and the effect of retention of sediments that are disrupting the fragile equilibrium of deltas and estuaries.

Recommendations on sediment deficit and sediment aggradation

6. Restore (as much as possible) the natural continuum of the fluvial system. It is suggested to do this through designing new water and sediment fluvial regimes from reservoirs, where periodical pulses (spates) have to be contemplated.
7. Restore the lateral connectivity between the river and the delta and estuary plains by means of the elimination or permeabilisation of embankments or artificial levees. The creation of strategic flooding areas along the rivers, delta and estuary plains will allow a better balanced development.

Recommendations on sediment contamination

8. Reduce water and sediment contamination in rivers, deltas and estuaries by means of the elaboration of general plans to minimize local pollution and diffuse its sources.
9. Monitoring programs could be implemented to improve the knowledge on the pollution status.

Recommendations on flooding risks

10. Implement new techniques such as restoration of delta and estuary wetlands; increase river lateral connectivity and creation of special flooding areas, in accordance to an integrated delta approach management.
11. Avoid, as much as possible, the construction of new hydraulic infrastructures which could aggravate the fragile equilibrium of these systems.
12. Prevent damage caused by floods by avoiding construction of houses and industries in present and future flood-prone areas; by adapting future developments to the risk of flooding; and by promoting appropriate land-use, agricultural and forestry practices.

Environmental Healthy Deltas

Land reclamation for urban, industrial and agricultural purposes significantly decreased the amount of natural estuarine environments such as mud flats, wetlands, salt marshes, etc. and resulted in a reduced environmental diversity. Their functions extend far beyond providing habitats for various species to include protection from floods and trapping pollutants, and, thus, are of great importance for the local population of deltas and estuaries.

Restoring abandoned man-made polders and adding more area to estuarine environment not only provides ecological benefits but also helps to mitigate flood risks and can have net positive economic impacts. The potential of such programs depend on the degree of urbanization and the property regime in a delta or estuary (i.e. private land vs. public land) which might require additional financial resources, political willingness and support or cross-border cooperation.

In addition, the restoration of wetlands impacts local communities by overhauling traditional economic activities. Thus, land rehabilitation programmes should also include help for local population to take advantage of new economic activities in their region.

Recommendations

13. It is recommended to reconcile the restoration of wetlands, which play an important ecological role, with economic and social goals such as improved flood risk mitigation, increased fish yield and improved tourism routes. The Danube Delta showed that land rehabilitation programmes can be a win-win solution. Yet, it must be recognized that various deltas and estuaries are affected by the urbanization and industrialization at different degrees. The local economic realities and political situation must be taken into account as they pose serious constraints for any rehabilitation programme.

14. The deltas and estuaries need to develop a common methodology and tools to influence local and national politicians, to create effective communication venues to reconcile numerous conflicting goals and visions and effectively communicate with the local population.

C. Tools for achieving a balanced development in deltas and estuaries

To promote a balanced approach in delta and estuary planning and management for the development of a sustainable, competitive and integrated area it is necessary to address two main issues: ensure an integrated land use planning and management of the delta or estuary and create a balance of economic activities – e.g. port activities and industrial activities –, urban land use, nature protection including biodiversity and nature conservation resources, and recreational and leisure activities that take place in the delta or estuary. The participation of all citizens and interested entities in these plans and solutions' is crucial to ensure that plans, projects and solutions' succeed.

Integrated Approach useful for balanced development

For a long time, deltas and estuaries were adapted to human needs without taking into consideration the side effects of such developments. Great accomplishments which enabled better socio-economic development were often followed by negative environmental consequences. Today one strives for having an integrated approach in which both economic development and nature and its resources are protected.

The need for a more environmentally conscious development is also implied by climatic uncertainties. Because of global warming and rising sea levels today's defence structures are not effective enough to mitigate the risks. Either hydro-structures should be designed and constructed or more resilient measures such as the restoration of wetlands and floodplains should be considered, or both.

The integrated approach can be ensured by adopting long term strategies and by setting up appropriate governing mechanisms and it can take either statutory or non-statutory forms. In general, the integrated approach should be based on a holistic perspective, promote a system's view and communication between stakeholders.

Recommendations

15. An integrated approach in planning and managing deltas and estuaries is needed to ensure a good balance between socio-economic and environmental interests. Having an integrated approach in long term visions and short term visions should both be stimulated.
16. It is recommended to start always with a cause and effect analysis to map out main challenges. Secondly, by identifying the actual challenges, one helps defining the solutions that are actually mastering these challenges or softening the effects. Thirdly it is recommended to inspect which of them are the most effective, meaning how many causes/effects a certain measure is mitigating. Finally, combine the most cost-effective set. By involving the stakeholders in this exercise an agreement between stakeholders and planning authorities can be stimulated and ensured.
17. Ensuring an integrated approach can be done in several ways: through a vision, action plans, actual projects and/or through working groups. It is recommended to find a way which suits the individual needs and characteristics of a delta or estuary.
18. Ensure that developing a vision or plan is not just part of an exercise. Too often plans/vision are being developed without being thoroughly implemented. Monitoring its implementation and ensuring commitment is equally important as developing the plan. This can be done e.g. by establishing working groups, business plans and/or a treaty.

Awareness - Participatory planning needed for balanced development

Management authorities responsible for the development of deltas and estuaries need to consult with all relevant parties to gain support for the proposed actions, and to ensure a democratic and transparent management. Participatory planning helps to raise public awareness, collects local knowledge and decreases pressure for unsustainable solutions. Finally, it contributes to building the identity of deltas and estuaries.
The benefits provided by the participatory planning come at a certain expense. Deltas and estuaries should be aware of the time needed for proper consultations and be prepared to advance to the next stage according the timelines, develop an efficient consultation mechanism which would allow avoiding deadlocks and committing to actions based on the findings.

Recommendations

19. It is recommended to ensure participatory planning in deltas and estuaries. Participatory planning helps to raise public awareness, collects local knowledge and increases pressure for sustainable solutions.
20. It is suggested that stakeholders further discuss and construct cooperative (innovative) ways for achieving the challenges of sustainable development of the deltas and estuaries and in this way deal, adapt and comply with EU Directives that relate to environmental concerns, and that simultaneously allow for economic progress among rural dwellers and small entrepreneurs in an era of economic crisis and governmental budget cuts.
21. It is recommended to have cross border coordination for estuary wide management.
22. Implement European Directives in a coordinated and mutually benefitting manner.
23. It is recommended to develop further representative and coordinated stakeholder platforms.

EU Directives useful but ensure coordination

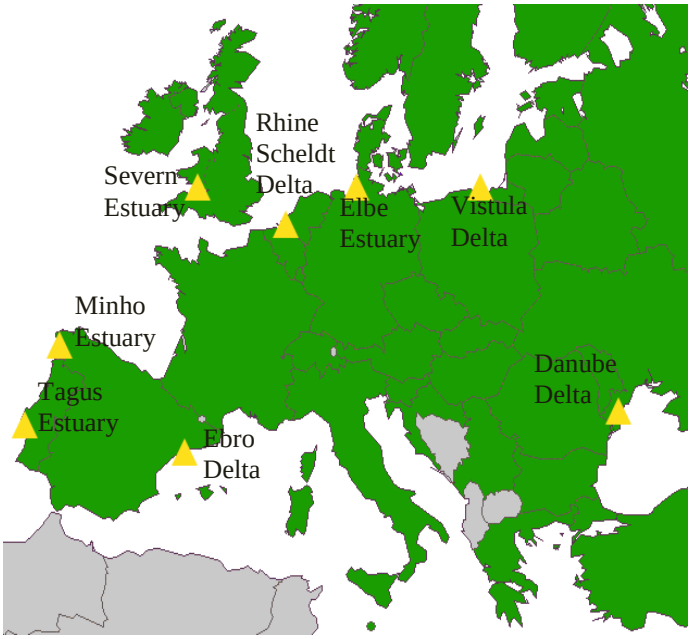
The European Directives such as the Habitats, Birds, Water Framework or Flood Directive contributed to the awareness of existing environmental issues in European deltas and estuaries and placed environmental concerns in the political agendas of the EU member states. Since the EU directives are focused on the environmental protection, member states have to find the balance between environmental and economic needs for an integrated approach.
Deltas and estuaries are challenged to implement sometimes conflicting EU directives, solve coordination issues and find a balance between social and economic development and nature conservation.
The implementation of the EU directives is facing challenges such as sectorial approaches or slow implementation. As a result, there is a need to mobilise all relevant stakeholders to exchange their visions and gain their support for the future actions. Otherwise unwanted, constraints to other activities and/or regulations might occur, as happened in the Danube Delta.

Recommendations

24. It is recommended to have a coordinated approach towards EU Directives to ensure a coherent implementation and minimise conflicting interests.
25. Furthermore it is recommended that the EU Directives become part of an integrative and participatory planning (e.g. territorial development) as early as possible.
26. River basins extending different administrative areas or states urge the cooperation of the involved national and international agencies to define the management plans.

DeltaNet is innovative:
. It is an unique partnership in Europe, established for the first time.
. Dealing with similar sensitive areas in Europe.
. DeltaNet's approach focuses on influencing governance through best practices from various points of view.

1. The DeltaNet Project



The European deltas and estuaries are geographically sensitive areas sharing many similar characteristics, problems and challenges. The deltas and estuaries are faced with a dynamic development and are often characterized by both concentration of population and economic activities, and natural and cultural heritage values. The many spatial and economic demands often threaten a sustainable development. Deltas and estuaries are becoming a kind of laboratory where different stakeholders, regions and countries are working together to achieve a sustainable spatial, economic and social development.

This is why eight deltas and estuaries exchanged in the INTERREG IVC DeltaNet project (2010-2013) knowledge and best practices on spatial planning measures in these geographically sensitive areas. They exchanged experience on 5 successive sub-themes that are relevant for the development of deltas and estuaries: 1) Integrated Delta approach, 2) Flood & sediment management, 3) Environmental Healthy Deltas, 4) Delta awareness and 5) Sustainable Coordinated Delta Policy.

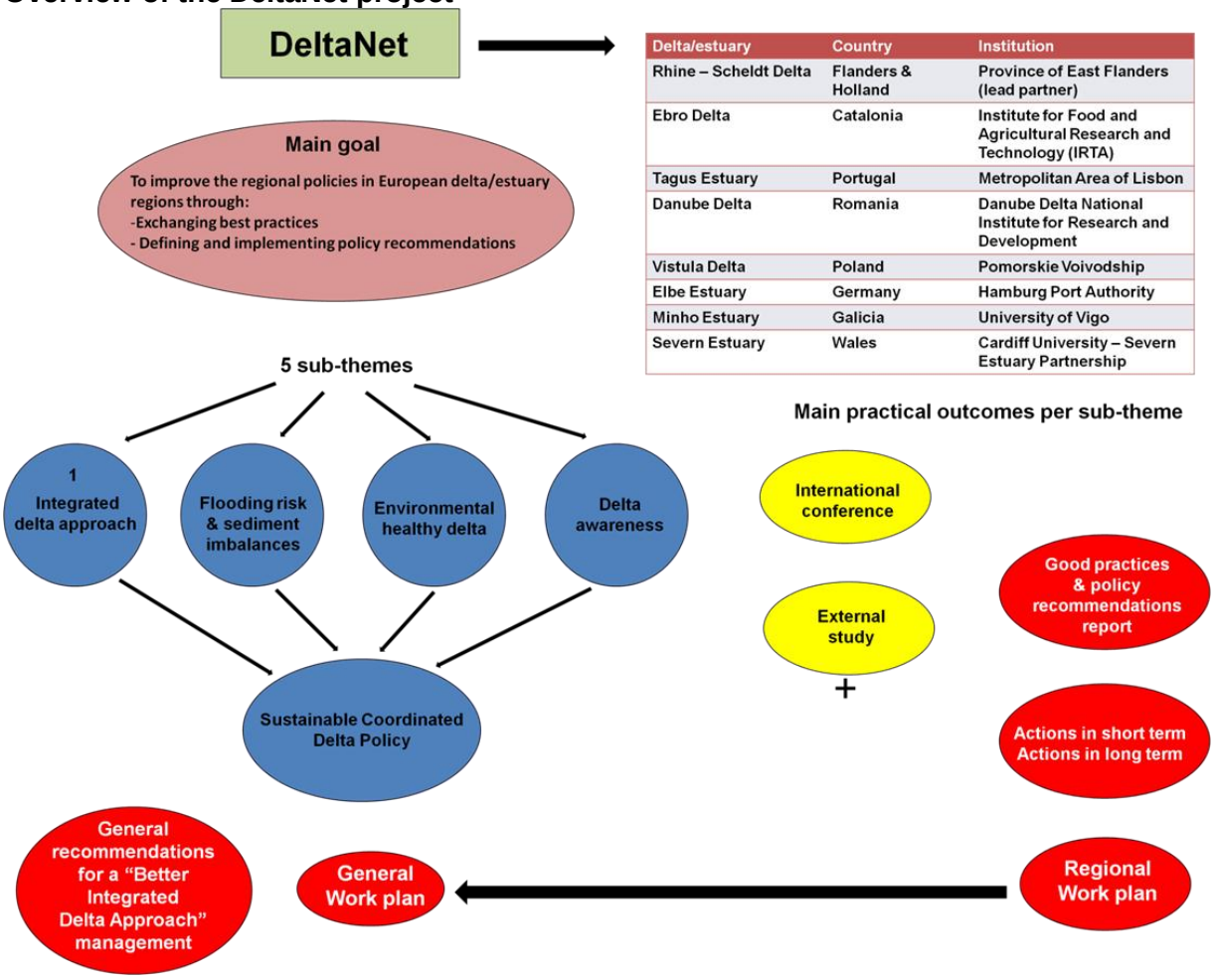
The deltas and estuaries involved are : the Rhine Scheldt Delta (Lead Partner), the Severn Estuary, the Elbe Estuary, the Vistula Delta, the Danube Delta, the Ebro Delta, the Minho Estuary and the Tagus Estuary.

The objectives of DeltaNet are:
1) To develop an improved European, national and regional policy agenda for the sustainable management of deltas and estuaries.
2) To increase the competitive position of deltas and estuaries.
3) Better delta and estuary policy will help them to develop clear visions with a clear focus that can attract economic and innovative developments.
4) To create a sustainable network that will enable the deltas and estuaries to cooperate and stimulate each other where possible and develop together innovative approaches.
5) Compare methodologies and tools which allow partners to develop appropriate methodologies reflecting the specific circumstances of their delta or estuary.

Some facts on DeltaNet:
8 Partners from whole EU
17 interregional workshops held on 5 themes
5 thematic international conferences held
27 work plans developed by the partners
15 people with increased knowledge on Deltas and estuaries
7 good practices identified and shared

The project is co-financed by the Interregional Cooperation Programme INTERREG IVC. The INTERREG IVC programme helps regions within Europe working together to share experience and good practice in the areas of innovation, knowledge economy, environment and risk prevention. This allows a wealth of knowledge and potential solutions for regional policymakers (www.interreg4c.eu).

Overview of the DeltaNet project



Delta/estuary	Country	Institution
Rhine – Scheldt Delta	Flanders & Holland	Province of East Flanders (lead partner)
Ebro Delta	Catalonia	Institute for Food and Agricultural Research and Technology (IRTA)
Tagus Estuary	Portugal	Metropolitan Area of Lisbon
Danube Delta	Romania	Danube Delta National Institute for Research and Development
Vistula Delta	Poland	Pomorskie Voivodship
Elbe Estuary	Germany	Hamburg Port Authority
Minho Estuary	Galicia	University of Vigo
Severn Estuary	Wales	Cardiff University – Severn Estuary Partnership

This final publication

This final report summarises the results of the whole DeltaNet project. The document is meant for policy makers, the involved partner regions, interested other regions and all stakeholders interested in the commonalities in deltas and estuaries. Therefore the next chapter describes the similarities, followed by a chapter which describes how deltas and estuaries deal with sediment management and wetland restoration. The report continues with tools for achieving a balanced development of the deltas and estuaries such as integrated approach, participatory approach and the EU directives. In each section the joint observations and main results are described, together with a good practice and recommendations. References are made to the deliverables of the DeltaNet project which can be found at http://www.deltanet-project.eu/deltanet-project.

2. Deltas and estuaries have similar issues

Joint observations of deltas and estuaries in Europe

Deltas and estuaries share some similar characteristics, challenges and opportunities. Often these regions are described by the complex overlapping of socio-economic and natural domains. Dynamic processes of urbanization, economic activities and infrastructure unfold and intertwine with the fragile needs of unique eco-systems. External factors such as global warming and its related risks as well as EU directives of to accommodate environmental needs should be taken into account. Thus, the DeltaNet partners have to find a balance between ecological values and urban and economic activities on a daily basis. However, most current regional development policies and practices have difficulties in dealing with such complexity.

Despite the unique challenges of deltas and estuaries, they are not perceived as an independent entity. Consequently, in addition to the problems arising from conflicting activities in the area, deltas and estuaries should develop a set of tools for sustainable delta management. Therefore, a well-established and adequate involvement of local and national policy makers to advocate an integrated approach is an indispensable prerequisite. Furthermore, a wide scope of stakeholders involved or dependent on the economic activities in the deltas and estuaries call for innovative ideas to gain support and insight for the sustainable delta management policies.

Common problems in deltas and estuaries: “We are not alone”

- Unbalanced delta/estuary approach: Competition between economic developments, e.g. for the ports and the specific ecological value of the delta and estuaries.
- Flood and sediment management: Deltas and estuaries are sensitive to flood risk from the sea and often face imbalanced sediment regimes.
- Deteriorating environment: Habitats, wetlands and biodiversity are endangered due to intensive use of the deltas and estuaries.
- Lack of delta/estuary awareness: The current regional policies often do not recognise sufficiently the specific characteristics of deltas and estuaries and there is a lack of clear communication and public participation.
- Lack of sustainably coordinated delta policy: The current regional policies are often not recognising sufficiently the need for a coordinated approach. A coordinated policy is needed to have a balanced and sustainable development of the delta or estuary.

Vistula Delta

Tagus Estuary

Main results – Description

In the DeltaNet project, the eight partners concentrated on five of the most common and characteristic challenges which are shared among deltas and estuaries. The main issues include competition between the highly important economic developments and the specific ecologic concerns of the deltas and estuaries. Examples are flood risk, sediment imbalance management, deteriorating biosphere, the lack of status as an independent entity, and, finally, the lack of a coordinated approach (Project Application Form, page 13).

Though deltas and estuaries might be situated and operating in different institutional contexts, geographical areas and climatic conditions, their experience still can be shared across the network. Deltas and estuaries can be either a densely populated area with large ports in combination with natural and/or agricultural areas (Rhine Scheldt Delta, Vistula Delta, Tagus Estuary, Severn Estuary, Elbe Estuary) or, important natural or agricultural areas since the soil there is very fertile or has important natural value (Danube Delta, Ebro Delta, Minho Estuary). In both cases economic activities conflict with the ecological concerns. The knowledge of how to reconcile these two activities, to gain a support from local stakeholders and to not sacrifice socio-economic development is of great interest for all members.

Similarly, although the DeltaNet regions have different institutional arrangements, experiences were useful to be shared. For instance, the example of cross-border cooperation at the highest political level in the Rhine Scheldt Delta is useful for other deltas and estuaries facing a similar situation (such as for the Minho Estuary which is also a cross-border area).

In addition, DeltaNet partners could learn from their experience of implementing EU directives into national and regional legislation since all of them are situated in EU member states.

Summarizing the outcomes of the DeltaNet project – the results of workshops and conferences – a common challenge for all delta regions in the development of sustainable management practices can be formulated:

The overarching challenge of today's deltas and estuaries is to mitigate the risks of both anthropogenic and natural origins such as coastal erosion, and the rising sea level (Themes 2 & 3) in such a way that economic and environmental objectives are considered and balanced (Theme 1). Instrumental to this challenge is the willingness to cope with the complexity of the natural system and the timely coordinated mobilization of all relevant stakeholders (Themes 4 & 5).

In other words, the DeltaNet partners have to deal with both the content (i.e. deteriorating environment, balancing the needs of economy and environment (integrated approach)) as well as the management process (participatory management, awareness, coordinated approach).

Recommendation

1. Even though the deltas and estuaries each have their institutional, natural and cultural settings, they are having quite similar issues in dealing with sediment management, flood risk management, integrated policy, healthy and sustainable delta and estuary management and participatory planning. It is recommended to deltas and estuaries to continue to learn from each other on how to manage most effectively and efficiently their delta or estuary.

2. Working together on current common challenges provides innovative insights in how to balance the different demands in regional policy and achieve improved policy instruments. Therefore it is recommended to create (and consolidate) national and international networks to improve the effectiveness of regional development policies in deltas and estuaries by exchanging experiences, improving policy instruments, optimising the current situation in their deltas and estuaries, developing common governance methodologies and tools, etc. Having politicians and policy makers involved is crucial for actual improvement and implementation.

Rhine Scheldt Delta

3. Sediment management & wetlands

European deltas and estuaries are among the most severely degraded systems worldwide. Uncontrolled development, industry and tourism have destroyed and degraded near-shore habitats and assemblages and deeply modified coastal landscapes and seascapes. As a result, these systems are facing increasing human pressures. As human impacts increase, irreversible alterations to the environment are also expected to grow. Thus, the need to understand the contributing factors that cause changes in these environments is essential in order to design appropriate interventions to capture and minimize negative impacts.

3.1. Sediment imbalances in deltas and estuaries

Joint observations of deltas and estuaries in Europe

Deltas and estuaries are sedimentary bodies formed by continuous interaction between fluvial and marine sediments. As such, dynamics of sediment transportation play a pivotal role in the evolution of deltas and estuaries. However, the natural dynamic and sediment balance has been altered by anthropogenic activities in river basins both downstream and upstream. A wide range of activities including but not limited to agriculture, dam construction, mineral mining interferes with the natural river flow and affects sediment loads transported downstream.

Inevitably, dynamics of sediment transportation in the DeltaNet regions are also affected by economic, social and urban developments in their river basins. All partners are faced with common challenges to mitigate the negative effects of sediment imbalances; they manifest themselves in different ways at each delta and estuary. The respective measures are based on the geomorphological idiosyncrasies, and the level and characteristics of industrial, agricultural and hydropower activities. For example, the sediment retention poses the highest risk to the deltas of the Danube, the Ebro and the Vistula, while the sediment aggradation is a more important issue in the Elbe, Vistula and the Minho Estuaries. Therefore, while all DeltaNet partners are faced with the same challenge, namely, sediment imbalances, it affects regions in different ways and it is neither viable neither recommended to develop a single set of good practices in managing and mitigating sediment imbalances. It rather calls for a number of recommendations for different situations based on the best performing regions.

Although the sediment imbalance causes many challenges for all deltas and estuaries, not all of them have adopted sediment management plans which deal with the sediment retention, aggradation and contamination in the same way. Moreover, in case of the Minho Estuary, the pro-active approach is lacking in studying characteristics of sediment retention and risk assessment of contaminated sediments for better informed decisions as well as sediment management (stopped dredging activities complicating navigation). However, it is important to stress that, since sediment imbalances are caused by activities along whole river basins, cooperation among all stakeholders is necessary to achieve tangible results. Furthermore, the effects of sediment retention are apparent not only downstream but also pose serious challenges upstream. The sediment retention decreases the storage capacity of dams, therefore diminishing their flood protection capabilities.

Ebro Delta

Main results - Description

There are several challenges related to sediment imbalances resulting from activities in the whole river basin. First of all, sediment retention in reservoirs decreases the amount of sediments transported down the river into the deltas and estuaries. For example, sediment retention in reservoirs results in 99 % lower sediment yield in the Ebro Delta. Consequently, there is delta regression and coastal erosion with 45 % of the delta at risk of being below sea level in the next 80 years[1]. Moreover, as water is released below the dam, the composition of biological communities has changed – the proliferation of macrophytes complicated navigation in the river and colonization of certain insects' generated discomfort for the local population and tourists[2].

In contrast, the Elbe Estuary, and the Hamburg port in particular, has to deal with sediment aggradation in the estuary caused by so called tidal pumps of marine sediments which are not properly counteracted with the river flow since it has been decreased by the dams in the upstream. Sediment aggradation complicates the navigation in the river and requires constant dredging operations. Also in the Minho and Vistula Estuaries there is sediment aggradation.

Common challenges shared between the deltas and estuaries in Europe[3]:
1. The effects of sediment flow and sedimentation in the river channel (Ebro Delta, Danube Delta, Elbe Estuary, Minho Estuary, and Vistula Delta).
2. The need for a joint decision making mechanism to deal with relevant information on sedimentation processes as well as eventual flooding risks (Minho Estuary).
3. The interaction of hydroelectric interests with natural processes of the delta or estuary system (Minho Estuary).

Finally, fluvial sediments contain contaminants and pose risks to several DeltaNet partners including the Elbe Estuary and Ebro Delta. Sediment contamination results from the agricultural and industrial activities and originates from rural areas through erosion of soil, air emissions,

[1] Conference Report "Impacts of Global Change on Deltas, Estuaries and Coastal Lagoons", page 15.
[2] Conference Report "Healthy Delta Environment", page 18.
[3] Source: Work Plan – Theme 2 Severn Estuary, page 3.

water treatment plants, mining activities, leaching landfills, etc. Sediment contamination poses risk to the biodiversity of river communities and health hazards for other species situated on the higher trophic nets[4]. Because of historical contamination, it is not sufficient to control the current level of river contamination, but it is necessary to treat already trapped hazardous contaminants.

The sediment retention in reservoirs is among the top challenges in the Danube Delta, Ebro Delta and Vistula Delta[5]. The retention causes coastal erosion, changes in the biodiversity below reservoirs, the accumulation of contaminated sediment and the decrease of storage capacities of dams, and in turn, lowers their effectiveness in flood control. As it turns out, the negative consequences of the sediment retention in the reservoirs are not reserved only to the deltas and estuaries but it also affects parts of the river which are more upstream (for example Iron Gate system is 864 km up the Danube mouth). This implies that it is not constrained to the deltas and estuaries but requires the involvement of actors along the river basin and better planning of new hydro structures. Feasibility studies should take into account the effect of sediment retention and strategies for its mitigation. This might be complicated to achieve given the fact that river basins cross numerous regional and national borders. However, as an example from the Ebro Delta demonstrates, it is possible to achieve cooperation with dam owners. The Ebro Water Authorities together with the reservoir management companies performed a number of controlled floods which helped to temporarily limit the proliferation of macrophytes. Nevertheless, it is agreed to develop a sediment management plant which would restore the sediment flux[6]. On the other hand, the Danube and Vistula are not involved in any activities to manage the sediment storage in reservoirs[7].

The accumulation of sediments causes serious problems for the Elbe Estuary, Vistula Delta and Minho Estuary. It creates difficult conditions for navigation and often calls for expensive dredging activities. In case of the Minho, dredging operations were halted after transferring them to Spain because they were deemed too expensive. Besides construction of sediment traps and intertidal areas, deltas and estuaries will continue dredging activities in order to keep the rivers navigable. Adaptation tactics applied in the Minho, where a ferry navigates during tides, cannot be applied in, for example, Hamburg which is the second largest port in Europe. Although the sediment aggradation is also a result of anthropogenic activities interfering with the river flow, the effects accumulate only to deltas and estuaries and thus they will have to initiate the development and implementation of mitigating measures.

Sediment contamination caused by mining and other industrial activities, agriculture and municipal and waste water dumping are considered to be among the biggest risks in the Ebro Delta and Elbe Estuary. The treatment of trapped contaminants is necessary to preserve favourable conditions for biodiversity and prevent health hazards. As the pollutants originate throughout the whole catchment area, concerted actions to eliminate the sources of contamination are needed from all stakeholders. Secondly, water reservoirs together with sediments retain contaminants, thus, enough efforts should be devoted to this issue (for instance, the Flix reservoir in the Ebro Delta). Finally, removing seriously contaminated sediments by dredging should follow strict security protocols. In the field of treatment of

[4] Theme 2. Good practices and recommendations, October 11, page 8 – 9.
[5] Theme 2. Good practices and recommendations, October 11, page 2.
[6] Conference Report “Healthy Delta Environment”, page 19.
[7] Theme 2. Good practices and recommendations, October 11, page 36.

contaminated sediments, the port of Hamburg and the Ebro Delta has accumulated invaluable experience of (contaminated) sediment management. See the text box below for the example of good practice.

To summarize, the sediment imbalance cannot be viewed as an issue isolated to deltas and estuaries and thus require wider involvement and cooperation among all key actors across in river basins, especially with operators of water reservoirs and main pollution sources. The lack of such cooperation might in part explain the situation in the Minho Estuary where joint decision making mechanisms are absent. Moreover, given the impact of sediment imbalance to the evolution of deltas and estuaries, the DeltaNet partners should prepare and implement sediment management plans which focus on the reservoir retention and management of contaminated sediments[8]. Though the sediment management is a costly process, the example of the Ebro Delta shows how to balance it with the economic and societal benefits.

Table 1 Overview of sediment imbalances in deltas and estuaries

	Main Problems	Sediment imbalance?
DANUBE	- Sediment retention in reservoirs - Coastal erosion with exceptions - Maintenance of Navigation Channels Subsidence - Flooding Risk	**Yes, Deficit & some Excess.** General regression (between 20 and 30 m/year) although there are places where sedimentary budget is still in equilibrium. Chilia and Sfantul Gheorghe arms have sediment accumulation.
EBRO	- Sediment retention in reservoirs - Delta regression (Coastal erosion) - Macrophytes proliferation - Subsidence - Sediment pollution - Flooding Risk	**Yes, Deficit.** General regression caused by subsidence and SLR, although aggradation in the El Fangar and Els Alfacs spits and Els Eucaliptus beach is observed.
ELBE	- Strong sedimentation in the upper estuary (Tidal pumping) - Increased dredging necessities - Contamination of sediments - Flooding Risk	**Yes, Excess (upper) & Deficit (mouth).** Sediment accumulation in the upper estuary; coastal erosion; relocation of sediments
MINHO	- Sediment retention in reservoirs - Sediment aggradation in the estuary (Tidal sedimentation Banks) - Flooding Risk	**Yes, Excess.** Sediment accumulation in some areas of the estuary
VISTULA	- Sediment aggradation in the estuary - Chemical pollution of sediment in the upper part of the river. - Flooding Risk	**Yes, Excess & Deficit.** Sediment accumulation in the river mouth
SEVERN	- Sediment pollution - Flooding Risk	**No**

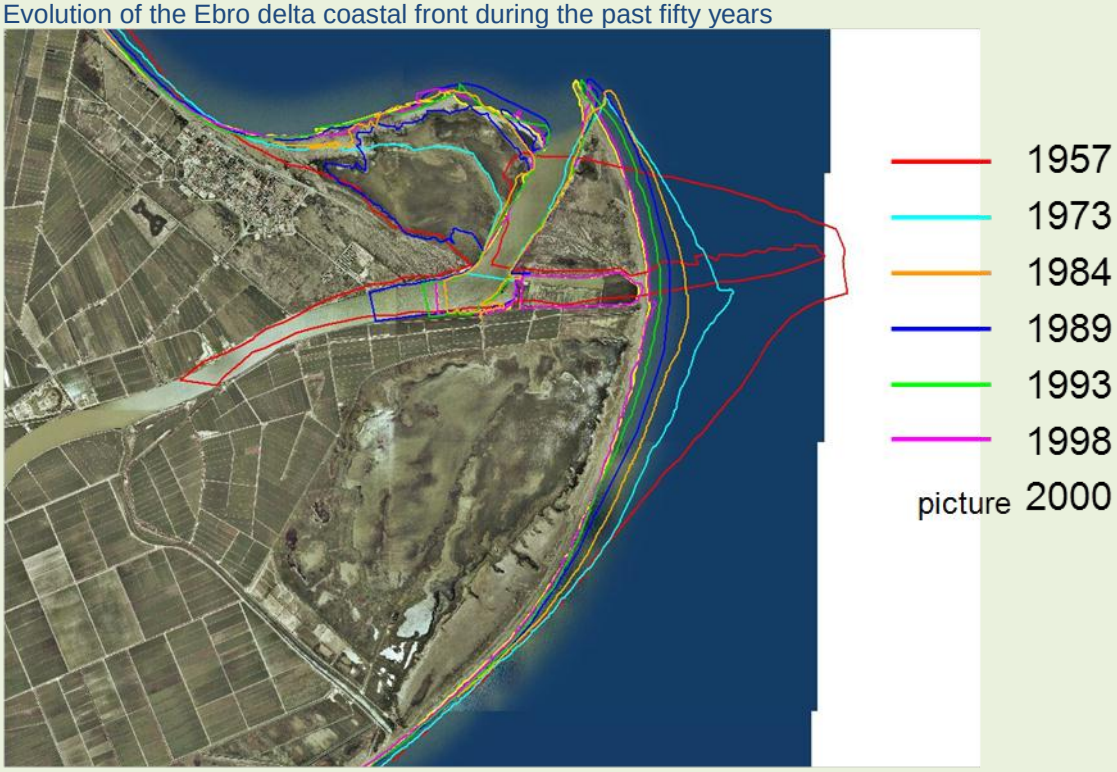
Source: Sediment Imbalances and Flood Risk in European Deltas and Estuaries, page 4

The good practice on sediment management in the Ebro Delta is described in more detail below.

[8] Theme 2. Good practices and recommendations, October 11, page 32.

Good Practice: Sediment Management in the Ebro Delta[9]

Evolution of the Ebro delta coastal front during the past fifty years



During the last century the total sediment load transferred from the Lower Ebro River to the Mediterranean Sea has been drastically reduced with 99%, because of the construction of the Mequinensa-Riba-Roja-Fix system of dams during the sixties. The sediment disruption is causing the progressive degradation of the fluviodeltaic system (see picture).

In this context, a sediment management plan for the lower Ebro River and delta is being developed by the IRTA on behalf of the Catalan Water Agency (ACA), in order to: 1) Restore the sediment continuity of the fluvial system by means of a new concept of reservoir management; 2) Minimize the sediment imbalance within the lower Ebro River; 3) Stop the coastal retreat of the river mouth area; and 4) Offset the elevation loss due to sea level rise and delta plain subsidence.

The SedMa plan mainly consists in the restoration of the sediment flux of the lower Ebro River by means of both the removal of the sediment trapped behind the dams, and the effective transport of the by-passed sediment to the river mouth and delta plain.

Three major elements constitute the framework of the management plan: 1) The application of some kind of technology to remove and by-pass the sediment stored in the dams; 2) The definition of a specific flow regime to transport the sediment from the river to the delta, including periodical pulses (floods) that are vital for its ecological and physical maintenance; and 3) The establishment of a controlled system to deliver part of the sediment to the delta plain. The present plan is firstly focused on the removal of the sediment stored in the Riba-Roja reservoir. The mitigation of the riverbed erosion (channel incision) of the Ebro River, as well as the by-passing of sediments trapped in the Mequinensa dam are also included, although at this stage of the plan the methods, operation (any project or action carried out by the final beneficiaries of INTERREG IVC) rules and management viability have not been analysed yet in detail. In addition, a set of complementary measures such as wetland restoration are also analysed.

Altogether, the SedMA Plan depends on both the sediment quality and quantity and the agreement with

[9] http://interreg4c.eu/ficheGoodpractices.html?id=302.

the Hydropower Company to remobilize the sediment trapped into the reservoirs. Furthermore, the SedMa Plan has to be approved by the Confederación Hidrográfica del Ebro (CHE).
The SedMa Plan can be considered a successful example of an integrated approach (cross-sectoral approach, in which projects are linked to different programme subthemes, even though they have to clearly focus only on one) to the management of the water and sediment flow in a river and delta. In spite that the SedMA Plan is not yet officially approved by the CHE, several actions that have already been initiated can be used as indicators of success: The design of a new environmental fluvial regime for the Lower Ebro River and its delta according to the European Union (EU) Water Framework Directive (WFD) requirements. The monitoring and sampling of the sediment transported in suspension and as bed load by means of the Network of Environmental Indicators of the Ebro Delta. This program started in 2007 and will be launched in 2012 with the participation of IRTA in collaboration of ACA and CHE. A sediment injection pilot test in different parts of the river channel planned for the end of 2011 or beginning of 2012 with the participation of IRTA in collaboration of ACA. Pilot studies on the generation of organic matter in re-naturalized rice fields. First phase (2009-2011) has been completed by IRTA, with the funding of the Spanish Ministry of Environment. In 2011 has been submitted a Life project with the participation of IRTA in collaboration of ACA. If approved (2012), the project would last three years. Study on the role of green filters in re-naturalized rice fields. First phase (2009-2011) has been implemented at experimental scale by IRTA with the funding of the Spanish Ministry of Environment. The next phase will be the implementation at real scale by IRTA with a total duration of 3 years.

Elbe Estuary

Recommendations

General recommendations on sediment

3. It is recommended not to view the sediment imbalance as an issue isolated to deltas and estuaries. It requires wider involvement and cooperation among all key actors along the river basins, especially with operators of water reservoirs and main pollution sources.
4. Moreover, given the impact of sediment imbalance to the evolution of deltas and estuaries, sediment management plans should be implemented. As the sediment management is a costly process, it should be balanced with possible economic and societal benefits.
5. It is recommended to define general and specific management plans where flood risk and sediment management actions should be coordinated. In most of the cases the sediment imbalances are leading to an increase of flood risks or coastal retreat because of sea level rise, the gradual compaction of the land (subsidence) and the effect of retention of sediments that are disrupting the fragile equilibrium of deltas and estuaries.

Recommendations on sediment deficit and sediment aggradation

6. Restore (as much as possible) the natural continuum of the fluvial system. It is suggested to do this through designing new water and sediment fluvial regimes from reservoirs, where periodical pulses (spates) have to be contemplated. The application of a new reservoir management model is a key point, since the sustainability of deltas and estuaries can only be guaranteed with the allocation of an appropriate liquid and solid flow regime.
7. Restore the lateral connectivity between the river and the delta and estuary plain by means of the elimination or permeabilisation of embankments or artificial levees. The creation of strategic flooding areas along the rivers, delta and estuary plains will allow, among others, the establishment of new habitats for natural species, the lamination of flood events (and mitigation of the flooding risk), the recharge of the groundwater aquifer, the input of organic and inorganic nutrients, the promotion of vertical accretion of the delta or estuary plain (to compensate the delta/estuary subsidence and sea level rise), and the mitigation of coastal line retreat, among others.

Recommendations on sediment contamination

8. Reduce water and sediment contamination in rivers, deltas and estuaries by means of the elaboration of general plans to minimize local and diffuse sources of pollution. The implementation of new technologies, creation of sewage treatment plants and a more stringent legislation regarding the use of certain physicochemical substances in agriculture and industry are some of the actions to be considered.
9. Monitoring programs could be implemented to improve the knowledge on the pollution status, which will allow the application of management policies assuming preservation and integration of natural resources and human activities.

Recommendations on flooding risks

10. Implement new techniques such as restoration of delta and estuary wetlands; increase river lateral connectivity and creation of special flooding areas, in accordance to an integrated delta approach management.
11. Avoid, as much as possible, the construction of new hydraulic infrastructures which could aggravate the fragile equilibrium of these systems.
12. Prevent damage caused by floods by avoiding construction of houses and industries in present and future flood-prone areas; by adapting future developments to the risk of flooding; and by promoting appropriate land-use, agricultural and forestry practices.

3.2. Wetland restoration in deltas and estuaries

Joint observations of deltas and estuaries in Europe

Wetlands situated in deltas and estuaries perform a far more diverse role than merely providing habitat for numerous flora and fauna species, nesting grounds for birds and etc. Their functions extend to include protection from floods and trapping pollutants, and, therefore are of great importance for the local population of deltas and estuaries.

However, over the years, economic and social developments have influenced deltas and estuaries such as converting wetlands through drainage to agricultural land. Recent urbanization resulted in the contraction of wetlands and transformed deltas and estuaries. Unfortunately, those developments lacked an integrated approach (in the sense of balancing economic and environmental needs) and favoured economic objectives over environmental concerns[10]. Consequently, deltas and estuaries have to face challenges caused by the altered natural wetlands and floodplain system. These include coastal regression, decreased water storage capacity, protection from floods etc.

The DeltaNet partners have valuable experience in wetland restoration. One transcending approach is characterized by converting abandoned and unsustainable agricultural polders and fishponds into wetlands. During 1994 – 2008 more than 15,000 ha of wetlands in the Danube Delta has been restored with positive economic and ecological results. This approach is recommended in low-lying areas there agricultural activities cannot be sustained, as, for example, in the rice fields in the Ebro Delta[11].

Unfortunately, in many cases, the floodplain restoration cannot be the question of transforming them back to the pristine state[12]. It depends on the degree of urbanization and the nature of property regime in a delta or estuary (i.e. private land vs. public land) which might require additional financial resources, political willingness and support, and cross-border cooperation. This implies that the DeltaNet partners need to create common tools and common vocabulary to influence local and national politicians and other stakeholders.

Minho Estuary

[10] Conference Report, “Healthy Delta Environment”, page 50.
[11] Theme 3. “Healthy Delta Environment. Ebro Delta Work Plan”.
[12] Conference Report, “Healthy Delta Environment”, page 15.

Main results – Description

The loss of large areas of wetland in deltas and estuaries has many similarities with the sediment imbalance problem. Both environmental issues are caused by developments in river basins which interfere with the natural river flow, or so called “lateral” and “longitudal” connectivity. Yet, the reduction of wetlands is the result of human activities in the downstream. Therefore deltas and estuaries have sole responsibility for the negative outcomes as well as the authority to reverse the situation. Moreover, besides common origins, they create such challenges for the DeltaNet partners as coastal regression, erosion, negative impact on biodiversity, water quality and increased flood risks. It is not surprising that measures such as wetland restoration help to mitigate the very same problems as management of sediment imbalances. Consequently, given this overlapping, deltas and estuaries should not treat those two problems in isolation from each other but rather seek the coordinated approach for the best and long lasting result.

The rationale and strategy for wetland restoration is rooted in such concepts as “room for rivers”, “fluvial territory” originating from the 90s and advocating for “the restoration of the connectivity between the river and its floodplains”. Mainly, they seek to improve ecological situation and integrity of rivers and crate water storage for flood mitigation. Moreover, this strategy corresponds to the WFD requirements[13].

Common challenges shared between the Severn Estuary and other deltas and estuaries in Europe[14]:

- The potential for wetland restoration with specific focus on how other partner experiences can be applied to the Gwent Wetlands Reserve.
- Communication and awareness raising of Healthy Delta Environment and need for wetland restoration in terms of compensatory habitat and Cardiff Bay development.
- How can the public be better informed / communication of compensatory habitat and related issues.

Amongst DeltaNet partners, the Danube Delta has achieved the most tangible results in floodplains restoration and accumulated valuable experience. During the last 20 years, it has applied innovative floodplain management practices to restore 15,712 ha of wetlands to their near natural condition. In addition, the Danube Delta has adopted the “Ecological Restoration Programme 2005 – 2015” within the “Master Plan for Sustainable Development of the Danube Delta Biosphere Reserve”. According to the programme, in the course of two stages, a total of 65,698 ha of wetlands will be restored, 19,616 and 46,082 ha respectively[15].

Besides the positive environmental effects such as increased water storage or habitat for birds, the pilot project of wetland rehabilitation demonstrated economic benefits through better fish yield or reed harvest. The text box below shows the Romanian experience in wetland restoration.

The Rhine Scheldt Delta, which experienced the dramatic reduction of salt marshes and mud flats (the area in the Dutch side decreased by 50 per cent from 1800) because of the land

[13] “Second Workshop on Theme 3”, page 8 – 10.
[14] Work Plan – Theme 3 Severn Estuary, page 3.
[15] “Workshop 1 on Healthy Delta Environment”, slides 27-30.

reclamation, has also developed plans to restore some estuarine environment – the Netherlands and Flanders agreed to add more than 1,000 ha of new wetlands, intertidal areas, and intertidal zones to the delta in both countries. Besides conservationist goals, the restoration of natural environments was expected to benefit other objectives such as "safety, agriculture, marine aquaculture, recreation and residential/employment initiatives." However, these projects have experienced delays because of political uncertainties[16].

Such project roadblocks reveal managerial challenges facing the DeltaNet partners. Despite the fact that the cooperation in Rhine Scheldt Delta is defined in the bilateral treaty, local political situation and conflicting goals, local stakeholders and population complicate the implementation of wetland restoration. More specifically, the private ownership of land severely limits the number of possible alternatives for the project team[17]. In addition, the restoration of wetlands impacts local communities by overhauling traditional economic activities. Land rehabilitation programmes should also include measures for the local population to take advantage of new economic activities in their region.

The good practice of the Danube Delta is described in more detail below.

Good practice: Land Rehabilitation in the Danube Delta [18]

[16] Conference Report, "Healthy Delta Environment", page 34.
[17] "Second Workshop on Theme 3", 2011, page 9.
[18] Romanian presentation during Workshop 1 on Healthy Delta Environment.

Since 1994, the Danube Delta is implementing land rehabilitation projects. The man-made abandoned and/or unsustainable areas such as fish and agricultural polders are being restored. In total, almost 16,000 ha were reverted to their almost natural state.
The programme of wetland restoration achieved a number of ecological and economic benefits. Restored wetlands provide habitat for birds and fishes, increased water storage capacity and sediment retention which is equal to 11 tons per hectare per year. The research revealed that young and reproducer fishes were present in the restored areas. Finally, the aesthetic values of the area were improved.
At the same time, economic benefits of wetland restoration include fish yield of 34 kg per hectare per year. Also, it provides reed and pasture.
Most importantly, Babina and Cernovca pilot projects suggest that the restoration of wetlands can generate positive in economic results which outweigh the project costs. The onetime costs of restoring 3,600 ha area was €100,000 and was used for research, design and implementation.
On the other hand, the economic benefits from fish yield, reed harvest, tourism and pasture for cattle amount to €140,000 per year. Fish yield and reed harvest have the highest economic value – €60,000 each. Thus, the total value per year generated from the restored area outweighs the project costs.
The Danube Delta land rehabilitation projects were received a number of awards for ecological restoration including WWF Conservation Merit Award (1996) and Eurosite Award (1995).

Recommendations

13. It is recommended to reconcile the restoration of wetlands, which play an important ecological role, with economic and social goals such as improved flood risk mitigation, increased fish yield and improved tourism routes. The Danube Delta showed that land rehabilitation programmes can be a win-win solution. Yet, it must be recognized that various deltas and estuaries are affected by the urbanization and industrialization at different degrees. The local economic realities and political situation must be taken into account as they pose serious constraints for any rehabilitation programme.

14. The deltas and estuaries need to develop a common methodology and tools to influence local and national politicians, to create effective communication venues to reconcile numerous conflicting goals and visions and effectively communicate with the local population.

Ebro Delta

4. Tools for achieving a balanced development in deltas and estuaries

4.1. Integrated approach in deltas and estuaries

Joint observations of deltas and estuaries in Europe

It is important to agree and explicitly define what constitutes the concept of an integrated approach. Sharing a common vocabulary allows DeltaNet partners and their stakeholders, including politicians, governmental and non-governmental organizations, to align their objectives and visions and better perceive the challenges of deltas and estuaries.

An integrated approach means a continuous balancing between the economic activities and environmental factors[19]. It is important to note that the term integrated approach is often mistakenly used to describe the coordinated approach. The latter refers to the inclusion of all relevant delta and estuary stakeholders in the sustainable management of deltas and estuaries.

The review of the documents revealed a number of challenges and recurring themes which must be considered while trying to reconcile the economic and environmental needs. The inherent challenges of the integrated approach result from the conflicting activities and uses which must be taken into account to find the right balance between economic and environmental domains.

This task is further complicated by the external factors and complex delta and estuary environment. Most notably, the effects of global warming such as rising sea levels, changed precipitation levels or risk of flooding introduce a new layer of complexity into the process of decision making. In addition, the transposition of the European legislation, for example, Habitat, Birds, Flood and WFD directives, creates both opportunities and challenges for the DeltaNet partners.
Finally, the number of stakeholders, directly and indirectly affected by the developments in deltas and estuaries, implies the complex institutional arrangement which, in some cases, span across regional and national borders. As a result, the sustainable management of the deltas and estuaries requires well-functioning communication channels and other venues for the exchange and alignment of different goals as well as inputs for the integrated.

Common challenges shared between the Severn Estuary and other deltas and estuaries in Europe[20]:

- European environmental directives, their transposition into national law and their implementation at regional level.
- Maintenance of Natura 2000 sites and the need to find a balance between economy and ecology in deltas and estuaries.
- Port and associated development in the context of limited space and Natura 2000.
- The implications of potential climate change and flood risk for future economic development
- The need for multi-agency and cross-sectoral approaches to address complex inter-related delta or estuary problems for areas which are institutionally complex.

[19] "Project Application Form", page 13, Conference "Integrated Delta Approach. Conference results", p5.
[20] Source: Work Plan – Theme 1 Severn, page 3

The Rhine Scheldt Delta

Main results - Description of integrated approach

Modern deltas and estuaries are largely shaped by the human efforts to adapt the natural environment for the social and economic functions. Unfortunately, accomplishments which enabled better socio-economic development were followed by many negative environmental consequences.

The DeltaNet regions are faced with a number of common challenges which must be taken into account for achieving a balanced strategy for the regional development. On the one hand, there is a pressure to cater the needs of local population and businesses to ensure that a region is an attractive place to live, work and spend one's leisure. On the other hand, there are requirements to take environmental and nature conservation concerns into account. As such, there is a competition between socio-economic activities and ecological values. In turn, this competition forms the key axis for an integrated approach. In order to remain competitive, the Antwerp Harbour has to resolve the issue of deepening the shipping channel (i.e. further adapting the environment for economic needs) with the nature conservation and safety issues[21].

The environmental concerns can be classified as man-made and natural risks though the effects of each often overlap. Man-made risks include water pollution, reduced habitats for flora and fauna species. For instance, bad water quality reduced the number of fish and benthic invertebrates' species were found in the freshwater part of estuary[22]. Alternatively, rising sea levels induced by global warming as well as changes in the precipitation regime present another set of challenges. Previous defence structures are not effective enough to mitigate the risks. Either new and higher dykes and other hydro-structures should be designed and constructed or more resilient measures such as restoration of wetlands, floodplains should be considered.

Finally, the variety and number of stakeholders active in deltas and estuaries which often span across regional and national borders create a complex institutional and regulatory environment. In order to articulate an integrated approach where economic and environmental concerns are balanced, different goals and visions have to be reconciled as well as a commitment to pursue agreed objectives. However, these might be difficult to achieve since regional entities might compete (for example, in case of the Elbe Estuary) or even across national borders (the Rhine

[21] "Good Practices and Policy Recommendations on Theme 1", pages 73 and 79-80.
[22] "Good Practices and Policy Recommendations on Theme 1", pages 64.

Scheldt Delta where agreements are not being honoured). In addition, there might be difficulties in aligning visions and approaches of central and regional administrations (the Ebro Delta).

Given the scarcity of space in deltas and estuaries, they have to balance both environmental and socio-economic needs and develop a method to commit all relevant stakeholders to the agreement. The integrated approach is ensured by adopting long term strategies (formalization) and by setting up appropriate governing mechanisms. The approach can take either statutory or non-statutory forms.

The development of the Severn Estuary area is guided by the Severn Estuary Partnership (SEP). The partnership is a voluntary organisation which was established to help to implement the Severn Estuary Strategy. SEP is independent, non-statutory and includes not only local authorities and other statutory agencies but also other parties (both organisation and individuals) who expressed the interest in the planning and management of the estuary[23]. It facilitates the coordination between the key sectors in the estuary, reviews the strategy for the estuary, provides a venue for communication and information dissemination through Joint Advisory Committee and numerous publications, provides the secretariat services to other estuary initiatives. The work is organised by the permanent staff and guided by a management group of key stakeholders.

Alternatively, the Tagus River Basin District Administration is responsible for the development of the Tagus Estuary Management Plan which seeks to identify the activities and uses that interfere with the water body's quality, involve all relevant stakeholders, and find compatible economic activities with the protection of natural issues. The Administration is a statutory body established by a law as a result of transposing the Water Framework Directive to Portuguese national legislation. The preparation of the Management Plan involved public sessions with universities and labs, experts and representatives of municipalities.[24]

The sustainable development of the Rhine Scheldt Delta is stipulated in the Long-term Vision for the Scheldt. It was laid down and signed by the Dutch and Flemish governments in 2001and focuses mainly on environmental and safety factors. Economic development is elaborated in terms of the port accessibility for bigger container vessels[25]. The cooperation and the implementation of the Long-term vision are specified in bilateral treaties and a Memorandum of Understanding which were signed in 2005. The text box below explains the good practice of Rhine Scheldt Delta how they use an integrated approach for the long term economic and environmental objectives.

The Severn Estuary Strategy is also an example of a non-statutory estuary-wide policy document[26]. It addresses around 100 issues and contains 350 proposals for action and aims to bring together all relevant stakeholders.

The experiences of the DeltaNet partners reveal some good practices of an integrated approach. Firstly, the Integrated Management Plan for Elbe Estuary takes multiple perspectives

[23] "Good Practices and Policy Recommendations on Theme 1", page 52.
[24] Conference Report "Integrated Delta Approach. Conference results", page 43-44 and "Good Practices and Policy Recommendations on Theme 1", page 16.
[25] "Good Practices and Policy Recommendations on Theme 1", page 66.
[26] "Good Practices and Policy Recommendations on Theme 1", page 54.

for the best results. For instance, “the integrated approach of the organisational framework” ensures that the representatives of businesses are equally involved and can actively participate. The Hamburg Port Authority helped establishing the steering committee for the implementation of the European Birds and Habitats Directives. Also, the Elbe Estuary is an example of a “technically integrated approach” which seeks to account for all possible synergies. For example, many overlapping objectives were identified between the sediment management and Natura 2000 objectives. In general, the integrated approach should be based on a holistic perspective and promote a system’s view and communication between stakeholders. This issue is discussed in greater detail in the section on Participatory planning of this report.[27]

To sum up, given the number and complexity of challenges, the DeltaNet partners need to develop an effective way to achieve the balanced and sustainable development of their regions. The integrated approach is articulated and implemented through drafting visions and plans for deltas and estuaries as well as setting up the appropriate organisational arrangements responsible for the integrated approach, either through non-statutory or statutory forms. For the best results, it is important to ensure active participation of all relevant stakeholders (especially representatives of economic interests) and facilitate communication and dissemination of information.

Table 2 SWOT of strategies and visions in the deltas and estuaries

Strengths	Weaknesses
Both Severn Estuary and Rhine Scheldt Delta have an integrated strategy/vision which has been developed with a participatory approach	The Severn Strategy is non-statutory
Severn implements strategy in SEP Strategic Business Plan	The Vistula, Danube and Ebro Deltas have no integrated vision
Danube Delta has a vision and a strategy	The Minho Estuary has no cross-border vision. Different policy processes in ES & PT and lack of integrated policy
The Tagus Estuary is preparing Tagus Estuary Management Plan (integrated participatory vision)	The Tagus Estuary Management Plan not yet approved (2012) , although it has been in development since 2009
Opportunities	**Threats**
To strengthen the ICZM (Integrated Coastal Zone Management) policy at EU level	The Severn Strategic business plan could become a weakness/threat due to funding and security issues: e.g. Non-statutory; high staff turnover, leading to lack of momentum/consistency; potential winding up, e.g. R-S partnership. SEP faces these threats currently
To develop cross-border Minho Estuary vision/plan	Sectorial approaches can cause conflicting interests and pressures for Tagus
To introduce more social participation processes in vision for Ebro	Politics influence the long term Rhine Scheldt and Ebro policy

Source: DeltaNet (final report theme 5)

[27] “Good Practices and Policy Recommendations on Theme 1”, page 80-81.

The table below describes the availability of plans. Each delta or estuary has a plan. Some of these are integrated plans whereas others are merely sectorial and well interlinked or sectorial and not well interlinked.

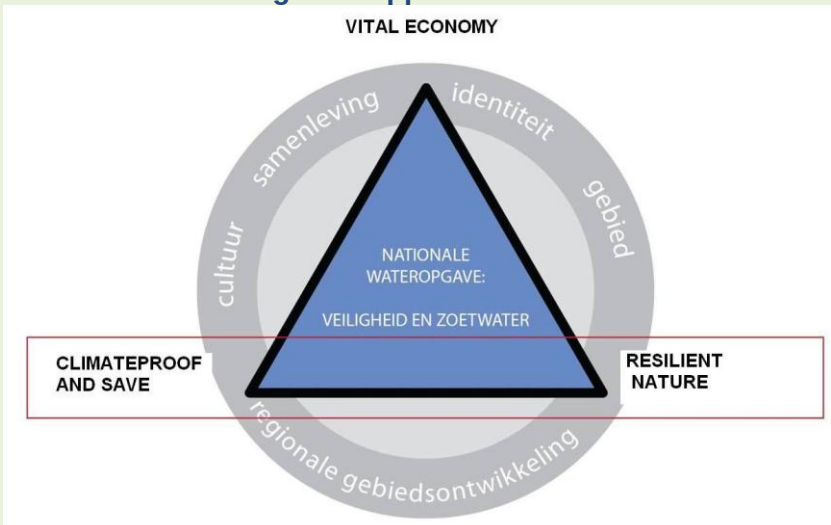
Table 3 SWOT of the plans in the deltas and estuaries

Strengths	Weaknesses
Rhine Scheldt Delta has an integrated plan and political treaty between NL & BE to ensure that agreed actions will be realised	Rhine Scheldt Delta fails to stick to former decisions causing political tensions between NL-BE
Minho has 2 basin plans (1 ES, 1 PT)	Minho has 2 basin plans (1 ES, 1 PT), limited focus on water quality and quantity. Lack of coordinating authority / integration of different stakeholders' interests in the Estuary. (focus on economic activities and interests of stakeholders)
Elbe plans are related to the Directives and are well interlinked.	Elbe and Ebro have sectorial plans.
Ebro plan is not implemented	
Vistula has Vistula's Flood Protection Program, Water Tourism Development Program and plans for Natura 2000.	
Opportunities	**Threats**
Develop integrated plan for Vistula, Danube and Ebro	Lack of protection for specifically Minho Estuary Sectorial approaches can cause conflicting interests and pressures for Tagus

Source: DeltaNet (final report theme 5)

As good practice of integrated approach the long term vision of the Rhine Scheldt Delta can be mentioned.

Good Practice: Integrated approach for the Rhine Scheldt Delta[28]



[28] Source: Good Practices and Policy Recommendations on Theme 1, page 73-75

The long term vision for the Rhine Scheldt Delta has an integrated approach through building on three objectives. The first objective, safety, is to ensure the maximum protection against flooding in the region. The second objective deals with the optimum accessibility to the harbours in the Scheldt. Finally, the healthy natural environment is the last objective.
These objectives are based on the main problematic issues in the region. For instance, global warming and rising sea levels decrease the effectiveness of the existing flood protection measures. In turn, new and higher dykes needs to be built. However, the reliance and dependence on technical measures are unsustainable in the long term given the climate uncertainties. Thus, more resilient measures which consider natural processes and natural flood mitigation measures are believed to be more economic in the long run.
The economic vitality and prosperity of the Rhine Scheldt Delta depends on the successful operations of ports. The upcoming trends in the maritime transportation reveal a shift towards larger container shifts and tighter operation schedules. As a result, Antwerp Harbour needs to deepen its shipping channel while, at the same time, it should take into account the environmental concerns.
Finally, the decrease in the area of salt marshes, mud flats, and other estuarine environments resulted in the loss the decline of the environmental diversity in the estuary. In addition, it has too little space to absorb the tidal energy.
Both governments agree that the Scheldt should be a dynamic in the sense it represents a constantly changing pattern of channels and intertidal flats, regular variation in salinity, and the formation of new salt marshes and mud flats. All three long term objectives benefit from maintaining the dynamic vitality of the system.

Recommendations

15. An integrated approach in planning and managing deltas and estuaries is needed to ensure a good balance between socio-economic and environmental interests. Having an integrated approach in long term visions and short term visions should both be stimulated.

16. It is recommended to start always with a cause and effect analysis to map out main challenges. By identifying the actual challenges, one helps defining the solutions that are actually mastering these challenges or softening the effects. Furthermore it is recommended to inspect which of them are the most effective, meaning how many causes/effects a certain measure is mitigating. Finally, combine the most cost-effective set. By involving the stakeholders in this exercise an agreement between stakeholders and planning authorities can be stimulated or ensured.

17. Ensuring an integrated approach can be done in several ways: through a vision, action plans, actual projects and/or through working groups. It is recommended to find a way which suits the individual needs and characteristics of a delta or estuary.

18. Ensure that developing a vision or plan is not just part of an exercise. Too often plans/vision are being developed without being thoroughly implemented. Monitoring its implementation and ensuring commitment is equally important as developing the plan. This can be done e.g. by establishing working groups, business plans and/or a treaty.

4.2. Participatory planning useful in deltas and estuaries

Joint observations of deltas and estuaries in Europe

Initiatives which take into account long term economic and environmental developments in deltas and estuaries influence a large number of local stakeholders and the local population. Management authorities responsible for the development of deltas and estuaries need to consult with all relevant parties to gain support for the proposed actions, and ensure democratic and transparent management. Participatory planning helps to raise public awareness, collects local knowledge and decreases pressure for unsustainable solutions[29]. Moreover, extensive consultations with stakeholders contribute to building the identity of a delta.

The DeltaNet partners have employed many traditional measures to involve local communities and stakeholders into the preparation of strategic policy documents. Measures include questionnaires, workshops and seminars, publishing draft versions to solicit for comments, websites, etc.

However, despite the benefits offered by participatory planning, the DeltaNet partners should be prepared to deal with some difficulties which result from the extensive cooperation with local stakeholders. Often, given the number of involved parties, the consultation can take a lot of time and introduce project are delayed. More severely, it can result in a standstill because of indecisiveness of policy makers.

To sum up, the participatory planning approach helps to align interests of various stakeholders and win their support. However, it is important to have realistic expectations of the duration of consultation process and an action plan how to break from a potential deadlock.

The Severn Estuary

[29] "Public Participation in Cross Border Estuary Management. A Severn Estuary Perspective".

Main results – Description

The Severn Estuary is particularly skilled in organizing extensive participation and consultations with local stakeholders. The preparation of the Strategy for the Severn Estuary provided ample opportunities for local community to give feedback at every stage. During the process, numerous public meetings and consultations took place which helped to prioritize the issues of future economic, social and natural health of the Estuary[30].

Besides traditional tools for consultations and participation facilitation such as workshops, seminars, public meetings, questionnaires, publishing draft documents for comments, the Severn Estuary Partnership holds Joint Advisory Committee meetings which act as a platform for coordination, integration and communications among numerous stakeholders. However, the unique instrument is the secretariat services offered to several stakeholders (ASERA, SECG and BCSEG). As a result, the services help to ensure that the right people are consulted and a coordinated approach is ensured as much as possible[31]. The text box below describes the Severn Estuary Partnership in more detail.

An extensive participatory approach might take a long time. In case of the Strategy for the Severn Estuary, it took five years to complete the entire participatory process. The initial consultation stage alone took two years to produce a joint issues report[32].

The Rhine Scheldt Delta incorporates participative management practices. It has identified and accessed stakeholders in both countries through the following communication channels: project sites, project news, participation rounds, and regular legal processes. However, just like the Severn, the process is long and complicated as stakeholders might exhibit a lot of influence which results in a standstill situation and indecisiveness of policy makers when it comes to making a decision[33]. For instance, in Flanders, drafting of S-IHD objectives with relevant local stakeholders including farmers, businesses and environmental associations resulted in a two years project delay.

Though stakeholders involvement is not very strong in the Vistula Delta[34], it has involved local communities and stakeholders into the preparation of the Strategic Environmental Assessment for the Programme for the Zulawy Region (Vistula Delta) – to 2030 (first stage to 2015) – Complex Flood Protection. Its preparation included such activities as including the local population in the presentation of the programme, and collecting remarks to prepare the final version of the Programme. Examples of activities included public hearings, and mailing questionnaires. The Programme foresees to include local population in every task in order to increase public awareness[35].

The Danube Delta, on the other hand, does not have local stakeholders involved. Private stakeholders are not recognized and have to rely on lobbying or their involvement in political parties[36].

[30] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 17.
[31] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 17.
[32] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 16.
[33] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 39.
[34] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 10.
[35] "Public Awareness", presentation by the Vistula region.
[36] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 29.

In the Minho Estuary, grassroots initiatives (e.g. bird protection) and small business initiatives (e.g. fishery, horticulture, wine production, leisure activities) have taken up the sustainability challenge. These represent a resistant and resilient production mode, which simultaneously generates social-economic dynamics that contribute to the protection of the River Minho's vulnerable natural environment. Although participatory planning processes take a lot of time, adopting such an approach helps to align the interests of stakeholders in the area and fosters policy objectives of environmental protection. In the DeltaNet project, the departure points and key actors for the application of a sustainable and coordinated estuary management in the Minho Estuary have been identified and analysed[37]. It is suggested that stakeholders further discuss and construct cooperative (innovative) ways for achieving the challenges of sustainable development of the Minho Estuary. In this way they deal, adapt and comply with EU Directives that relate to environmental concerns, and that simultaneously allow for economic progress among rural dwellers and small entrepreneurs in an era of economic crisis and governmental budget cuts.

The table below summarises the above described strengths, weaknesses, opportunities and threats in dealing with stakeholders throughout the involved deltas and estuaries.

Table 4 SWOT of Stakeholders in the deltas and estuaries

Strengths	Weaknesses
There is extensive participation & consultation in Severn Estuary and Rhine Scheldt Delta. Water boards are involved in planning and implementation in NL.	There is little/no coordination and limited stakeholder involvement in Vistula and Ebro Delta. In the Ebro Delta national and regional levels have two different opinions.
There is regular exchange between stakeholders in Elbe Estuary.	The Danube Delta public management is only focused on biosphere.
In Tagus Estuary there is existence of active stakeholders in several areas – there is strong stakeholder involvement in Tagus Management Plan elaboration.	There is lack of an institutional and formal platform that brings together the Tagus Estuary stakeholders.
	There is little coordination in Minho Estuary. Different institutions involved at different levels. There is no power for governance in Minho. Many institutions and agencies are involved to control different topics in different parts of the basin and estuary. There is lack of a coordinating authority / integration of different stakeholders' interests in the Minho Estuary.

[37] Lola Domínguez García, Lummina Horlings, Paul Swagemakers, & Xavier Simón Fernández (2013) Place branding and endogenous rural development. Departure points for developing an inner brand of the River Minho Estuary. *Place Branding and Public Diplomacy.*

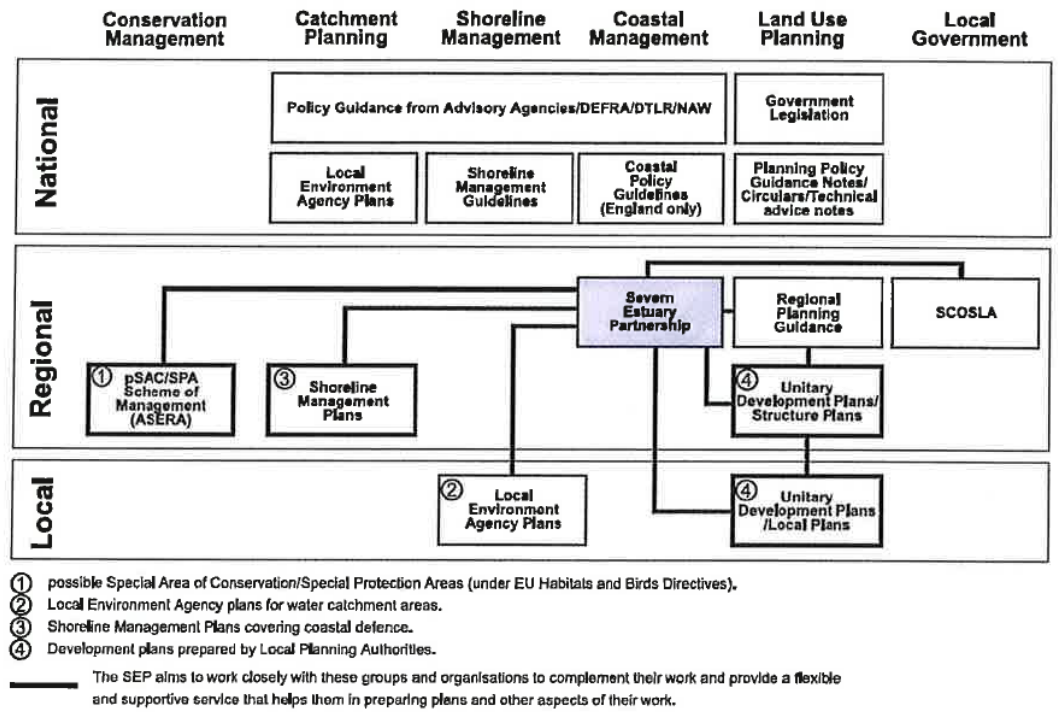
Opportunities	Threats
Stronger stakeholder involvement is needed in Vistula and Ebro Delta. More coordination is needed in Vistula & Minho Delta and a global platform could be created. The social platforms in Ebro could be better coordinated.	Extensive consultation can slow down implementation in Severn Estuary. Also the lack of funding for voluntary Partnership approach is a threat for the continuation.
In Severn Estuary time and resources are needed for implementation of the stakeholder engagement.	The different interest / trade-off between environmental and economic aims without real discussion are a threat in Minho, Ebro and Tagus.
Policy makers should be stimulated to implement decisions in Rhine Scheldt Delta & the stakeholder involvement should be revived in the delta as it is not working properly at the moment.	The economic crisis may force all deltas and estuaries to use more unsustainable practices and non-coordinated stakeholder involvement.
A coordinating/monitoring body is needed in Tagus to avoid fragmented management	Administrative boundaries are a threat for having the right stakeholders involved.

Source: DeltaNet (final report theme 5)

The benefits provided by the participatory planning come at a certain expense. The DeltaNet partners should be prepared to account for the time needed for proper consultations. Preparing for the next stage according the timelines, and developing an efficient consultation mechanism avoids deadlocks and commits to actions based on the findings.

Below the good practice of the Severn Estuary is described in more detail.

Good Practice: The Coordinated Estuary-wide Approach in Severn Estuary[38]



[38] Source: Severn Estuary Partnership, Strategy for the Severn Estuary. "Good Practices and Policy Recommendations on Theme 1", pages 52 – 62. "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 17.

The development of the Severn Estuary is coordinated by the Severn Estuary Partnership (SEP). It is a non-statutory, voluntary organisation which includes local authorities, statutory agencies, other bodies and individuals. The SEP was established in 2001 to implement the Severn Estuary Strategy (SES) – the document identifying and addressing 95 issues and containing over 350 proposals from thirteen sectors. The preparation of the SES involved extensive public consultations through workshops, questionnaires and publications of draft versions for comments.
The daily work of the SEP is carried out by the partnership staff and guided by a management group which consists of representatives of key stakeholders. In addition, the partnership holds an annual forum as well as hosts Joint Advisory Committee.
The SEP fosters a coordinated estuary-wide view amongst relevant stakeholders and provides a venue for the information exchange. It performs a number of communication activities which include the dedicated website (www.severnestuary.net), online and traditional newsletters (Severn Tidings), and informational leaflets, manages an extensive contact database of relevant stakeholders. Moreover, the SEP organises an annual the Severn Estuary Forum which attracts practitioners, policy makers and users of the estuary. Joint Advisory Committee meetings also offer a communication and coordination platform for estuary wide groups and stakeholders. In addition, thematic workshops and conferences are organised for planning professionals.
Finally, the SEP is actively involved in regional and local levels and supports various groups in preparing plans and other aspects of work. More specifically, it provides secretariat services to other estuary groups with environmental goals to ensure the coordinated approach. The services for ASERA are related to the estuary Natura 2000 site and services for SECG deals with shoreline management (coastal flood and erosion risk management).

Recommendations

19. Participatory planning helps to raise public awareness, collects local knowledge and decreases pressure for unsustainable solutions. Deltas and estuaries are recommended to ensure a participatory planning approach because it helps to align interests of various stakeholders, win their support, raises public awareness, collects local knowledge and increases pressure for sustainable solutions. However, it is important to have realistic expectations of the duration of consultation process and an action plan how to break from a potential deadlock.

20. It is suggested that stakeholders further discuss and construct cooperative (innovative) ways for achieving the challenges of sustainable development of the Minho Estuary and in this way deal, adapt and comply with EU Directives that relate to environmental concerns, and that simultaneously allow for economic progress among rural dwellers and small entrepreneurs in an era of economic crisis and governmental budget cuts.

21. It is recommended to have cross border coordination for estuary wide management.

22. Implement European Directives in a coordinated and mutually benefitting manner.

23. It is recommended to develop further representative and coordinated stakeholder platforms.

4.3. EU Directives useful but coordination needed

Joint observations of deltas and estuaries in Europe

The adoption and mandatory implementation of the European Directives such as the Habitats, the Birds, the Flood risk or the Water Framework Directive (WFD) helped to contribute to the awareness of existing environmental issues in European deltas and estuaries and place environmental concerns in the political agendas of the EU member states[39]. The EU directives served as an external pressure for European countries to account for environmental concerns. Since the directives are supranational and obligatory by their origin, they are applicable both to the national and the regional authorities. The EU member states which delay the implementation of directives or the transposing of directives to their national legislation selectively face penalties. Thus, environment-related directives help to promote environmental cause in deltas and estuaries, set things in motion and align regional and national governments[40].

However, the implementation of the EU directives comes with a certain price. While the merits of them to the awareness are not disputed, idiosyncrasies of member states prevent the implementation of the directives in time or in full scope and, as a result, the goals are not always achieved. After analysing the experience of the DeltaNet partners with the implementation of the EU directives, it is possible to outline the most common challenges and side effects. Member states are faced with the lengthy implementation, limited transposition of directive regulations into the national legislation, or, in contrary, taking them too far to the detrimental effect for other activities.

Coordination issues among stakeholder in deltas and estuaries are the most prominent. Many agencies with responsibilities for certain river functions may cause a fragmented and sectorial approach. Moreover, there might exist differences in the approaches to river management at national and regional levels (the case of Ebro). In addition, in case of cross-border and, sometimes in cross-regional deltas and estuaries, the issues might arise because the transposition of the EU legislation is not carried out at the same pace and scope.

Finally, there are some challenges related to the conflicting nature of the EU directives themselves. As a result, the implementation of Water Framework Directive might require a careful reconciliation of goals and measures with the Habitats or Birds directives since all three directives might be applicable to a certain area. Also, since the primary goal of the EU directives is environmental protection, member states have to find the balance between environmental and economic needs for an integrated approach.

Overall, though the EU directives present an external pressure for the increased attention to environmental concerns, they cause many problems to the member states, and, unless there is coordination among all relevant stakeholders, they might pose serious challenges to the integrated approach.

[39] "Ebro Delta Work Plan. Theme 5", page 5.
[40] "Work Plan Rhine Scheldt Delta. Theme 5", page 7.

Elbe Estuary

Danube Delta

Main results - Description

Most of the member states challenges related to the implementation of the EU directives are coordination issues among all parties involved. The lack of coordination can result in the duplication of implementation efforts, not sufficient implementation and sectorial approach.

For instance, the Ebro Delta faces a particular problem with the lack of coordination and cooperation between national and regional authorities. The Ebro Basin Hydrological Plan, prepared by central administration, gives priority to socio-economic objectives and, as a result, the flow regime is not in line with the WFD regulations. Despite the fact that the Catalan Water Authority drafted proposals which take into account the WFD goals, the proposals were not considered[41]. The cooperation between the two levels of government might be challenging because of a historical approach prevalent in water management as a resource management. Thus, the implementation of the WFD requires not only changes to Spanish regulations but as well a shift in water management practices. The lack of cooperation and incompatible approaches to water management causes delays in the implementation of the WFD directive and penalties for Spain for not fully implementing the directive. A similar problem exists in the cross-border Minho Estuary. Here, the conflict of interest arises since there are many implementing agencies and there is no integrated vision for the estuary[42].

In contrast, in the Severn Estuary, the national and local plans, such as the Severn Estuary European Marine Site Management Plan, account all for the objectives of the EU directives. Here, however, there is a risk for duplication of the effort[43].

Another complex factor is the number of local stakeholders affected by the EU directives. For instance, the Flanders part of the Rhine Scheldt Delta carried out separate consultations for each designated Natura 2000 area with relevant stakeholders such as farmers, forest owners, businesses, environmental associations and others to gain support for a Natura 2000 network. On a downside, because of the intense nature of the consultations, the S-IHD objectives were drafted two years past the deadline[44].

However, it is also possible to take the objectives of the EU directives too far to the extent they pose constraints to other activities and/or regulations. In the Danube Delta, the implementation of Natura 2000 was done excessively and, as a result, too many areas were designated as

[41] "Ebro Delta Work Plan. Theme 5", page 6
[42] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 21.
[43] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 15.
[44] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 35.

Natura 2000 sites. In turn, this caused negative effects to other directives, for example the Flood Protection Directive which has to take into account such factors as the birds hatch period[45]. This might have been caused by the lack of consultations among relevant agencies and stakeholders. The management of the delta is fragmented and private stakeholders can influence policy only by lobbying or political parties.

Despite the positive effect to the environmental issues in deltas and estuaries, they come at the expense of economic and social development. For example, the objective of nature conservation blocks such projects as road or wind parks construction[46].

The DeltaNet partners which experience coordination issues among different stakeholders, especially stakeholders representing different regions or administration level, could draw onto the Severn Estuary Partnership experience. Non-statutory approach with the associated organisational frameworks encourages a more strategic perspective and provides better policy coherence. It is effective since it is difficult to achieve political acceptance for strong legal instruments in the context of cross-sectorial issues and complex arenas[47].

On the other hand, the EU directives play an important role in promoting delta and estuary management practices which take into account environmental concerns. For instance, in the Elbe Estuary, the delta management policy is based on the implementation of Natura 2000 and the WFD. Moreover, two more plans are being prepared on Marine Strategy Framework Directive and Flood Risk Management Directive[48]. Thus, the EU legislation can be seen as a catalysing factor for the sustainable management of the Elbe Estuary. See the text box below for more information on implementing Natura 2000 directives in the Elbe Estuary.

Moreover, the EU directives may facilitate the inclusion of relevant stakeholders. Specifically, WFD demands that river basins districts are established. For instance, the Tejo Basin Council, an authority for Portuguese part of the Tagus river basin, provided the venue for participation for basin stakeholders[49].

The table below summarises the strengths, weaknesses, opportunities and threats on dealing with the EU Directives in the deltas and estuaries as described above.

Ebro Delta

Tagus Estuary

[45] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 10 & 29.
[46] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 38.
[47] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 16.
[48] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 18.
[49] "Coordinated Delta Approach. Comparative Analysis of DeltaNet regions", page 33.

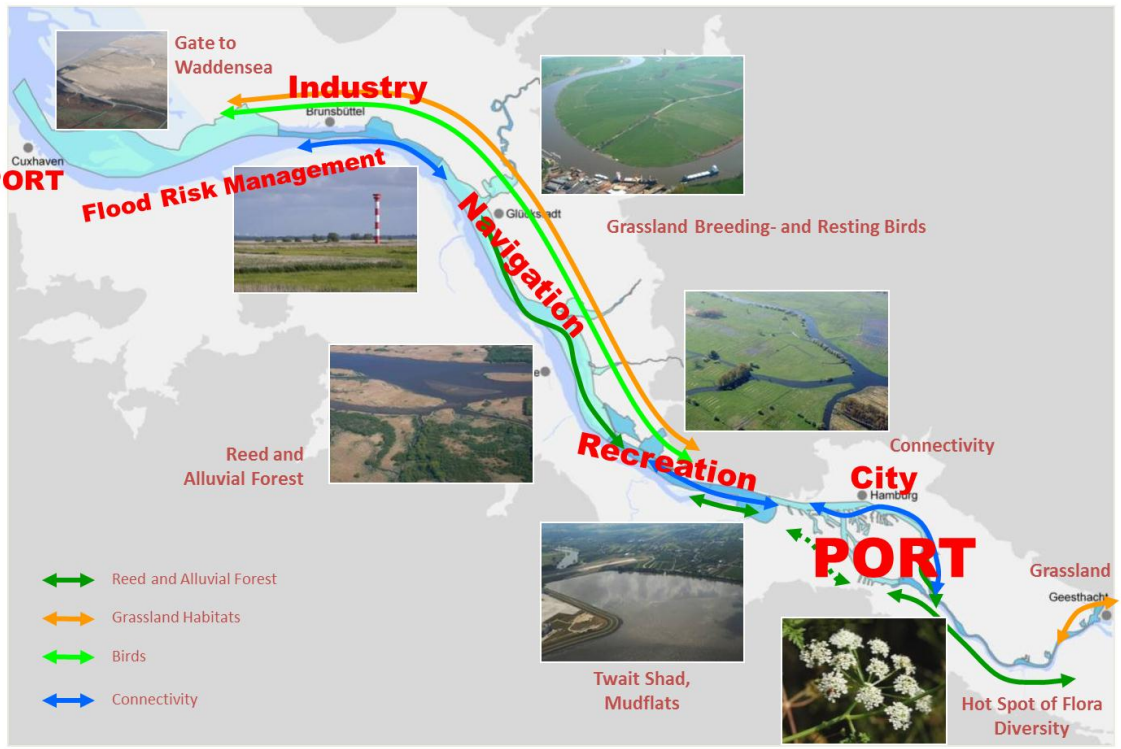
Table 5 SWOT of how the deltas and estuaries deal with the European Directives

Strengths	Weaknesses
Directives clearly integrated in a neutral non statutory policy in Severn Estuary and responsibilities are clearly divided. Also directives are translated into Statutory Plans, e.g. EMS Plan	No clear applicability/coordination of EU regulation in Minho Estuary except for Water framework directive and Natura 2000
Directives are clearly linked/implemented through a plan in Elbe Estuary	Natura 2000 sites in Danube Delta are only chosen on scientific criteria (no stakeholder involvement).
Birds and Habitats Directives are clearly implemented in Tagus Estuary; estuary management plan under Water Framework Directive is being concluded,	No coordination of implementation of directives in Ebro Delta and Tagus Estuary
Ebro adapting approach towards WFD	
Active consultation between Natura 2000 & Anti-flood investments in the very mouth of the Vistula Estuary	
Opportunities	**Threats**
EU legislation as framework of reference & more integrated approach in Ebro Delta, Minho and Tagus Estuaries	Weak reinforcement by the Spanish and Catalan Governments (Ebro Delta). New Ebro River Basin plan not in accordance with Water Framework Directive
Use regulations to find motivation for sustainable solutions. Further alignment of directives requirements and associated implementation.	Bird and Habitat Directives influence necessary investments in Vistula and Danube Delta
Directives should become clearly integrated in a neutral non statutory policy in Severn Estuary and with responsibilities clearly divided	Directives could be used to delay/hamper projects. Volunteer approach – no legal weight or associated secure funding
A more active consultation & discussion between NL & BE on the Natura 2000 & WFD in Rhine Scheldt Delta (juridical not successful yet)	Non statutory integration in the Severn Estuary created funding and security issues. Could threaten / collapse joint implementation in the future (e.g. cross border issues –alignment of directive The volunteer approach at Severn has no legal weight or associated secure funding.
Stakeholder platforms should be used more for the directives to ensure a balanced development of the Danube Delta.	Sectorial approaches can cause conflicting interests and pressures.

Source: DeltaNet (final report theme 5)

Below the example of implementing Natura 2000 in the Elbe Estuary is described in more detail.

Example of implementing Natura 2000 in Elbe Estuary[50]



Almost 90 per cent of the Elbe Estuary, including the shipping channel, is designated as a Natura 2000 site. Just the Port of Hamburg area together with some other industrial spots is excluded.

In order to comply with the European regulations, namely Habitats and Birds Directives, the Hamburg Port Authority co-initiated a Natura 2000 steering committee in 2004. The committee included highly ranked representatives of the environmental and economy ministries of Schleswig-Holstein, Lower Saxony and Hamburg states, the Port Authority and the Federal Administration for Waterways and Navigation.

In 2005, the steering committee developed a frame concept for the conservation objectives which was reported to the EU.

In 2007, the stakeholder signed a treaty which obliged the members of the committee to prepare an Integrated Management Plan for the Elbe Estuary by 2011. The plan itself is not legally binding but serves as a guideline for future actions of the responsible partners. The plan contains the following elements: common objectives for nature conservation, proposals for measures to achieve the objectives, guidance for projects and measures, additional basis for the assessment of plans or projects, legal framework for maintenance dredging, improvement of planning security.

During the preparation phase, the stakeholders had to describe their activities in relation to the Natura 2000 objectives. As a result, some potential synergies were identified. For instance, the sediment management activities were described with a focus on the synergies with Natura 2000. In addition, the removal and treatment of contaminated sediments contribute to the goals of the WFD.

The Natura 2000 management plan which is effective since 2012 in the Elbe Estuary is considered good practice by the EU.

[50] Work Plan Theme 1 – Elbe, page 3-4. “Second Workshop on Theme 1”, page 9; “Second Workshop on Theme 2”, pages 16 – 17; “Good Practices and Policy Recommendations on Theme 1”, page 45.

Recommendations

24. It is recommended to have a coordinated approach towards EU Directives to ensure a coherent implementation and minimise conflicting interests.

25. Furthermore it is recommended that the EU Directives become part of an integrative and participatory planning (e.g. territorial development) as early as possible.

26. River basins extending different administrative areas or states urge the cooperation of the involved national and international agencies to define the management plans.

Severn Estuary

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6. Links to the deliverables of the DeltaNet project

All documents can be found at: http://www.deltanet-project.eu/documents or contact one of the partners.

Theme	Full name
Overall	2 Brochures
	7 Newsletters
	Final Publication
	Website http://www.deltanet-project.eu
Theme 1 Integrated Delta Approach	Good practices and policy recommendations report http://www.deltanet-project.eu/filemanagermodule/file/id/121/src/documents/
	Conference report of the international Lisbon conference (November 2010) & conference presentations
	4 work plans for Rhine Scheldt Delta, Tagus Estuary, Elbe Estuary and Severn Estuary
	4 interregional workshop reports & workshop presentations
Theme 2 Flood risk and sediment management	Good practices and policy recommendations report http://www.deltanet-project.eu/filemanagermodule/file/id/195/src/documents/ http://www.deltanet-project.eu/filemanagermodule/file/id/196/src/documents/
	Conference report of the international conference in Ebro Delta (June 2011) & conference presentations
	5 work plans for Danube Delta, Ebro Delta, Minho Estuary, Severn Estuary and Elbe Estuary
	3 interregional workshop reports & workshop presentations
Theme 3 Healthy Delta Environment	Good practices and policy recommendations report http://www.deltanet-project.eu/filemanagermodule/file/id/317/src/documents/
	Conference report of the international Tulcea conference (September 2011) & conference presentations
	5 work plans for Danube Delta, Ebro Delta, Minho Estuary, Severn Estuary and Vistula Delta
	3 interregional workshop reports & workshop presentations
Theme 4 Delta Awareness	Good practices and policy recommendations report http://www.deltanet-project.eu/filemanagermodule/file/id/307/src/documents/
	Conference report of the international Gdansk conference (May 2012) & conference presentations
	5 work plans for Ebro Delta, Severn Estuary, Tagus Estuary, Vistula Delta and Rhine Scheldt Delta
	3 interregional workshop reports & workshop presentations
Theme 5 Coordinated Delta Approach	Good practices and policy recommendations report http://www.deltanet-project.eu/filemanagermodule/file/id/319/src/documents/
	Conference report of the international Ghent conference (October 2012) & conference presentations
	8 work plans for Rhine Scheldt Delta, Tagus Estuary, Elbe Estuary and Severn Estuary, Danube Delta, Ebro Delta, Minho Estuary, Vistula Delta

Theme	Full name
	3 interregional workshop reports & workshop presentations

Abbreviations

Abbreviation	Full name
ASERA	Association of Severn Estuary Relevant Authorities
BCSCG	Bristol Channel Strategic Coastal Group
BCSEG	Bristol Channel Standing Environment Group
DDBRA	Danube Delta Biosphere Reserve Authority
DDNI	Danube Delta National Institute
FRMD	Flood Risk Management Directive ("Directive 2007/60/EC on the assessment and management of flood risks")
ICPDR	International Commission for the Protection of the Danube River
KZGW	Krajowy Zarząd Gospodarki Wodnej (National Water Management Authority of Poland)
MSFD	Marine Strategy Framework Directive ("Directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy")
NDSCG	North Devon and Somerset Coastal Advisory Group
RZGW	Regionalny Zarząd Gospodarki Wodnej (Regional Water Management Authority of Gdansk)
SCOSLA	Standing Conference of Severnside Local Authorities
SECG	Severn Estuary Coastal Group
SEP	Severn Estuary Partnership
TRBDA	Tagus River Basin District Administration
VNSC	Vlaams Nederlandse Schelde Commissie (Flemish Dutch Scheldt Committee)
WFD	Water Framework Directive (“Directive 2000/60/EC establishing a framework for the Community action in the field of water policy”)