

The River Elbe in Hamburg

A description of the issues surrounding the dredging of the River Elbe and possible means of conflict resolution



Photo: A. Holda



Case study report within the Coastman project

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Abstract

The development of the city of Hamburg has always been interlinked with and shaped by its harbour activities. Due to its inland location and topography, the port's main problem is the accumulation of sediments and the need for regular.

The further deepening of the River Elbe is also of on-going concern for the purpose of port development. An additional 1 metre depth of the River Elbe is vital to allow 24 hours accessibility of the port, independent of high tides, as well as to allow ships with 15.5 meters draught and bigger transport capacities than ever before to reach the port of Hamburg. This in practice means changes to the river bottom over a distance of 130 kilometres, from the port area downstream to the Elbe outlet into the North Sea. The further deepening of the river is envisaged for the years 2007-2009. For the Hamburg and its region this is a political decision of great importance creating controversies due to the often conflicting economic, environmental and social interests of different stakeholders.

This case study describes the background of the problem and provides different alternatives for its solution. A self assessment tool was introduced by the Hamburg team as part of this case study. This so-called 'Marker' was used for the assessment of the current state of Integrated Coastal Zone Management planning.

Keywords: Germany, Hamburg, port, Integrated Coastal Zone Management, ICZM Marker

1 Introduction

From the historical perspective, Hamburg has always been bound to harbour activities, which have shaped the development of the city to a great extent. Due to its location inland and topography, the port has one problematic characteristic, the need for regular dredging of accumulating sediments.

The deepening of the river was specifically discussed in the 1990's, when it was discovered that the river sediments were highly contaminated, and needed to be treated before any disposal could be considered. The pollution was a result of upstream industrial activities in the former GDR and Czech Republic, which at that time largely disregarded environmental issues. Since then, many pollution prevention and control techniques have been implemented and the quality of the river water has improved. However, the polluted sediment is still transported up and downstream throughout the river.

Although some technical solutions to clean part of the dredged sediments have been found, further problems for the port of Hamburg have emerged. For example, the amount of sediment reaching the harbour had doubled by 2004, constituting over 8m tons, as compared with 4m tons in the years before. The capacity of on-land storage of sediments will be exhausted in 6 years, thus new sustainable long term solutions to deal with the increased amount of this material, including treatment and storage, need to be found. Moreover, recent observations followed by further research indicate a trend of decreasing water levels in the river as a result of climate change. Less water will affect both the people living in the Elbe river basin as well as the local fauna and flora, and additionally interfere with the port activities in the near future.

One of the on-going problems seen in the Hamburg area, which is highlighted by the issues mentioned above, concerns the further deepening of the Elbe River for the purpose of port development. To allow 24 hours accessibility of the port, independent of high tides, as well as to allow ships with 15.5 meters draught and bigger transport capacities than ever before to float to the port of Hamburg, the Elbe river needs to be deepened by another 1 meter. This in practice means changes to the river bottom over a distance of approx. 130 kilometres, from the port area downstream to the Elbe outlet into the North Sea.

Planned for the years 2007-2009, the further deepening of the river is a political decision of great importance for the Hamburg region, which creates controversies due to the often conflicting economical, environmental and social interests of different stakeholders.

This case study will therefore take a closer look at the multidimensional character of the Elbe River Deepening Plan by presenting different viewpoints of the stakeholders and their respective arguments for and against the plan. It will also discuss related environmental management issues which add up to the complexity of this case. Furthermore, a set of relevant conflict resolution methods, which bear in mind the circumstances that led to the current state of conflict, together with the presently drafted or prepared solutions (such as 'Concept for the sustainable development of the Tidal Elbe' as well as the German national ICZM strategy) will be described.

In addition, as part of the case study, the Hamburg team introduced a self assessment tool, called a 'Marker', which is used for the assessment of the current state of Integrated Coastal Zone Management planning. These developments will be outlined in this case study as well as lessons learned.

2 Problem Background

2.1 Characteristics of the Elbe drainage area

The River Elbe is one of the largest rivers in Central Europe, third after the rivers Danube and Rhine in terms of length as well as catchment size. The drainage basin area of the River Elbe comprises 148,268 km² (IKSE 1995, 2000) and is shared between Germany, Czech Republic, Austria and Poland. However, Austria and Poland count less than 1 % of the catchment area while 2/3 is located in Germany and 1/3 in Czech Republic. The source of the River Elbe is in the Giant Mountains (“Krkonoše Mountains”, Czech Republic), flows through the Czech Republic, through the northern and central part of Germany and discharges in the North Sea near Cuxhaven. The River Elbe covers a distance of 1091 km (727 km in Germany, 364 km in Czech Republic) (IKSE 1995, 2000) and along its way, the catchment area interacts with some of the major cities in the area, such as Prague, Dresden, Berlin and Hamburg (refer to Figure 1).

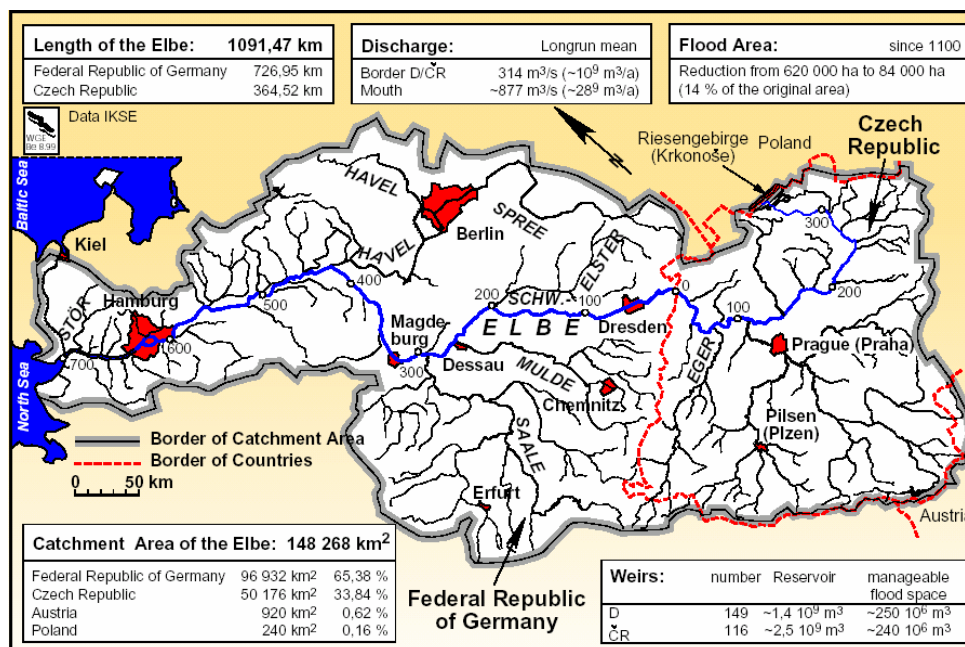


Figure 1: Characteristics of drainage area of the River Elbe (Source: ARGE ELBE)

On its last 110 kilometres, before reaching the North Sea, the river is tidally influenced. Tidal fluctuations lead to very special forms of wetland habitat and biodiversity. This is also true around the city of Hamburg, especially where its container shipping port is situated.

2.2 The city of Hamburg and the importance of its port

The Free and Hanseatic City of Hamburg is a city-state and the second largest city in Germany with 1.7 million inhabitants. It is a cultural and commercial centre for Northern Germany, its metropolitan region consisting of approximately 4 million people. Hamburg municipal area is equal to 755.3 km² whereas the metropolitan region covers a total surface of approximately 19.000 km² and embraces 14 districts around the City of Hamburg. After the Ruhr area and Berlin it is also the third biggest industrial area in Germany, with business related to: aircraft-, ship- building and automotive industry; electronics technology, precision engineering and optics industry; mechanical engineering; chemistry; mineral oil processing;

and metal production. However, of highest importance to the city is the industry related to the harbour and the harbour activities per se. (SAHSH, 2005)

The Port of Hamburg is the largest port in Germany, the third largest port in Europe (after Rotterdam and Antwerp) and one of the ten largest container ports worldwide. It is considered a focal point for the trade conducted with Eastern and Northern Europe and is also an important connection point that ensures the traffic to and from the hinterland flows, thanks to its efficient network of inland waterways, feeder ships, railways and road carriers (HPA, 2006a). The international trade volumes account approximately for one third of Europe's export. The surface area occupied for the activities relating to the harbour function constitute as much as 10% of Hamburg's total area.

The port and shipping sectors employ around 75,000 people in Hamburg. In addition, more than 133,000 jobs in a vast range of industrial and service sectors are directly or indirectly dependent on the port, which accounts for 12,7% of the total employment of the city generating a share of 14,4 % to the GDP of Hamburg. In the metropolitan catchment area around 156,000 jobs depend directly or indirectly on the port and 258,000 throughout Germany. (HPA, 2007)

2.3 Accumulating sediment and the problem of previous contamination

In order to sustain the trade by allowing free passage of ships through the harbour, which is located around 110 kilometres from the North Sea, as well as to keep the harbour fully operational, the depth of the navigation route has to be assured. Like almost all harbours situated at tidal rivers, Hamburg harbour is affected by sedimentation problems. A frequent characteristic of harbour sedimentation is that 60-85% of the deposited material is located near the harbour entrance. This is mainly caused by flow-induced eddies due to the trapping effect of horizontal flow circulation. Sediments accumulate in the port of Hamburg through tidal action from the marine environment and through the deposition of fluvial sediments from the river Elbe and lead to a permanent decrease of water depth. Therefore, in the Port of Hamburg, dredging has to be undertaken regularly to secure a sufficient water depth for all types of vessel traffic.

Traditionally, the dredged sediments were used beneficially for land reclamation or agriculture. However, approx. 20 years ago the contamination of dredged sediments, mainly with heavy metals (As, Cd, Hg, Zn) and organic contaminants (PCB, Dioxins, PAHs), and the resulting negative effects on the environment, came into public focus (Heise, 2005). Thus, it became clear that sediments needed to be treated before their usage or disposal in the Hamburg region. The pollution was a result of upstream industrial activities in the former GDR and Czech Republic (mining chemical, pharmaceutical, pulp and paper, as well as leather-processing industries), which at that time disregarded environmental issues (Netzband et al., 2002). This led to a broad political discussion. A Dredged Material Research Programme was initiated, but Hamburg could not act upstream to prevent further emissions into the river Elbe. The political change of the late 1980's led to significant improvements for the Elbe. Many industrial and agricultural complexes of the former communist regimes collapsed, and substantial amounts of discharges of pollutants ceased. The remaining industries and farms or those that had started since the early 1990's are generally equipped with modern pollution control technologies (Reincke et. al., 2003). However, the polluted sediment is still transported downstream by the river Elbe.

2.4 Solutions for the treatment of dredged material

Initially, a technical solution for the treatment of dredged sediment was devised, consisting of pre-treatment, which is the separation into sand and contaminated silt fraction, and the dewatering process followed by environmentally safe disposal of the silt in two specially constructed silt mounds (Netzband, 2002). Pre-treatment is done in the large scale METHA plant (MEchanical Treatment and Dewatering of HARbour-sediments). It has a throughput capacity of 1 million m³ of sediment per year. Its products, besides smaller amounts of coarse materials, are sand, fine sand and silt. The sand is used as construction material and is almost contaminant free (Detzner et al. 2004). The fine sand can be used in industry as a raw material or additive, whereas the silt can be used as a sealing material in the construction of disposal sites or can be used for harbour backfilling (Langaas et. al., 2002). At present, a major portion of the dredged material generated by maintenance works is relocated into the Elbe. With the open water disposal, sediment coming from the river is put back into the aquatic system. The effects of relocation on the environment are minimized, in accordance with a concept of sustainable relocation.

The cumulative impact on Hamburg of both the amount of sediments from upper reaches of the Elbe and their contamination is that Hamburg has to spend substantial amounts of money on treatment, relocation and disposal of the dredged material. The costs for the city of Hamburg amount to roughly € 30 million per year, not including personal and capital costs (HPA 2005a).

2.5 Tidal pumping – more sediment reaching the harbour

Until the year 2000, the amount of sediment that had to be dredged every year was at a stable level of roughly 2 million m³. Since then, the amount of material has been increasing, reaching 3 to 4 million m³/year. In the year 2004, over 8 million m³ of sediment needed to be dredged from the tidally influenced Hamburg area (HPA, 2005b). The increase in the amount of sediment in the port is caused by a specific tidal pattern, the so called tidal pumping effect. It returns to the harbour the material that has been relocated in the past years in the area of the turbidity zone (HPA, 2006c). In short, the high tide brings back more of the material to the port, as the low tide takes away. This is a problem of huge importance for Hamburg harbour, which not only has to dredge more accumulating sediments, but also has to find new ways to handle its treatment, as the current amounts exceed the capacities of the METHA sediment treatment plant. In addition, this also means an increase of the associated costs for the dredging itself and for treatment and storage of the sediment.

2.6 The problem of on-land storage space for treated sediments

Dredging activities and treatment of contaminated sediments are not the only problems with which Hamburg has to deal in view of increasing amounts of sediment reaching the harbour. It is also the issue of space that plays a crucial role here. Being a city state, Hamburg had to dispose of the treated sediments, originating from dredging, in its limited city borders. However, the on-land storage capacity for the treated sediments is predicted to satisfy the disposal needs only for the next 6 years (HPA, 2006c). Therefore Hamburg had to seek out other solutions. The Hamburg Port Authority and the Waterway and Shipping Directorate (“WSA Nord”) for example, have developed a sediment management concept for the tidal Elbe, which was seen as an economically feasible solution for sediment storage. The plan encompasses storage of 4.5 millions m³ of dredged material in the North Sea in the years 2005 to 2008.

2.7 Influence of climate change on Elbe water level

Observations of the fluctuations of the water level of the river Elbe indicate a decreasing water level trend. Further research carried out by the Institute for Climate Research in Potsdam as well as the Max-Planck Institute for Meteorology led to the conclusion that this is happening as a result of climate change, and moreover, show that the water level can decrease even further within the next years (DUH, 2006; HA, 2006). Less water can affect both the people living in the Elbe river basin as well as the port activities in the near future. With a decrease of water levels large vessels will no longer be able to reach the port of Hamburg. This will lead to severe consequences for the shipping trade and for the economy of the port as well as of the whole Hamburg region.

3 Conflict Description

3.1 Reasons for deepening of the Elbe River

Accumulating sediment has always been a problematic issue for the harbour to deal with, and dredging the river for the purpose of providing good navigation can be described as a traditional activity. However, as shipping technologies change, the carrying capacity of vessels constantly increases, resulting in bigger draught of the ships. As a result, to sustain the trade and guarantee their competitiveness, harbours have to develop and adapt. Such changes, in the case of the port of Hamburg, also involve the deepening of the river Elbe.

In addition, at present, the navigability of the gateway from the Port of Hamburg towards the North Sea depends on the tidal fluctuations on the river Elbe. With reference to the Elbe, the low tide is longer than the high tide, 7 hours 30 minutes long. In Hamburg, the tidal range is 3.63m (2001 – 2005 average) (HPA, 2007). If the tidal fluctuations are not taken in account, vessels reaching 12.80 meters fresh water draught may reach or leave the Port of Hamburg independently of tidal variations; while vessels with a deepest draught of 15.10m have to depend on the high tide. The outgoing vessels may use a 13.80m fresh water draught availability during the high tide to leave the Port of Hamburg (HHVW, 1999). At present, the Lower Elbe is 15.30m deep, but for full navigability independent of the tide fluctuations, a deepening by a further 1 meter is necessary.

3.2 Economic, Environmental and Societal interests

As long ago as February 2002 the Senate presented Hamburg's application for a further adaptation of the Lower and Outer Elbe shipping channel to the Federal Ministry for Traffic, Construction and Housing (BWA, 2004a). The development plan, whose start was initially set for the end of year 2007, has met a broad public debate and has faced criticisms from many non- governmental environmental organisations. The use, ecological state and further transformation of the river Elbe are important subjects for the different interest groups, which have various economic, environmental or societal aspects as their focus.

3.2.1 Economic interests

Some of the predominant economic interests are as follows:

- Harbour related activities are a central driving force for the economy of Hamburg and the whole of Northern Germany;
- Assuring competitiveness of the harbour on a European scale, with regard to trade as well as tourism;
- Utilising capacity and fulfilling the demands of the container terminals;

- Sustaining other smaller businesses, related to port activities;
- Investing in the development of the largest port in Germany.

Those interests are represented by the Hamburg Ministry of Economy and Labour Affairs, the Hamburg Ministry of Urban Development and the Environment, Hamburg Port Authority, the Hamburg Chamber of Commerce as well as tourism operators.

3.2.2 Environmental interests

Some of the predominant environmental interests are as follows:

- Protecting and maintaining the natural conditions of the Elbe environment in general;
- Keeping the morphological changes of the river on the lowest possible level, as they also impact on flooding;
- Lowering the industrial emissions of pollution from the harbour to zero;
- Acting against severe O₂ depletion, present during the summer time in Hamburg, which often results in a large number of fish kills;
- Ensuring that the disposal of potentially contaminated dredged sediment in the North Sea will not affect fish and the marine environment.

They are represented by Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety, by various non-governmental environmental organisations such as Greenpeace, WWF, Deutsche Umwelthilfe, BUND, as well as by the general public.

3.2.3 Societal interests

Some of the predominant social interests are as follows:

- Securing employment for 146.000 people in the metropolitan region, directly or indirectly related to the harbour activities;
- Assuring the use of water for the purpose of social events, such as Elbe Swimming Day on 17 July 2005 (Elbebadetag, 2005) or the Big Jump Event (Big Jump, 2005) which now occur annually.

Social interests are represented by the general public as well as the Workers Union.

3.3 *Divergent opinions on the deepening plans*

Based on the different interests and stakes they represent, two conflicting groups advocating for or against the further deepening of the river Elbe can be distinguished.

The arguments for deepening of the Elbe are mainly supported by economic interests. Since the harbour activities are among the driving forces for the economy of Northern Germany, utilising their capacity is important and desired in the whole region. Also, further development of the port will not only promote environmentally friendly transportation of goods, but will also secure the current employment of 146.000 people, and related small businesses (BWA, 2006). In addition, financial aspects speak for the deepening. As compared to other investments in the region, the costs of the plan, of around € 320 million, are seen as a relatively low investment. There is enough money in the national and state budget to carry out the plan, which is strongly supported by the Hamburg Ministry of Economy and Labour Affairs.

On the other hand, the arguments against the port development plan are various, and range from environmental concerns to suggestions for financing another deep sea water port.

The environmental arguments express the concerns of further morphological changes applied to the river and the consequences of the deepening to the oxygen content in the river, to fish populations as well as tidal fluctuations and sediment transport. The extent of the impacts can only be estimated, thus the real influence might prove to be more severe, as it was the case with the last Elbe deepening in 1999 (WWF, 2005).

Based on recent research indicating that the general decrease of the water level in the Elbe is related to climate change, many non-governmental environmental organisations demand that a new feasibility study be carried out for the Elbe deepening plan, taking climate change aspects into account (DUH, 2006). As the Institute for Climate Research in Potsdam predicts that low waters will be even more severe in the coming years, many NGOs claim that the 24 hours navigation availability to the harbour, independent of high tides, will not be achievable. Thus, in view of the increasing amount of sediment transported to the harbour, their suggestion to the local authorities is that the investment will not meet its purpose (LZ, 2006).

The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety does not deny that vessel transport is one of the most environmentally friendly ways of transporting goods. However, a major argument against the deepening is the long term vision of the container transport development. There are claims that after the year 2010, one deep water port will be developed on the German North Sea coast, serving as a hub for the current shipping industry (HA, 2004a). Moreover, some argue that Germany is financially unable to develop more than one deep water port. Therefore, if the port of Wilhelmshaven receives the necessary financial support, it will become a serious competitor and a problem for the port of Hamburg in several years. Some experts confirm this prediction and speak for Wilhelmshaven: since it is situated directly at the coast, vessels would not have to travel at least 110 kilometres inland. Moreover, Wilhelmshaven does not have such extensive problems with sediments as Hamburg has.

In addition, an important argument used against deepening in 2007 is that despite predicted further increase in vessel draught and carrying capacity, further deepening actions of the Elbe will not be achievable (HA, 2004b). The Hamburg tunnel under the river Elbe, for example, makes it technically nearly impossible (LZ, 2004).

4 Relevant stakeholders and relevant conflict resolution methods

4.1 *Categories of stakeholders*

Based on the differing interests of the various parties concerned with the deepening plan, the coastal stakeholder community was identified and divided into three groups. The first category encompasses the relevant decision making bodies, whereas the second category focuses on interest based parties, whose fate is dependent on approval of the Plan. The third category gathers other institutions and research bodies.

Category 1: conflicting stakeholders

- Hamburg Ministry of Urban Development and the Environment
- Hamburg Ministry of Economy and Labour Affairs
- Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety

Category 2: interest-based stakeholders

- Hamburg Port Authority
- Chamber of Commerce Hamburg
- Tourism operators
- Ship owners
- Port workers

Category 3: other stakeholders

- Universities
- NGOs
- Research Institutes
- Authorities dealing with integrated coastal zone management of neighboring Länder (German regions), in particular Schleswig-Holstein and Niedersachsen.

The interests of those stakeholders and their following viewpoints, for or against the Elbe Development Plan, have been described in the previous chapter. The next section deals therefore with the decision-making process and how that relates to conflict resolution.

4.2 *Decision making process and conflict resolution*

Having received the application for further adaptation of the “Lower and Outer Elbe shipping Channel” in 2002, the Federal Ministry for Traffic, Construction and Housing set up a project group for carrying out the required preliminary investigations. A set of feasibility studies was seen as a precondition for the project to be put on the top priority list of the Federal Traffic Routes Plan. They included investigations of the technical feasibility of another shipping channel expansion, an environmental risk study, as well as an economic cost-benefit analysis. The results showed that another expansion is technically feasible, economically cost-effective and ecologically justifiable (BWA, 2004b). On this basis in September 2004 the Federal Government gave its preliminary consent to the Development Plan, which left the path clear for the preparation of the Plan Approval Procedure. In specific terms it meant that (BWA, 2004a):

- detailed plans for the project were to be completed;
- measures leading to the award of a contract for the environmental studies had to be carried out;
- scoping meetings were to be held;
- parameters of the environmental sustainability study were to be determined;
- involvement or participation of those authorities and associations that are responsible or affected was to be assured;
- and environmental studies as such were to be carried out.

The environmental studies consisted of in-depth hydrological studies, carried out by the Federal Institute of Hydraulic Engineering. In addition, the landscape conservation plan was initiated to define the compensating ecological measures that are to be called for, as well as an intensive ‘transparent planning’ strategy to keep the general public well informed. It is thus assumed that an independent survey as specified by the cabinet resolution (BWA, 2004a) will give full consideration to the natural conservation aspects. The above described studies were to be brought to a conclusion in time for the Plan Approval Procedure to be initiated in the middle of the year 2006.

With regard to such big development plans as the Hamburg Port development, the disputes of conflicting stakeholders are highly political. Therefore, the decision making process, which includes the Feasibility Study and Plan Approval Procedure, takes into consideration different perceptions and concerns of the interested parties as well as ensuring public participation, which together should lead to the resolution of the conflict.

In addition to the legislative process, various research institutes and universities carry out both independent in-depth studies on a given subject, as well as providing additional and often new input and long term predictions of the factors that are relevant to the case. An example can be the two already mentioned institutes – the Max-Planck Institute for Meteorology in Hamburg and the Institute for Climate Research in Potsdam – making studies on climate change and its influence on the Elbe River. Providing reliable data on a highly disputed subject leads to transparency and contributes to conflict resolution, whereas new information and observations assure that all aspects or impacts in the Development Plan are being considered.

5 Possible solutions or lessons learned

There is no single, satisfactory solution to such multidimensional problems, where conflicting interests and different stakeholders are involved. The outcome of the decision making process is unlikely to satisfy all parties to the same extent, unless a sustainable long-term vision for the region as well as for the port is taken into account. That is why as one of the means for conflict prevention and management, through better development of the coastal region, a Sustainable Development Plan for the tidal Elbe taking into account the national Integrated Coastal Zone Management Strategy, was developed.

Moreover, in addition to the legislative Plan Approval Procedure, several other decision support tools can be used for conflict management and resolution. The Marker self-assessment tool and the SWOT Analysis, as well as the DPSIR Framework, which were applied to this case study by the COASTMAN Hamburg team, can be used to enhance the process by improving its transparency and by analysing it from a different perspective while at the same time making sure that all interests are taken into consideration.

5.1 DPSIR Framework

As part of the Hamburg case study an overview of environmental management dimensions of current and potential future conflicts in the river Elbe in Hamburg was developed using a DPSIR Framework. In addition, conclusions on how to improve the environmental condition of the river Elbe in Hamburg, taking the social, economic and political development of the region into consideration, were drawn. Applying this framework provides a higher transparency to the assessment of the origins and consequences of environmental problems, thus serving as a good conflict management tool.

5.1.1 Description of methodology

Adopted by the European Environment Agency, the DPSIR framework is a crucial instrument for describing the interactions between society and the environment and relationships between the sources and results of environmental problems. DPSIR stands for:

- *Driving Forces*, the human or economic activities that cause pressure – e.g. population increase, increased urbanisation;
- *Pressures*, expression of the driving forces – e.g. emissions of harmful substances;
- *State of the environment*, which describes the quality and quantity of natural resources – e.g. nitrogen and phosphorus levels in inland and coastal waters;
- *Impacts*, effects or loss of use experienced in the environment – e.g. loss of amenity in a waterway, decrease in biodiversity;
- *Responses*, various corrective actions undertaken that may affect any of the inputs of the conceptual framework – e.g. EU Directives, taxes, incentives.

Relationships between the components are described in Figure 2. It describes the interaction between the State of the environment, the anthropogenic Pressures and the underlying direct and indirect Driving Forces. Further, the Impacts of the changes in the State of environment and the Responses from society in order to counteract these unwanted impacts are comprised by the framework. The DPSIR model illustrates both that the societal activities affect the state of the environment, and that there is a feedback from the State of the environment to society in the form of environmental policy initiatives for individual sectors (agriculture, transport, industry etc.). In order to understand their dynamics it is also useful to focus on the links between the DPSIR elements. For instance, the relationship between Driving Forces and Pressures by economic activities is a function of the eco-efficiency of the technology and related systems in use. Similarly, the relationship between the Impacts on humans or eco-systems and the State depends on the carrying capacities and thresholds for these systems. Whether society “Responds” to impacts depends on how these impacts are perceived and evaluated and the results of Responses on the Driving Forces depends on effectiveness of the Response (Arevalo & Heise, 2003).

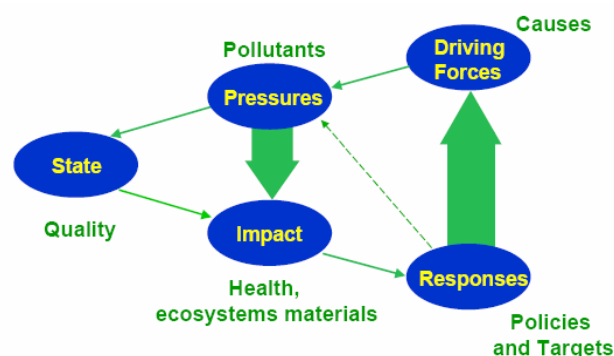


Figure 2. DPSIR assessment framework. Source: EC, 2003

5.1.2 Application of the DPSIR Framework to the River Elbe

General overview of the Driving Force – Pressure – State – Impact - Response framework for the Hamburg part of the river Elbe was carried out outlining different aspects of the environmental problems and conflict. Results are presented in Table 2.

Table 1. DPSIR Framework applied to River Elbe in Hamburg.

Driving Force	Pressure	State of environment	Impact	Response
Port Activities and Navigation	<ul style="list-style-type: none"> - Dredging - Utilisation of the port area - Shipping accidents 	<ul style="list-style-type: none"> - Change of river morphology and ecological condition of the river - Pollution (oil, chemicals) 	<ul style="list-style-type: none"> - Disappearance of several species in flora and fauna - Contaminant accumulation in sediments and also in fishes 	<ul style="list-style-type: none"> - National, European and international policies - National and international cooperation agreements and conventions
Flooding	<ul style="list-style-type: none"> - Flood protection 	<ul style="list-style-type: none"> - Change of river morphology and ecological condition of the river 	<ul style="list-style-type: none"> - Treatment and disposal of dredged material made difficult due to the heavy contamination of sediments with heavy metals (especially Cadmium) 	
Households and Industries	<ul style="list-style-type: none"> - Point and diffused pollution sources 	<ul style="list-style-type: none"> - Pollution of the river water and sediments with nutrients and hazardous substances 		

5.1.3 Future environmental management problems and related conflicts of the River Elbe

Based on the assessment of the current problems and trends, possible future conflicts can be identified. These may arise from several environmental problems, which have to be faced and taken into consideration while managing the river Elbe. They are as follows:

- A continuing threat to biodiversity is the future decrease and degradation of the habitats as a result of climate change, further specialisation of agriculture and continued increase of traffic infrastructure and industrialisation.
- The proliferation of new alien species, mainly as a result of new conditions caused by increasing water temperature, ballast water and introduction by man may pose future problems.
- Future water quality problems with new hazardous substances may arise. Endocrine disruptors are substances that have disruptive effects on hormonal processes in organisms including man. PCBs and TBT are examples of endocrine disruptors, the production and use of which are being or have been phased out or are strictly limited.
- Due to the development in the shipping sector (e.g. insufficiently trained crews, sub-standard vessels, and inadequate salvage capacity) there is a potentially increasing risk of shipping accidents.
- Another future threat is a potentially accelerating sea level rise, which may on the one hand have an impact on the ecosystem, and on the other hand pose an increasing burden on coastal protection and the safety of the hinterland.

The solution of future conflicts depends on the extent to which the barriers to progress in environmental protection and sustainability can be overcome. This is mainly due to the complex, inter-sectoral, inter-disciplinary and international nature of both the problems and the solutions. These barriers are underpinned by shortcomings in institutional structures, non-implementation of commitments already made and lack of information on and understanding of possible 'win-win' solutions for achieving sustainable outcomes. Such solutions embrace competitiveness and innovation, social cohesion, territorial cohesion and the protection and maintenance of scarce natural resources and valuable ecosystems (EEA, 2004).

5.1.4 Conclusions drawn from application of DPSIR Framework

The application of the DPSIR Framework to the case study of the River Elbe provided higher transparency of the studied problem and has led to one conclusion: a sustainable river management strategy of the river has to consider integration and implementation of sectoral strategies with regard to policies/activities in the coastal zone and mainland. As there is still insufficient or lack of cooperation between local, regional, national and EU authorities in the preparation, implementation, enforcement and coordination of the rules and regulations, cooperation between responsible authorities is essential. In order to facilitate sustainable management the rules and regulations should be harmonised and simplified. While acknowledging that public participation in policy and management already exists on many levels it is encouraged to further enhance bottom-up processes wherever possible and as far as compatible with the principles of parliamentary democracy.

The full report from the application of the DPSIR Framework to Hamburg case study can be viewed on COASTMAN website at: www.coastalmanagement.net

5.2 SWOT Analysis

Within the framework of the COASTMAN project a conflict assessment method, the SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) of the Port of Hamburg has been performed. It casts a different light on the positive trends and challenges in the environmental management of the Elbe in Hamburg.

5.2.1 Application of the SWOT Analysis to Hamburg case study

Table 1 depicts the strengths, weaknesses, opportunities and threats of the environmental management components of the river Elbe. The commitments to abide by national laws and the EU Water Framework Directive (WFD) as well as the geo-economic importance of the port are positive signs for the future of Hamburg's harbour areas. These strengths make it possible to ensure the ecological sustainability of the river Elbe and the economic stability of the Port of Hamburg. The location of sources of pollutants outside the boundaries of Hamburg and the non-availability of an economical dredged sediment disposal option are serious weaknesses found within the framework of the analysis, which may also be a source of conflicts. At the same time, the globalisation of the Eastern and Central European countries has provided an opportunity for the Port of Hamburg to promote its business.

In contrast, the proposed harbour development plans have been opposed by different stakeholders on the basis of environmental, ecological and social reasons. The lack of harmonisation of ideas on the development plan poses a major threat to the Port of Hamburg.

Table 2. SWOT Analysis of environmental management components of River Elbe. Own illustration.

Strengths	Weaknesses
The concerned authorities and stakeholders are eager to find solutions to the technical, environmental and legal problems being faced by Hamburg's coastal areas.	Major sources of contaminants do not lie within Hamburg's jurisdiction. From upstream, different pollutants travel and stick to sediments, resulting in contaminated sediments at a later stage.
The commitment to national laws and international conventions is very strong among the authorities responsible for coastal resources management.	Deepening of harbour project is questioned due to the presence of contaminants in Dredged Material (DM). The Federal Government does not support Hamburg with regards to its idea of DM management.
Hamburg has the ability to ensure its economic stability, due to its well-established port economy.	The disposal of DM is a very expensive task. Hamburg has to spend a large amount of money on the treatment of DM and its disposal.
Hamburg has efficient hinterland links.	The lack of land available for disposal of environmentally safe dredged material disposal and relocation restrictions are also weaknesses.
Hamburg has been the European centre for trade with East Asia and China.	
Hamburg has very close relations with the Baltic Region and Eastern Europe.	
Opportunities	Threats
An opportunity exists to improve the environmental status of coastal water by implementing EU directives at European level.	Lack of consensus between Hamburg and other upstream Federal States regarding the management of the Elbe catchment area is a major threat.
The EU encourages research work in the field of coastal resources management. It provides a great understanding of specific problems.	Furthermore, NGOs are also opposed to the deepening of the harbour.
Hamburg has the potential to compete with other ports in the region.	The relocation of dredged material and changes to the river morphology pose a threat to the ecosystem.
Hamburg has the opportunity to benefit economically from the economic development in Eastern European countries and Russia.	Emissions from old polluted sites in coastal water will lead to the ongoing pollution of surface water and sediments.

5.2.2 Conclusions from applying the SWOT Analysis

The analysis has disclosed the various strong and weak points related to the activities of the Port of Hamburg. Within its framework, different aspects of the environmental management of the harbour were investigated to establish its capacity to face present and future economic, environmental, and social challenges. Keeping in mind the different operational aspects of the Port of Hamburg, the following recommendations have been put forward to avoid or at least minimise possible conflicts among different stakeholders:

- Long-term solutions to reduce contaminants in the sediments from upstream must be developed with the help of the Federal Government and other Federal States. This will help to ensure the deposition of clean sediments from the Port of Hamburg in suitable places.
- More extensive environmental impact assessment of the deepening of the Port of Hamburg may be carried out in order to determine its precise impacts on the biodiversity of the Elbe.
- A long-term solution to environmentally friendly sediment disposal should be drawn up to alleviate the fears of different stakeholders.
- The possibility of sub-aquatic disposal should be investigated.
- Legal obligations can be met by following a long-term policy as mentioned above. In addition, close co-operation with other stakeholders will reduce the chances of any legal conflicts arising.
- A close coordination with the NGOs and other concerned bodies is necessary to keep alive the social and cultural value of the Elbe.

5.3 German National ICZM Strategy

In the view of the European Union, the implementation of an ecologically sustainable, economically balanced and socially compatible coastal zone management that also gives careful consideration to cultural aspects meriting protection and maintains the integrity of the coastal ecosystems is of decisive importance for sustainable development. By virtue of the recommendation of the European Parliament and the Council of 30 May 2002 (EC, 2002) to implement a strategy for integrated management of coastal zones in Europe, the Member States were called upon to focus their attention on this tool and submit a report by February 2006.

The development of a national ICZM strategy in Germany is based on an assessment of the economic, social and ecological situation of Germany's coastal zones as well as of the legal, political and administrative structures and institutions that have an influence on the conditional framework for taking action in the coastal regions.

For the national strategy ICZM is viewed as an informal approach aimed at supporting sustainable development of the coastal zones through good integration, coordination, communication and participation. On the one hand, ICZM is a process that should permeate all planning and decision making levels as a guiding principle, and on the other hand, it is a tool applied prior to formal procedures for the purpose of integrated identification of potential development and conflict as well as for resolving conflicts. The German national strategy is based on the following basic principles:

- ICZM shall promote **sustainable development** of coastal zones with their specified ecological, economic and social features and support the sustainability strategy of the Federal German Government;
- ICZM represents a guiding principle for political and social action at all levels in coastal zones and is aimed at coordinating the development of coastal zones through a comprehensive approach and **integration** of all concerns;
- ICZM incorporates all relevant policy areas, economic and scientific stakeholders, social groups and levels of administrations into the process (**participation**) in order to identify development potential at an early stage, find solutions for which there is a consensus and improve conflict management;
- ICZM is viewed as a continuous process that combines the phases of planning, implementation and evaluation of changes in coastal zones so as to make the best possible use of experience for the future (**experience transfer**).

The results of the assessment of strengths and weaknesses of the current situation in coastal zones indicate that major aspects of the ICZM basic principles have already been implemented in important areas through the planning practice established in Germany, on respective legal foundation. However, it is also plain that further steps have to be taken to improve the achievement of goals at the planning and in particular at the individual decision making level. With respect to the existing set of tools and activities the national strategy envisages four areas in which further steps should be pursued:

- Further optimisation of the set of legal instruments according to the basic ICZM principles,
- Creation of the basis for continuation of the dialogue process,
- Best practice projects and their evaluation,
- Development and application of ICZM indicators.

However, as the German national strategy states, it should not lead to the creation of new bureaucratic obstacles. On the contrary, by initiating broad-based participation, acceleration of the problem-solving process is targeted since conflicts can be identified, discussed and resolved at an early stage.

Implementation of the national strategy will have to be pursued by Federal and state legislators as a top down approach, especially in connection with optimisation of the existing set of tools in accordance with the basic ICZM principles. Furthermore, the Federal and Länder governments will have to provide resources and communication platforms and perform coordination tasks. In addition, another focal point will be the bottom up oriented cooperation between governmental institutions with local, regional and social actors.

The Integrated Coastal Zone Management Strategy for Germany has been presented by the Cabinet on 22 March 2006, and was officially submitted to the European Commission at the beginning of April (Umwelt, 2006). (BMU, 2006)

5.4 ICZM and the Marker self-assessment tool

One of the keys to the sustainable development of the City of Hamburg is reconciling the interests of those stakeholders developing its harbour with the interests of other stakeholders present, such as tourism, fisheries, housing, and nature conservation among others. Therefore within the Hamburg case study an investigation was carried out on how instruments of Integrated Coastal Zone Management can contribute to resolving conflicts.

5.4.1 Aims and objectives

The reasons for applying the ICZM Marker in the framework of the Hamburg Case Study were the following:

- The Marker was introduced to COASTMAN partners and to representatives of the Hamburg stakeholder community and was regarded as an interesting instrument.
- A contribution to the European discussion process on ICZM instruments was sought by testing the Marker in Hamburg and providing feedback to the European level and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.
- Application of the Marker in form of a workshop facilitates the discussion process among coastal stakeholders about what ICZM is, what has been done in the recent past in order to establish it as part of the local, regional or national coastal management and planning process, and where the weaknesses are, thereby contributing to conflict resolution and communication among the stakeholder community.

On 28 April 2006, the National ICZM strategy for Germany was presented at a conference in Bremen. The strategy itself as well as several conference participants was critical about the European ICZM Progress Marker. This is why it was decided to focus less on the results of a Marker application in Hamburg and more on achieving consensus on how the Marker could be improved in order to best serve its purpose of indicating ICZM progress in Germany and facilitating conflict management in the course of a discussion process, active stakeholder participation, and integration of different interest groups.

5.4.2 Description and methodology

The method of choice for bringing together the stakeholder community and initiating a discussion process on conflicts and achievements of coastal resource use was the application of the European indicator for measuring progress in Integrated Coastal Zone Management (ICZM), an element of implementing the ICZM Recommendation by the European Parliament and the Council of 2002 (EC, 2002).

The “Progress Indicator”, often referred to as “Marker” because of its simple, binary response structure, was developed under the guidance of the EU ICZM Expert Group and its Working Group on Indicators and Data, established by DG Environment of the European Commission. The Working Group received assistance from the Topic Centre for Terrestrial Environment, a structure of the European Environment Agency, and EUCC – The Coastal Union as an additional subcontracted consultant. The resulting Progress Indicator/Marker has received approval of the EUC ICZM Expert Group and was recommended for testing in EU Member States on various levels (Expert Group ICZM, 2004).

The ICZM Progress Marker is an instrument for assessing to which degree ICZM in its widest sense is being implemented on local, regional and national level and whether there is progress

over time (e.g. within five-year intervals) in applying and establishing the ICZM approach. It highlights success stories as well as failures, thereby helping to focus resources where they are most needed.

A second set of indicators has also been developed by the Working Group on Indicators and Data under the guidance of the Expert Group. This Indicator has the complementary aim of assessing sustainable development along the coast, thereby showing whether progress in ICZM has the intended results (Working Group ID, 2004).

The ICZM Progress Marker methodology (included as Annex 1 to the full report) consists of 31 actions characterising the process from an early stage of ICZM (phase 1: Aspects of coastal planning and management are taking place) to the final stage (phase 4: An efficient, adaptive and integrative process is embedded at all levels of governance and is delivering greater sustainable use of the coast). This list of actions is complemented by annotations that describe in more detail what each action implies. The goal is to assess whether this action has already been completed or not or whether information is lacking and therefore an assessment is not possible. This assessment is to be carried out for the local, regional, and national level and applied for the year 2000 and the year 2005 in order to indicate progress over time. The results can be visualised in form of a table where positive assessments are marked with green, negative ones with red, and “don’t know” with yellow (please see Annex 1 contained in the full report).

A representative group of coastal stakeholders should make the assessment in the framework of a workshop. Optionally, the assessment can be done in written form to familiarise the stakeholders with the methodology and provide an indication as to which actions are being assessed the same way by all stakeholders and for which ones a joint discussion is necessary in order to reach a common conclusion. In a second step, a workshop should follow.

Application of the Marker, in tests carried out so far, has shown that civil servants working in central government departments, for example, will not necessarily have much knowledge of what is going on locally. Similarly, local practitioners will have restricted knowledge about what, if anything is happening at regional or national levels. Even people working in the same organisation often differ with their colleagues in assessing whether a particular action is being fully implemented or not.

Therefore, it is beneficial to bring together practitioners from different administrations, organisations, agencies and interest groups to jointly complete the table. In this way, a more accurate picture of how far ICZM is being implemented at all three spatial levels – national, regional and local can be gained.

In fact, the act of completing the table is itself an important step in helping to implement ICZM. The debate necessary to decide on an answer, even one as apparently simple as ‘yes’ or ‘no’, leads to an exchange of opinions about which organisations and agencies are doing what on the coast, and to what effect.

5.4.3 Application of the Marker in Hamburg

In April 2006, identified stakeholders received a letter inviting them to do the self-assessment by filling in the ICZM Progress Marker table translated into German and consulting with the Explanatory Notes, where necessary. They were also informed that they would be invited to a workshop in Hamburg in order to discuss conflicting issues and achieve a consensus on how

to assess progress of ICZM in the city. After several weeks, those stakeholders that had not responded were contacted by phone and e-mail in order to discuss reasons for not participating and answering questions.

On 26 June 2006, a workshop took place at TuTech Innovation in Hamburg with the participation of 20 stakeholders. Several others had voiced interest but could not participate due to other obligations. The scope of the workshop had been extended to include the issue of Sustainability Indicators in the context of the German ICZM Strategy, because of its complementary nature to the ICZM Progress Indicator.

Irene Lucius from EUCC – The Coastal Union presented the specific objectives of the workshop in detail and briefed the participants on the latest ICZM policy development on European level. She stressed that the ICZM Progress Marker has been applied in the context of national and regional workshops in Belgium, France, South UK, Poland, Spain, Malta, and Italy. The results so far are promising: There is a clear positive trend over the past 5 years and the indicator has been well received, although some measures for improving the tool have been put forward, e.g. the need to add “in progress” to the already existing possible categories of “Yes”, “No”, and “Don’t know” for assessing the 31 actions.

In addition, Bastian Schuchardt, bioconsult, gave a briefing on the state of the German ICZM process, referring to the German ICZM Strategy, which recommends, among others, the establishment of an ICZM Secretariat and ICZM Forum. The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety had contracted bioconsult to develop proposals for coastal sustainability indicators tailored to the German situation.

Sustainability Indicators had been developed as a follow up to the European ICZM Recommendation and applied within the framework of the project DEDUCE in some countries. Achim Daschkeit presented results of applying those indicators to German regions and visualising them with the help of WebGIS. The problems encountered in the process were in particular the low availability of data for some indicators and the lack of clear objectives, limits and consequently judgment for interpreting the results (e.g. what is a “sustainable” or “unsustainable” population density along the coast?). These norms have to be defined by the coastal stakeholder community first. Also, the direct relevance of some of the indicators to ICZM has not been made clear. He added that the application of the EU sustainability indicators is not sufficiently relevant from a policy point of view.

Achim Daschkeit continued by providing his analysis of the ICZM Progress Indicator and the process of applying it. The development of ICZM processes – planning or regional development processes – can be evaluated with progress (also called process) indicators. In Achim Daschkeit’s opinion, the EU ICZM process indicator is not very appropriate for the German context because it does not deliver precise information about the ICZM process and because the “byproduct” of doing the assessment – raising awareness on what ICZM is and how it is being implemented – is not important in a country where stakeholders are already well informed about the approach. Many actions – in particular those of the first phase – could best be assessed by an expert doing literature search for legal acts and policy initiatives. The other actions require a subjective assessment for which standard empirical methodology exists in the form of opinion surveys with a range of possible answers (e.g. from “I fully agree” to “not at all”). Intensity and quality of communication and cooperation, for example, are best assessed with this methodology if the usual conditions and limitation of empirical social research are being taken into consideration.

Another weakness according to Achim Daschkeit is the fact that the composition and minimum number of stakeholders applying the marker for a particular area are not defined. Consequently, results are not well comparable and only of limited value. Furthermore, the formulation of some questions is too vague. He concluded by saying that the content of the ICZM Progress Marker is appropriate, but the process of application needs to be refined.

5.4.4 Results of the ICZM Progress Marker test run in Hamburg

The ICZM Progress Marker table was sent to 55 stakeholders from 45 institutions representing different sectors and administrative levels. Most of them are working for Hamburg institutions, some representing the “Länder” Schleswig-Holstein and Niedersachsen and at Federal Government level. Out of those, only four did the assessment, while some explained why they could not do so in written form. The most commonly cited reasons were unclear responsibility, lack of time, the negative attitude of the recently published ICZM Strategy for Germany towards the European ICZM Marker, and the special status of Hamburg (it is both a municipality and a “Land” and it is located not directly on the coast).

While the number of respondents is too low for a proper statistical analysis, some qualitative remarks can be made: There was considerable agreement in the positive judgment of actions in the first phase and least agreement on the assessment of ICZM progress in Hamburg from the year 2000 to 2005.

5.4.5 Discussion

The Workshop participants agreed on the following weaknesses of the Marker:

- 1) Many aspects of ICZM are already established in Germany, but they are not called ICZM. Therefore, the Marker tends to undervalue progress in those actions where the term ICZM is mentioned.
- 2) The Marker is too extensive and not clear enough in some points. Therefore its application can lead to long discussions about terminology without providing much insight. It would be better to limit the Marker to a maximum of 10 crucial points.
- 3) Neither the actions themselves nor the annotations are formulated clearly enough. Some actions consist of different elements that need to be assessed independently. This leads to inaccuracy, redundancies, and frustration during the application process.
- 4) Some actions can be assessed only subjectively (e.g. there is no objective answer to what is “properly staffed and properly funded”)
- 5) “Yes”, “No”, and “Don’t know” are not specific enough for assessing the actions.
- 6) The aims and target groups of the Marker should be better communicated. It should be made clear for example that it is not an instrument for solving local problems.
- 7) The terminology must be better defined. Some terms such as “stocktake of the coast” or “report on the State of the Coast” are clear in the English language context but not yet established in the German language, neither as English nor as German terms.

- 8) Filling in the Marker table individually does not lead to meaningful results because of ambiguous terminology and because left to themselves, stakeholders tend to answer questions purely from the perspective of their interests and discipline.
- 9) Clear instructions are needed which type of stakeholders and how many of them must contribute to the assessment. The group of people who ended up applying the marker in Hamburg appears too random.
- 10) The ICZM Sustainability and Progress Indicators are being discussed and applied independently at the moment although they are (or should be) interrelated.

The participants recommended the following improvements:

- 1) The conditions for applying the marker need to be defined clearly. Two alternative models have been proposed:
 - a) If an ICZM Forum is established with representation of the major stakeholder groups (as the Germany ICZM Strategy recommends for the near future), the Marker can be applied during a Forum session. This would provide the opportunity to define terminology and, during the discussion process, achieving a common opinion on the state of ICZM, integrating the perspective of the different sectors and disciplines.
 - b) If no Forum (or comparable body) is established, the Marker can be split into two groups of actions: those that can be assessed objectively with the help of a literature search, and those that can be assessed with the help of a questionnaire answered by a sufficiently large and representative group of stakeholders in written form.
- 2) Sustainability and Progress Indicators should not be assessed independently.
- 3) The actions need to be formulated more clearly and if necessary, terminology needs to be better defined without using the term ICZM. Thereby, the annotation can be reduced to a large degree or made obsolete.
- 4) Some actions need to be split into two or more elements, to be assessed independently. Other actions, of lesser relevance to ICZM, should be eliminated or integrated into others in order to reduce redundancies and reduce overall number of actions.
- 5) More communication efforts are needed to convince stakeholders about the necessity of ICZM. This would increase motivation for applying the Marker.
- 6) The aims of applying the Marker have to be made very clear.

Some of the participants voiced their willingness to engage in further development of the Marker on the European and German level.

Conclusions for the ICZM progress Marker test run in Hamburg

The ICZM progress Marker test run in Hamburg has shown that there are many objections to the methodology in Hamburg and the region. It would not be advisable to let individual representatives of the stakeholder community carry out a written assessment as in its present form. Also, in the German translation, the wording of the actions is not precise enough. A workshop type setting would be beneficial with sufficient time allocated – probably one day

as minimum – to explain to the participants the precise purpose of the exercise, to clarify terminology, and to moderate a discussion process between the different stakeholders that leads to a common assessment.

When interpreting these results it is important to bear in mind that this was a test run of the application of the ICZM marker. The purpose of this workshop seemed to be unclear at the beginning and led to some confusion.

While in some European regions starting the process of stakeholder interaction is a goal in itself, the participants in Hamburg seemed much more goal-oriented. This is why more emphasis would need to be placed on explaining the reason for the testing exercise. Once the goal – constructive criticism in order to improve the Marker – was made clear, the German audience focused entirely on this aspect, not on testing the methodology and interpreting preliminary results.

Superficially, it looks like the COASTMAN objective of applying the Marker as a mechanism for conflict resolution by facilitating a productive discussion process among stakeholders about achievements and challenges of the ICZM process has failed. At a second glance, however, the process helped to unite stakeholders in their sometimes strong criticism of the methodology and to raise their interest in contributing to developing ICZM methodology for Germany. During the workshop criticism arose e.g. regarding the formulation and grouping of the marker actions, leading to an intense discussion, which left some participants irritated at times.

Ideally, the planned German ICZM forum will become a platform for developing and applying the Marker in the near future. If this effort fails, application of the Marker will require a strong champion – such as the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety – who could bring stakeholders together for Assessment Workshops.

The discussion process has also brought into the open that the stakeholders, who came together in Hamburg, have their own, not very clear definition of ICZM. This may also be the case in other countries, and would mean that in some cases considerable adjustments to the way coastal resource use is being managed and planned would be required. The fact that the tedious, meticulous and often long-lasting planning process with stakeholders participation so common in Germany is a good base for, but not the equivalent of ICZM, has to be communicated much better. In any case, as long as ICZM is an ambiguous and vague term in any country's context, the application of the Marker will have its problems.

Independent of these aspects, the discussion process has revealed several shortcomings of the present methodology and it can be hoped that critique and recommendations will be taken into consideration during future rounds of revising the assessment tool.

In particular, the idea of producing a clear protocol for applying the Marker should be considered. If ICZM progress assessments are to be made comparable between different European countries, regions and municipalities, the assessment process should be agreed upon. Developing two options – the joint assessment in the framework of a workshop and the written assessment, split into a literature search part and a questionnaire – may be considered as a pragmatic but at the same time sound solution. A critical revision of the actions, in particular defining key terminology more clearly and reducing inaccuracies and redundancies, would be recommended.

5.5 Sustainable development plan for the tidal Elbe

In June 2006, the Hamburg Port Authority in cooperation with the Waterway and Shipping Directorate WSD Nord) prepared a “Concept for a sustainable development of the Tidal Elbe River as an artery of the metropolitan region Hamburg and beyond” (HPA, 2006c). This policy paper discusses concepts, which will provide overall holistic and topical inputs to the preparation of an Action Plan for Sustainable Development of the Tidal Elbe. It shows that there are real chances of developing a plan for the tidal Elbe, from which benefits for different interests, such as fisheries, agriculture, nature protection, tourism, shipping and economy will arise.

The document describes the specifications and the situation of the tidal Elbe. It explains future strategies and their general frameworks, together with an analysis of the political framework and the current need for investigation and action. It is made clear that the involved Länder (German states) and the Federation have to jointly take the necessary long-term measures, in order to positively influence the dynamics of the river system and its morphological and ecological features.

The successive implementation of methods over the next 100 years is expected to lead to the development of a dynamic estuary, in which various ecological and economical functions will be improved. The identified core aspects of the future sustainable Action Plan for the tidal Elbe are the following:

- Attenuation of the increasing energy of the tides through technical measures focused on the estuary funnel;
- Creation of tidal zones in the area between Glückstadt and Geesthacht;
- Optimisation of sediment management, taking into consideration the whole Elbe river system.

The concept recognises that without adequate measures, the system of the tidal Elbe will increase its land area, creating not only ecological disadvantages but also making the maintenance of the water bodies and Hamburg harbour more complex. In addition to the planning of measures, different models will be used to simulate processes of the river system, which are expected to lead to convergence of development of the tidal Elbe with nature protection.

The sustainable development element is seen as a challenging, demanding and long term task. This project, which encompasses the next hundred years, can only be successful if all interests are taken into consideration. In this view, the authorities submitted the developed concept for discussion, comments and public inspection.

6 Conclusions

The development plan for the Lower and Outer Elbe, which envisages the deepening of the river by a further one meter, has met a broad public debate and has generated criticisms from various non- governmental environmental organisations. The use, ecological state and further transformation of the river Elbe are important subjects for different interest groups having related economic, environmental or societal aspects at their focus. The conflicting interests have generated virile political pressures, and a dilemma can be seen between the positive, but relatively short, economical consequences, and the long term, sustainable planning for the region, where investing in development of another deep sea port is highly likely.

Concerns were expressed about further modifications of the river environment when some of the long term aspects influencing the decision making were not taken into consideration, as well as when the national port development plan is not being considered. Therefore, in addition to the legislative decision making process, which includes the Feasibility Study and Plan Approval Procedure, a Sustainable Development Plan for the tidal Elbe as well as a German national Integrated Coastal Zone Management Strategy, were recently developed.

However, to ensure consideration of all different perceptions and concerns of the interested parties several other decision support tools can be used, which will in turn lead to better conflict management and potentially towards conflict resolution. Presented in this report, the Marker self-assessment tool, the SWOT Analysis, as well as the DPSIR Framework, which were applied to this case study, are recommended to be used to enhance the decision making process by improving its transparency, while at the same time making sure that all interests are taken into consideration.

It is hoped that the presented methods will be useful to other harbour cities and might lead to cooperation and an exchange of experience in conflict prevention and conflict management.

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