

Master Thesis

Area-oriented coastal protection
-
**A theoretical and stakeholder based
analysis of possible synergies and obstacles
on the German North-Sea coast**

Steffen Schwalfenberg



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Master Thesis in the double degree Master program Water & Coastal Management

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List of abbreviations

ARL	German Academy for Spatial Research and Planning (german: <i>Akademie für Raumforschung und Landesplanung</i>)
BATNA	B est A lternative T o N egotiated A greement
BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (german: <i>Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit</i>)
BMELV	Federal Ministry of Food, Agriculture and Consumer Protection (german: <i>Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz</i>)
BNatSchG	Federal Nature Conservation Act (german: <i>Gesetz über Naturschutz und Landschaftspflege</i> or <i>Bundesnaturschutzgesetz</i>)
DKKV	German Committee for Disaster Reduction (german: <i>Deutsches Komitee für Katastrophenvorsorge e.V.</i>)
e.g.	for example, for instance (lat. <i>exempli gratia</i>)
EA	English E nvironmental A gency
EC	E uropean C ouncil
ETFI	E uropean T ourism F utures I nstitute of Stenden University of Applied Science Leeuwarden
EU	E uropean U nion
EUCC	C oastal and M arine U nion
FAK	F achausschuss K üstenschutzwerke
GAK	Common task of the state for improvement of the agricultural structure and coastal protection (german: <i>Gemeinschaftsaufgabe zur Verbesserung der Agrarstruktur und des Küstenschutzes</i>).
ICZM	I ntegrated C oastal Z one M anagement
IPCC	I ntergovernmental P anel on C limate C hange
KFKI	German Coastal Engineering Research Council (german: <i>Kuratorium für Forschung im Küsteningenieurwesen</i>)
URSI	U rban R egional S tudies I nstitute of Rijksuniversiteit Groningen
LKN	Schleswig-Holstein's Government-Owned Company for Coastal Protection, National Parks and Ocean Protection (german: <i>Landesbetrieb für Küstenschutz, Nationalpark und Meeresschutz Schleswig-Holstein</i>)

n.d.	no date given
n.p.	no place given
NLWKN	Lower Saxon State Department for Waterway, Coastal and Nature Conservation (german: <i>Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz</i>)
MLR	Schleswig-Holstein Ministry of Agriculture, the Environment and Rural Areas (german: <i>Ministerium für ländliche Räume, Landesplanung, Landwirtschaft und Tourismus des Landes Schleswig-Holstein</i>)
PBL	Netherlands Environmental Assessment Agency (dutch: <i>Planbureau voor de Leefomgeving</i>)
rf.	refer, refer to
RWS	Dutch state agency for public works and water management (dutch: <i>Rijkswaterstaat</i>)
V&W	Dutch Ministry of transport, public works and water management (dutch: <i>Ministerie van Verkeer en Waterstaat</i>)
VROM	Dutch Ministry of Housing, Spatial Planning and the Environment (dutch: <i>Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer</i>)
WFD	Water framework directive (EC/2000/60)

Glossary

Adaptation

Unlike mitigation, which focusses on the causes and reduction of speed of climate change, adaptation focusses on reducing the impacts and effects of climate change. Adaptation measures “*moderate harm or exploit beneficial opportunities*” (IPCC, 2012b, p. 556) on local and regional levels as a quick response with more or less direct effect on society, than of mitigation (IPCC, 2012b; NICHOLLS, et al., 2007; TOL, 2005). For more information on the shift from mitigation to adaptation refer to Chapter 2.1.

Bounded rationality:

A term coined by Herbert A. Simon expressing the limits a planner faces, such as limited resources and time, but also imperfect skills. Moreover fragmented information or problem definition as well as incomplete knowledge about underlying values and interests limit planning processes (ALLMENDINGER, 2009).

Coastal protection philosophy:

Coastal protection philosophy describes the strategic outline of coastal protection and the entirety of all anthropogenic measures to protect humans against the hazards of the sea (KUNZ, 2004).

Compromise:

Compromise is in contrast to consensus not forming a win-win situation. It is optimally the least bad solution for all participants, in which less is gained and all have to omit some of their interests. SUSSKIND (2008) goes that far to define compromise in a pejorative way as abandoning ones deeply held beliefs, values and ideals and “*to risk giving up ones identity*”. In a negotiation leading to a compromise the participants do not share knowledge about other interests. Reaching the own interests, without reflecting or knowing the interests of the other parties, is the main goal.

Conflict:

Conflict is defined as a situation in which two or more individuals, stakeholders or parties have contrary objectives. That incompatibility is a matter of subjective perception of the involved parties to the topic (KRIESBERG, 1982). Especially in complex situations with many parties conflicts can escalate in lock-in situations or dissolution of a negotiation process, but also to positional argumentation (ISAACS, 1993).

Discourse:

Discourse is defined in various ways. STRÜBING (2013, p. 171) sees it, in the German context, as a form of public problematisation and thematisation. A more generally valid definition describes discourse as set of ideas, concepts and categories that give meaning to social phenomena, which is produced and reproduced through communication (HAJER & VERSTEEG, 2006). HAJER (1995) points out, that discourses are always, beside a neutral reflection, a way of questioning common beliefs and structures and influence them for the benefit of one's own beliefs.

Interdisciplinarity:

Interdisciplinarity in research describes the cooperation of more than one scientific discipline, combining scientific knowledge and knowledge generation of the included disciplines (SCHALTEGGER, et al., 2013).

Mitigation:

Mitigation describes the reduction of the speed of climate change, by managing its causes, such as lowering the emission of greenhouse gases, sustainable use of resources or production of goods and changes in land-use. In terms of disasters, mitigation means the action to decrease the effects of hazardous events (BIESBROEK, et al., 2009; IPCC, 2012b).

Paradigm:

A scientific paradigm is a “*theory or group of ideas about how something should be done, made, or thought about.*” (MERRIAM WEBSTER, 2013b) A paradigm can be seen as consensus and valid as long as no events or crises occur, which are not compatible with the prior group of thoughts. Hence this term is used in the sense Thomas S. Kuhn defined it, although the establishment of a paradigm in disciplines other than natural sciences is remarkably difficult (KUHN, 1976).

Resilience:

Several interpretations and definitions of resilience are discussed in literature of which two are chosen as most appropriate for this study. “[Resilience is the] *ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions*” - (IPCC, 2012b, p. 563) It can also be seen as a continuous process of impact, response, recovery and preparedness towards an event. A balance between resistance against impact and flexibility in response are the key aspects in this conceptualization, which includes the objective of societal learning to adapt to a new situation (GALDERISI, et al., 2010).

Reversal of economic effect of technical protection measures:

The construction of technical protection measures, such as dikes, barriers or flood walls have two effects: they reduce the probability of a flood and secondly following on that, construction restrictions are often suspended, as the area is protected. Development and land-use behind the dike is intensified – values of material assets increase – although an absolute safety cannot be guaranteed. In case of an extreme event the protection line might not be sufficient anymore and the protected area is flooded. The loss of goods is higher, than before, as more goods are present in the flood prone area. Additionally to the higher damages, the society has to carry the investments of construction and the long-term maintenance costs of the dike, barrier or wall. To reduce this effect, the type of land-use behind the dike is essential (SEIFERT, 2012). This situation of mutually dependent actions can also be called path dependency.

Risk:

Risk can be defined as the probability of an event and its impact in a certain system. Both, the chance of occurrence and the degree of impact are central factors of risk and define its level. Risk has components, such as hazard (e.g. sea-level rise, extreme tides and storms), a receptor (e.g. low-lying areas probably protected by a dike) and a pathway (e.g. a breaking dike, or false construction causing wave overrun) (GOULDBY & SAMUELS, 2005). This segmentation of the term can, especially in the context of uncertainty of climate change, be extended by a definition of LUHMANN (1991) and his distinction of risk and hazard: He defines risk as closely linked to a decision made under uncertainty. Damages can thereby either be defined as consequence of a decision, which is then risk / risk of a decision, or be defined as external and involuntary, which is hazard.

Risk perception:

Risk perception is an individual or collective perception process about the identification, analysis and articulation of risk. This process can be expressed rationally or by sensory impressions (MARKAU, 2003).

Synergy:

Synergy is a term for the collaboration of forces towards one direction of action or the total force which results from this collaboration (FUCHS-HEINRITZ, et al., 1994). Forces can be defined here e.g. as political power or power of members within a collaborative process, but also a strong regional identity. It is in any case a win-win situation. And further, a synergetic result can produce more beneficial outcome, than the sum of its single parts.

Transdisciplinarity:

In contrast to interdisciplinarity, transdisciplinarity merges several scientific disciplines and knowledge as well as case-based practical knowledge and facilitates collaboration upon prac-

tioners and scientists. Both approaches are common in sustainability and climate research, as both topics demand the cooperation of various scientific disciplines, whereas only trans-disciplinarity includes the involvement of practitioners of different sectors. (SCHALTEGGER, et al., 2013).

Vulnerability:

Vulnerability is the inability of a system to cope with new situations, such as climate change or weather extremes. It is defined by its sensitivity to the occurring event and its adaptive capacity to cope with it. Moreover affected values, as well as the type and magnitude of the event are factors of the vulnerability of an area or system (IPCC, 2012b).

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Executive Summary

The current coastal protection philosophy of Germany, which is based on the hold-the-line strategy and heightening the existing main dike line is trapped in a path dependency. Problems, such as increasing sea-level and extreme weather events caused by climate change and increasing pressure due to economic development in the hinterland are reasons for that. A shift from the old reactive strategy to a new proactive, adaptive and flexible strategy of coastal protection is demanded in times of climate change. A new paradigm, which follows the principles of area-orientation and risk management, was therefore proposed in a scientific debate to overcome this locked-in situation.

In this thesis it is dealt with coastal protection from a socio-political perspective with the focus on the processes behind a possible paradigm shift. The principle of area-orientation is so far not implemented in Germany and obstacles seem to prevail for doing this. Hence a knowledge base about area-orientation is provided and the theory is combined with the mutual gains approach to negotiate obstacles and identify possible synergies. This process is enhanced by expert interviews of involved stakeholders within the spatial demarcation of Lower Saxony and Bremen in a case study.

A general tendency of overplanning within a narrow legislative framework and a lack of suitable and available space and financial resources are identified as main obstacles. Additionally sectoral thinking is blocking synergetic developments in area-oriented coastal protection. Time scales of several decades and the uncertainty about the further development of climate change and sea-level rise impede a broad and open societal and political discourse about new strategies of protection.

Despite these obstacles, which hinder an implementation of area-orientation in the German coastal protection philosophy, a general potential for creating synergies can be observed. Hence success factors, such as additional political commitment, reflexive planning processes, integrative thinking and open communication are presented as solution for these problems and as outcome of this thesis.

Keywords

Coastal protection, area-orientation, climate change adaptation, coastal zone management, mutual gains approach, consensus planning, paradigm change.

1 Introduction and problem description

For centuries coastal protection served the protection of land, monetary values and most important lives. This long lasting tradition of coastal protection had to face various challenges and needs, such as storm surges or land reclamation and still has to deal with upcoming challenges. Nowadays climate change including sea-level rise can be identified as the greatest challenge for coastal protection.

Germany's coastal protection philosophy^(G) ¹ at the North Sea coast was revised after the catastrophic floods of 1953 in the Netherlands, England and Belgium, and of 1962 in Germany. Since then it relies mainly on a main dike as major protection line, which needs to be as high as the design-based water level. Additionally it has to be constructed in a way, that also slight wave overrun, will not harm the stability of the dike. In this case of reactive philosophy, the dike height is defined as decisive element for reducing risks^(G) of protected areas. Constructing extremely high dikes to be entirely safe from any extreme event is due to economic reasons not possible – it would be too expensive (KUNZ, 2004). Besides escalating costs, also environmental and social concerns speak against this solution: Massive constructions, such as dikes or storm surge barriers have a barrier effect on the dynamic environmental processes in a coastal zone and especially in the Wadden Sea. From the socio-economic point of view an increased demand of space and the combined construction and use restrictions near the dikes can be identified as most pressing and result in protests and opposition (VON LIEBERMAN, 2002). Massive and high structures of dikes hinder the view to the sea and through the landscape, which leads in regions with high touristic attractiveness and high dependency on this economic sector, to little acceptance among society and possibly economic losses. Coastal protection generally and the common strategy in Germany specifically can be defined as everlasting task with no clear end (VON LIEBERMAN, 2002; NLWKN, 2007). Rising sea levels require continuous improvement and reinvestment in existing structures. These investments allow an intensive land-use of flood-prone areas, which co-finance the construction of the dikes, but increase the risk as well, resulting in further demand for dike-improvement. Therefore the common strategy is stuck in a path dependency.

These rather evident reasons can be extended by the increasing uncertainty about climate change impacts. The complexity of climate change and the interrelations between global and local climate system are not fully understood. Despite the use of sophisticated climate models, knowledge about scale and progression of climate change is still imperfect. Research on this topic and the dimensioning of climate change mitigation^(G) and adaptation^(G) measures

¹ Due to better readability and intelligibility of this text the number of footnotes is reduced as far as it was possible and considered as appropriate. Therefore key terms used in this thesis and are marked with a (G) and are explained in the Glossary on page VII. Terms, which are used in a range of meanings as they were coined by various schools of thinking, are defined in that way, most appropriate for the context of this thesis.

are bound to uncertainty. Additionally to this scientific uncertainty the sharing of information from climate researchers to the administration of coastal protection is limited and has potential for optimization. The sector of coastal protection is therefore facing uncertainty twofold: First, the general uncertainty of not knowing when and in which magnitude the next storm surge will occur. And secondly, shared with the sector of climate research, it has to face the problem that waiting for secure understanding of the magnitude of climate change and its impact might be too late for effective and appropriate adaptation measures. (WIESNER-STEINER, et al., 2006).

Combining these factors leads to the statement, that absolute safety cannot be achieved in coastal regions (KUNZ, 2004). Moreover this strategy of rigid line structures has a limited flexibility to adapt to new climatic, morphological, hydrological and spatial situations. Contrary to the feeling of safety evoked by massive dikes, risk and vulnerability^(G) towards extreme events for flood prone areas increase. Less construction restrictions are valid for areas saved by a dike, leading to increasing monetary values and population growth. In case of a dike breach or wave overrun the impact and hazard is accordingly higher. Especially vulnerable areas are also areas with high socio-economic importance, high infrastructural or private values and goods, such as cities, but also sub-urban or rural areas with high attractiveness as tourism destination. In highly developed coastal states, such as the Western European countries, an increase of vulnerability towards climate change could be observed within the 20th century (rf. among others SCHUCHARDT, et. al (2011)).

As a response to global climate change the former Dutch Ministry of Transport, Public Works and Water Management² introduced a more flexible, because area-oriented protection strategy in 2000 to face the limitations outlined above. The concept “A different approach to water; Water management policy in the 21st century” tries to deal with risks differently and tries to implement a softer, but equally effective coastal protection. Instead of blocking water, this adaptive approach supports living with the water and giving more space to the water within its natural boundaries. This merely strategic vision of 2000 was implemented to the National Water Plan in 2009 and in the national plan for climate adaptation in 2011 (V&W, 2000; RIJKSOVERHEID, 2009; PBL, 2011). A shift from only reducing the chance of occurrence of flooding to additionally reducing the impacts in case of a flood was proposed by this document (PBL, 2011).

Similar to the mentioned Dutch strategic paper, the German researcher KUNZ (2004) proposed a change in the current German coastal protection paradigm^(G), by introducing risk management and area-oriented aspects into coastal protection. Vulnerability studies, which identify weaknesses and comprehensive risk management strategies as basis for area-

² This ministry was merged with the former Ministry of Housing, Spatial Planning and the Environment in 2010 to the new Ministry of Infrastructure and the Environment.

orientation, are core aspects of this paradigm change. However the current reactive protection philosophy is not replaced instantly, but cultivated and further developed towards a proactive, flexible and adaptive protection philosophy (KUNZ, 2004; 2005). Following this argumentation area-oriented coastal protection could provide a chance for adaptation towards future challenges such as climate change. Nonetheless, compared to the Dutch approach, this proposal has not been set into practice, yet.

In the last decades a general shift from global mitigation towards regionally or locally addressed adaptation strategies for reducing the impacts of climate change can be observed, as corresponding strategy papers and programs were launched. The scientific debate about climate change, climate adaptation and mitigation was mainly driven on global scale by natural and engineering science. Although participative measures on local scale were facilitated (such as the Local Agenda 21 initiatives) it can be said, that natural sciences are rather separated from social sciences and practical local knowledge. This leads to prevailing economic and environmental thinking superimposing or even neglecting socio-cultural processes (DÖRING, 2009). Additionally coastal protection can be seen as detached from spatial planning. This trend is of particular severity as the successful implementation of adaptation measures demands the equal implementation of societal, economic and ecological needs and interests into spatial planning (SCHMIDT, et al., 2012). Spatial planning can be seen as important “*switchboard*” between climate change research and the comprehensive perspective of sustainable development, which includes societal, economic and ecologic interests. And therefore spatial planning is able to successfully implement mitigation as well as adaptation strategies (BIESBROEK, et al., 2009, p. 231).

Apart from climate change the coastal zone is under increasing pressure of changing demographic development. Various intense land-uses, such as agriculture, industry, nature conservation and tourism are conflicting sectors in scarce space. This is also framed in the term ‘coastal squeeze’ where a variety of interests are combined in one area causing conflicts^(G). The coast is squeezed by intense land-use on the one side and increasing pressure by the sea-level rise on the other side. Therefore adaptation strategies have to take multiple interests and needs of various actors and sectors into account – a source of increasing complexity and further conflicts between stakeholders in coastal protection efforts.

The combination of the presented issues in this very first chapter – the increasing vulnerability of coastal areas, the proposed paradigm change towards an adaptive and area-oriented coastal protection and the various environmental, societal and economic interests causing land-use conflicts – are framing the problem statement for this study. The theoretical framework set in this thesis contributes to identify possible synergies^(G) and turn conflicts into potential win-win situations by the application of mutual-gains approach. This thesis has the purpose to give insights into area-orientation in coastal protection and the discussed reconsideration of the German coastal management paradigm. The outcome will first identify ob-

stacles and synergies for the implementation of area-orientation in coastal management at the North-Sea coast of Germany and second will suggest eight success factors for a positive implementation process.

1.1 Context and research questions

The scope of this research is the German coastal zone of the states Lower Saxony and Bremen. This is decided, as the tidal range of the Wadden areas in the North Sea are higher than in the Baltic Sea and the protection strategy is mainly technical and line-oriented. Additionally the coastal protection of Lower Saxony and Bremen is planned and controlled by one cooperative document – the master plan for coastal protection of Lower Saxony and Bremen (NLWKN, 2007). In Bremen 89% (359.45 km²) of the state area are flood prone. 452,985 inhabitants are potentially endangered, and protected by main dikes of 155 km length. In Lower Saxony about 6,600 km² are flood prone, in which approximately 1.2 million inhabitants live. Lower Saxony is protected by 645 km of main dikes (FAK, 2009).

The following research questions formulate the common theme of this study, starting with a theoretical part about area-orientation in coastal protection. Synergies and obstacles will be identified in an empirical section, in which the outcomes of semi-structured interviews with representatives of involved sectors will be included. The synthesis of this study is a list of success factors or essentialities, which are supporting a paradigm change in coastal management in North-western Germany.

Theoretical: *What are the benefits of an area-oriented approach to coastal management, which strategies and elements can be ascribed to such an approach and which stakeholders need to be involved?*

Empirical: *What synergies and obstacles can be identified in the case that area-oriented coastal management is implemented?*

Synthesis: *What success factors are needed for the positive implementation of area-oriented coastal management?*

1.2 Relevance of this research

This thesis is contributing to the theoretical and scientific debate about climate adaptation and coastal management. Four factors are determining the scientific relevance of this research: First of all, climate change and sea-level rise cause urgency for action in various fields of spatial planning. There are not only scenarios predicting sea-level rise by 30 – 140 cm within this century at Lower Saxony's coast (depending on the climate model), but also changing distribution of temperatures and precipitation will change towards less precipita-

tion in summers and more precipitation in winters, resulting in more extreme weather conditions during the whole year (SCHUCHARDT, et al., 2011). Water management and agriculture have to be adapted to the changing precipitation levels. An effective combination of short term action to facilitate global long-term effects therefore is a challenge for spatial planning (BIESBROEK, et al., 2009).

Above only one out of dozens of climate prognoses with varying values is cited, as listing them all would exceed the scope of this work. This leads to the second factor of relevance: the uncertainty and complexity related with climate change. Magnitude, trend and local specifics of climate change and its impact are still bound to uncertainty. The actual rate of sea-level rise is vague and interacting with countless other factors, such as land subsidence but also anthropogenic influences on the dynamic system of the sea and within estuaries. Still the thesis will not reduce the mentioned uncertainty, but will contribute to find flexible solutions for coping with uncertainties.

Not specifically linked with coastal protection, but to spatial planning in general is the third aspect of relevance: The natural conflict potential of actors in spatial planning acting with multiple interests, needs and land-uses. Often opposing claims for land lead to apparently immutable conflicts over long time periods. Additionally the diversity in policy arrangements and projects in climate adaptation and mitigation make it hard to identify synergies and benefits for all involved sectors (BIESBROEK, et al., 2009). The analysis of synergies and obstacles in this context can contribute to find and facilitate win-win situations for these locked-in situations.

Finally the concept of area-orientation itself presents an aspect of relevance. The concept, which is described in Chapter 2.2 in depth, has the goal to increase spatial quality by implementing multiple uses and sectors in spatial planning. First this can reduce the stakeholder conflicts mentioned in the third aspect and secondly it is a proactive approach, which is with respect to climate change favourable. In combination with the mutual gains approach (cf. Chapter 2.3) this study can contribute to a transition in coastal protection by supporting communicative and holistic principles and negate obstacles against an implementation of area-oriented coastal management.

Besides its scientific relevance, this thesis has a high societal relevance, as coastal management and protection, as well as climate change adaptation are topics, which have influence on the most fundamental claim of people, who are living in coastal areas: safety. These topics are dealing with the future liveability of coastal areas and how they could be kept attractive places to live in. This attractiveness is not only a form of aesthetic, but also of cultural attractiveness and diversity, which increases spatial quality; economic attractiveness, forming a diverse and vital economic landscape worth investing in and finally an ecological attractiveness, protecting and creating a unique landscape of natural habitats.

Relating to the aspect of uncertainty in climate change impacts, this thesis will facilitate the step from theoretical debate to practical outcomes and therefore will contribute to close the gap between science and society. Possible synergies and obstacles are identified from interviews of the involved practitioners and experts. A negotiation process including the mutual gains approach, which is included in this thesis, can benefit from this thesis, as information source for setting up a collaborative decision making process.

The critical reflection on the existing paradigm and the initiated paradigm change in coastal protection in this thesis can encourage the debate of adaptation measures in coastal management, not only in scientific realms, but also in the society. Stressing the term of risk communication (cf. Chapter 3.2), which can contribute to an active and broad discussion about the risks of climate change and the needs for appropriate adaptation measures is one of the very first steps towards a transition in coastal management. This thesis thus supports awareness raising and at the same time helps to eliminate concerns and anxieties among affected citizens by highlighting positive and synergetic outcomes of adaptation measures.

Resolving land-use conflicts and facilitating synergies can enhance the spatial quality and the value of living in low-lying coastal areas. Apart from this rather subjective issue, risk – as an objective factor – can be reduced. Property of society is protected in a flexible way, and enhances the ability to cope with impacts of climate change.

1.3 Methodology

Metaphorically spoken, the methodological building of this thesis is divided in a substructure or grounding and a superstructure, which is based on this grounding. The substructure is built by the method of case study research. Performing a case study is not only a methodological choice, but all the more a preference in which context and in what depth a selected topic is studied (FLYVBJERG, 2011). A case study is defined as “*an intensive analysis of an individual unit [or area, or paradigm] stressing developmental factors in relation to environment.*” (MERRIAM WEBSTER, 2013a)

Case studies do not necessarily stand alone as method, but can be extended by further methods, as it is done in this thesis. So the case study is not characterized by the (additional) methods used, but by the demarcation of the unit (FLYVBJERG, 2011). In this thesis the case builds up a narrative around the paradigm shift in coastal management and limits the context to the German North-Sea coast. The case study is the demarcation for further methods used in this thesis – a methodological superstructure represented by qualitative content analysis and qualitative social research.

A qualitative content analysis of scientific literature, but also of other documents, such as regulations, strategy papers and directives give a deep insight into the current debate on climate adaptation, coastal management and the above addressed paradigm change in coastal

protection. The core of a qualitative analysis goes further than just reading the text, as the underlying assumptions, interests and philosophies can be identified. As the case study reveals causal relationships within the case (FLYVBJERG, 2011), the texts are interpreted and reconstructed for the same purpose (STRÜBING, 2013).

The second data sources are qualitative interviews and their analysis by methods of qualitative social research. As actors of various sectors are involved in coastal protection and especially in area-oriented coastal management, a stakeholder analysis identifies the relations and stakes of the different actors in the topic. Out of these various fields six sectors are selected and thus deliver representatives for interviews. To reveal personal notions and beliefs totally detached from a scientific discourse^(G) or biased for instance due to the membership in organisations or institutions, semi-structured and anonymised interviews are conducted. Interviews can reveal how actors construct their deeply held beliefs and interests and how they perceive and react on diverging opinions. As an outcome the qualitative analysis of the interviews describe the intersubjective relation and the communication of actors (MAYRING, 2003).

This brief overview about the used methods is further extended in Chapter 4 including an analysis of the involved stakeholders and an interview guideline. It will also outline the methodological strategy and research protocol of this thesis.

1.4 Outline of the thesis

This introduction gave insights in the scientific relevance of this study, the problem statement and in brief the scientific methods used in this thesis. An introduction of the theoretical backbones of this thesis, namely climate adaptation, area-orientation and the mutual gains approach will be given in chapter 2. As an extension of chapter 2.2, which describes the approach of area-orientation in theory, chapter 3 will provide a comprehensive overview about the elements and strategies of area-orientation in coastal protection. This theoretical database and knowledge base, is enhanced with descriptions of practical projects.

Chapter 4 will build on the introducing short version of the methodology. Here a more in depth description of the used and applied scientific methods is given. This chapter includes the selection of the stakeholders for interviewing and is therefore also the basis for the empirical part of the thesis. This empirical section is dealing with the case study area of the German North Sea coast and its bordering states Lower Saxony and Bremen. An introduction to the case area will be given in chapter 5, as well as information about the proposed paradigm change in coastal protection and how the societal and scientific debate is reacting on climate change and its risks.

As outcome of the interviews obstacles and synergies will be identified, categorized and listed in chapter 6. In a comparing process and the exact analysis of the interviews, it is

checked, whether and how the named obstacles can be turned into synergies and how the involved sectors can collaborate. Due to the variety of the named obstacles, success factors are invented to negotiate obstacles and identify synergies in the context of area-oriented coastal protection. These eight success factors are listed and described in chapter 7.

Chapter 8 concludes this thesis with a discussion of the results. A more critical reflection of the used methods and theories and the demand for further research is forming chapter 9.

2 Theoretical Framework

On the insights, given in the preceding sections the following theoretical framework can be conceptualized. The above described problem in coastal management and protection is a result of various factors. Besides climate change and its impacts as unforeseeable factor, other foreseeable and anthropogenic factors play a role in coastal management. Increasing population density resulted in the broad utilization of coastal areas. Uses, such as energy, resource and food production facilitated high rates of economic expansion. All these uses in potentially flood prone areas ask for the protection of lives and investments (NICHOLLS, et al., 2007).

Adaptation is an appropriate and common tool to deal with climate change impacts. But land-uses in flood prone areas require a flexible and proactive way of coastal management dealing with climate change impacts and with anthropogenic issues. Adaptive coastal management strategies can facilitate beneficial and even synergetic stakeholder relationships and land-uses with the same or even higher safety level, as with the common line-oriented strategy.

Climate adaptation is one of the two mainstays of this thesis. With reference to the title of this thesis and as direct measure of climate adaptation, area-orientation in general and the supplementary paradigm change in coastal planning specifically are forming the second backbone of this study. The mutual gains or consensus building approach implements a more sociological and inter-subjective viewpoint, which focuses on dialogue and negotiation towards win-win situations. Although not applied practically, the outcome of this thesis can be used as knowledge base for future negotiation processes, which apply the mutual gains approach.

2.1 From mitigation to adaptation

Today a broad range of the academic world is certain, that climate change will cause sea level rise and has significant effects on environment, economy and society. The increased probability of extreme weather events, such as storm surges and heavy rainfall will have implications particularly on coastal regions and low lying areas in the coastal zones (IPCC, 2012a; SAFECOAST, 2007; NICHOLLS, et al., 2007). It is also certain, that within the last decades the international debate mainly dealt with mitigation of climate change and not adaptation of the resulting impacts. Although mitigation was high on political agenda, inescapable changes in climate with measureable effects, claim for adaptation strategies as local and quick supplement (SAFECOAST, 2007; BIESBROEK, et al., 2009). This led to the acceptance of a combination of short-term action (adaptation) to facilitate long-term strategies and an implementation in policies accordingly (BIESBROEK, et al., 2009).

Adaptation can be defined as anthropogenic measures to adjust and adapt to expected climate change and its effects. The intention lies in reducing the negative effects and symptoms of climate change on society and environment. Despite the overwhelmingly negative notion and perception of climate change, the implementation of adaptation strategies can cause beneficial effects as well. This is strongly depending of the adaptive capacity that a system has. This capacity as the sum of strengths and resources to adapt to climate change effects is determined by monetary and technical resources. Additionally knowledge about adaptation strategies, institutional and organisational flexibility, ability to cooperate, work interdisciplinary^(G) and / or transdisciplinary^(G) and finally individual or common willingness to adapt contribute to adaptive capacity (IPCC, 2012b; SCHMIDT, et al., 2012; SCHUCHARDT, et al., 2011).

From the past, where mitigation and adaptation was seen apart from each other and even as competitive approaches, a shift in thinking occurred towards simultaneous application of both strategies, whereas a greater weighting on adaptation can be observed. Trade-offs and benefits are seen in a parallel application of adaptation and mitigation, increasing effectiveness in time, human and financial resources (BIESBROEK, et al., 2009). Due to the different administrative levels, from international and national policies for mitigation to local and regional action of interest groups or regional government for adaptation, these synergies and trade-offs were recognized sceptically (KLEIN, et al., 2007). Another point of critique is the different spatial dimension of the approaches – adaptation focusses on local and regional level and mitigation tends to be implemented on national or international level. TOL (2005) summarized, that adaptation and mitigation are competing for resources, but still can be applied together and benefit from each other, although only depending on the context. Spatial planning with its broad scope can be a facilitator in combining both approaches also in regional and local level (BIESBROEK, et al., 2009).

Both – mitigation and adaptation – have influence on and are influenced by socio-economic development. Following the recent trend, this thesis is only dealing with adaptation strategies in coastal zones as the results of adaptation strategies affect the adapting area locally and more or less immediately, whereas mitigation measures would have slower impact on global scale. (NICHOLLS, et al., 2007; TOL, 2005). In Fig. 2-1 the framework of anthropogenic climate change with its impacts on societal and natural systems is visualized, making the immediacy of adaptation to mitigation apparent.

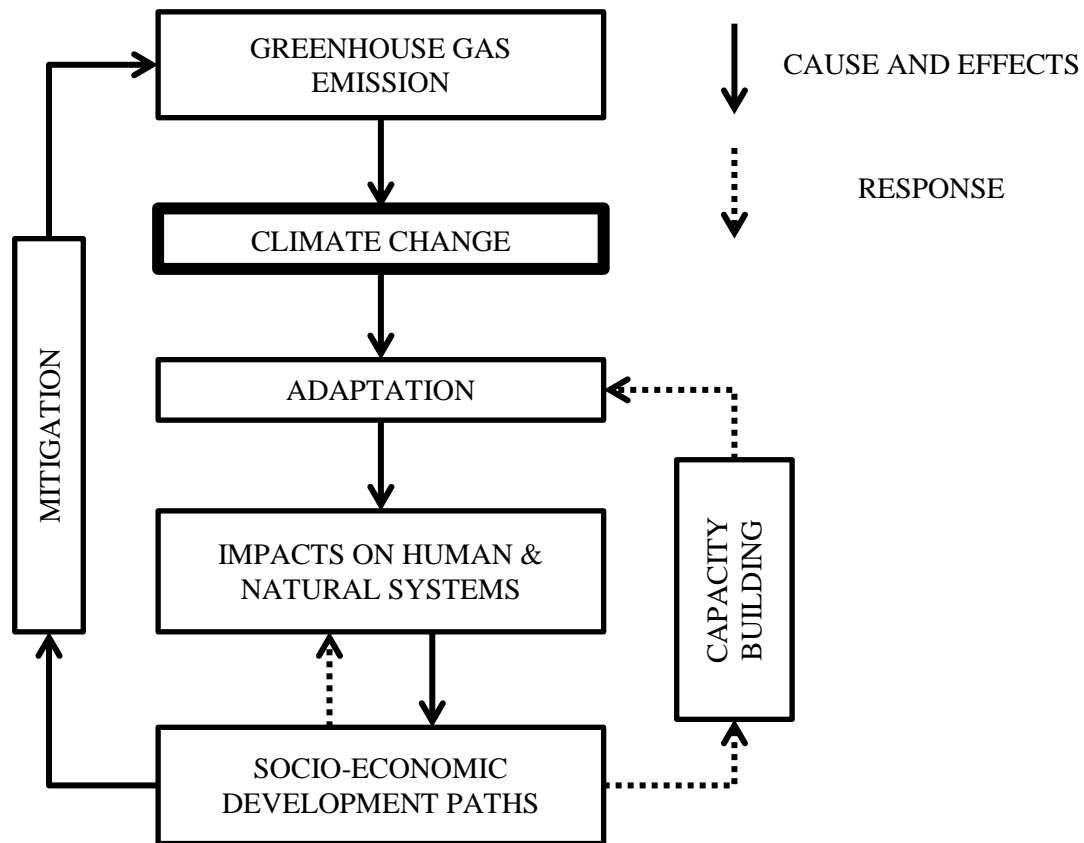


Fig. 2-1 Framework of climate change and its impacts on human and natural systems and the relations of socio-economic developments. Those directly affect adaptive capacity and mitigation (based on IPCC (2001)).

Several research projects in Germany were and are dealing with climate adaptation strategies, such as NORDWEST 2050, KLIFF, RADOST and KLIMZUG NORD covering the northern coastal states of Germany. The project CLIMATE PROOF AREAS establishes a cross boundary perspective on climate adaptation in several regions of the Netherlands and Germany. Additionally climate adaptation recently became at least a minor topic in the political agenda: Plans were launched on national, but also on regional and local levels in Germany (BUNDESKABINETT, 2008; NIEDERSÄCHSISCHE REGIERUNGSKOMMISSION KLIMASCHUTZ, 2012) and in the Netherlands accordingly, incorporating adaptation strategies (PBL, 2011). Moving ahead in the theoretical framework, a visionary adaptation measure – the concept of area-orientation – is presented in the next chapter. This approach is covering the above mentioned factors of adaptation, as it focusses on local or regional spatial dimensions and can contribute to the reduction of climate change impacts by careful consideration of interrelations between climate system and spatial characteristics.

2.2 The concept of area-orientation as a means of adaptation

Line-oriented structures in the landscape, such as railways, roads, or dikes form barriers within a spatial system, which was once characterized by dynamic links and interrelations among natural processes or spatial functions. A recent work of the authors HEERES et al. (2012) revisits this topic. The Dutch planning model for motorways was analysed on its transition from line towards area-orientation. Area-orientation, which is also called context sensitive design or area-development, can be defined as a holistic and proactive planning approach. It considers the spatial implications of line-oriented structures and interests of various sectors and includes them together with the unique characteristics of a specific surrounding area into a new planning paradigm. Another definition calls that the approach is also related to administrative bodies, meaning, that different bodies on various levels have to be involved (VROM (1984) in DE ROO (2003)).

Within the last six decades the road infrastructure planning in the Netherlands could be characterised as mainly line-oriented. One state-owned agency had the responsibility and other spatial sectors were not involved in the planning process, which led to a sectoral control in legislation, execution and organization (HEERES, et al., 2012). But not only infrastructure and coastal planning, as will be discussed later, were facing sectoral management, also environmental policy was confronted with this approach and the term ‘integration’ became a new paradigm in planning (DE ROO, 2003). Two dimensions of integration can be distinguished, needed to implement new approaches, such as area-orientation in an existing organisational pattern (HEERES, et al., 2012; DE ROO, 2003):

- **Internal integration**, meaning the reconstruction of organisational patterns within a planning sector in that way, that it can cope with the inputs from other sectors
- **External integration**, describing the integration between the main sector and the other involved spatial policy sectors considering them as equal partners during the process (e.g. coastal protection, tourism and nature conservation)

The equal incorporation of new sectors in a planning field, which was predominantly controlled by one single sector, is a complex task in the sense of organizational issues and power relations, but also in sharing and generating knowledge and joint fact finding. No single actor is capable to handle the complexity of area-orientation alone. Undoubtedly, transparent and open collaboration among various sectors is the most eminent variable in the process of area-orientation (rf. HEERES et al. (2012)).

Therefore the shift from line towards area-orientation is hallmarked by the increased number of involved stakeholders and the level of integration coming from sectoral planning, over internal to external integration. Relations between the type of integration, number of involved stakeholders and level of area-orientation are shown in Fig. 2-2.

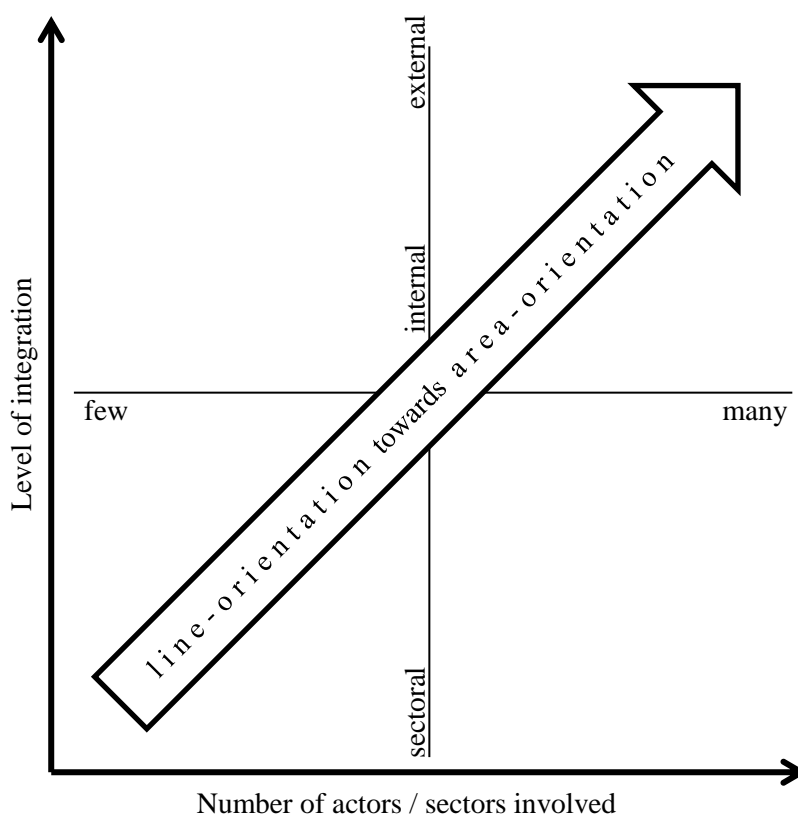


Fig. 2-2 Framework of the two approaches line and area-orientation with their relations of actors / sectors and levels of integration (based on HEERES et al. (2012, p. 153)).

Planners dealing with area-orientation have to keep in mind that problems may evolve from this involvement of various actors and consideration of interests, needs and conceivably confronting positions. The more interests and actors are involved within a process, the more tensions and possibly weak compromises^(G) with disadvantages for one or more parties are generated. Unwillingness to cooperate among the stakeholders, limited resources or bounded rationality^(G) are other aspects for failing cooperation. Reviewing literature dealing with participation and collaboration makes clear, that these problems are not specifically associated to area-oriented planning. A problem directly related to area-oriented approaches is defining the correct scope of planning. Area-orientation thrives by including the characteristics of an area to facilitate better spatial quality. Taking this as principle can lead to an endless scope, as everything can be seen as potentially related. A good demarcation of the considered planning area is therefore the key for not losing sight (HEERES, et al., 2012).

Area-orientation can be seen as an element for climate adaptation, as it involves spatial characteristics and considers a variety of sectors in a holistic way. In this sense climate change can be seen as sector as well, which implications and impacts has to be considered in the planning process. A careful consideration of possible future scenarios including the impacts of climate change will facilitate proactive sustainable spatial development by the means of area-orientation.

In this subsection the concept of area-orientation was introduced on the basis of the example of infrastructure planning, but it can also be used as general proactive adaptation concept for spatial planning. In conclusion this approach can improve the spatial quality and generate a kind of spatial harmony, as area specific characteristics of various sectors are integrated in planning. Beside these geographical realms it has to be highlighted, that internal and external integration of sectors, stakeholder involvement and cooperation across sectors are essential for area-oriented planning. Conflicting interests of stakeholders and multi sectoral planning may cause barriers in the planning process. In the next chapter a tool to overcome these challenges is presented with the mutual gains or consensus building approach.

2.3 Mutual gains approach to achieve consensus in locked in situations

A planner, no matter whether performing area-orientation or ‘common’ planning, has to deal with a variety of stakeholders of multiple sectors, but also with different physical interrelations. This communicative action evolved in the late 1980s and early 1990s, after a period of technical rationality in which a planner was an indisputable expert dealing with technical solutions. Authors, such as HEALEY (1992), INNES (1995; 1996) and FORESTER (1987) adopted the Habermasian thought of communicative and discursive action for consensus building to a planning theoretical position. Spatial planning and decision-making has become an open process, in which many parties, actors and interest groups are equally involved, informed and interdependent. The planner’s position changed to that of a mediator and simultaneously individuals became actors in planning processes. Actor and stakeholder relationships have mostly a long-term character, which can exceed the process of planning and completion of a project (WOLTJER, 2004). WOLTJER (2004) defines three forms of consensus planning, namely negotiation, learning and persuasion. The below described technique of mutual gains negotiation is combining the former two types: negotiation and learning.

Mutual gains negotiation is defined by “*advancing self-interest through the invention of packages that meet interests on all sides*” (SUSSKIND, 2008). Other terms for this technique are principled negotiation or integrative bargaining as consensus building. It is not about convincing or persuading other parties of the merits of own ideas and interests, but about finding common interests in a collective process. That process is distinguished by logical argumentation based on objective criteria and fair interaction facilitating long-term relationships (FISHER, et al., 2012; SUSSKIND, 2008). FISHER, et. al (2012)³ define interests as needs, desires, concerns and fears which individuals or groups care about at most. They identify two types, namely interests in substance and relationship. Especially in spatial planning

³ To avoid misunderstandings in the chronology of this approach: The book „Getting to Yes“ was initially published in 1981 by FISHER et al. and was reissued several times. The latest edition is used as source in this thesis.

an interest in long-term relationships between the actors is vital, as land-use conflicts and spatial planning have large time horizons of years up to several decades.

The goal of the presented approach is not a compromise, but a dialogue for finding a win-win situation and forming a consensus among different parties. Consensus is defined as outcome that all participants agree upon as at least acceptable (WOLTJER, 2004) and is therefore better for the participants than a compromise. ISAACS (1993) develops the approach further by introducing the aspects of dialogue, learning, collective thinking and joint fact finding. He states, that consensus indeed is a type of agreement, but the aspects of mutual understanding of the underlying patterns of thinking are not included. The involved parties still focus on their own ideas and positions – whereas dialogue can be characterized as a collective learning process creating joint facts, shared meaning and reflection of interrelations upon all involved actors (ISAACS, 1993). This exactly is the heart of the presented approach – that all participants know each other's interests and goals and can therefore form a consensus, or a synergy, which is in sum even more than the single parts of the agreement.

Besides knowing own interests it is important to develop a best alternative to negotiated agreement (BATNA). The BATNA comes into action, when the predefined goal of an actor in a negotiation is not achieved. In such a case, alternatives may be more valuable, as accepting an unfavourable outcome of the continued negotiation. A fixed position, such as that a nature reserve must have a certain size under any circumstances, is blocking the invention of new ideas and synergies or the acceptance of alternatives. Other than that a flexible BATNA extends the number of options and enhances the chance for synergies. A fixation on the fixed goal (a certain size of a nature reserve) is forming a strong commitment and may blind the negotiators for new and possibly more innovative and better solutions. Therefore the BATNA has to be seen as standard to check any decision against. It further clarifies the question, which options are present when the goal is not reached. Just as knowing interests of the other parties, knowing or imagine a possible BATNA of opponent actors is a strong factor in negotiation with unbalanced power relations (FISHER, et al., 2012). Finally BATNAs may develop during negotiation, when new information is shared.

The process of the mutual gains approach is shown in Fig. 2-3 from an actor's perspective. Some of the shown steps require or profit from the election of an independent mediator, who is capable of moderating the process and – just in case – is able to reconcile disagreements upon the actors. A short training for all participants may also be useful, to assure, that the process is understood and a high level of transparency is gained (SUSSKIND, 2008).

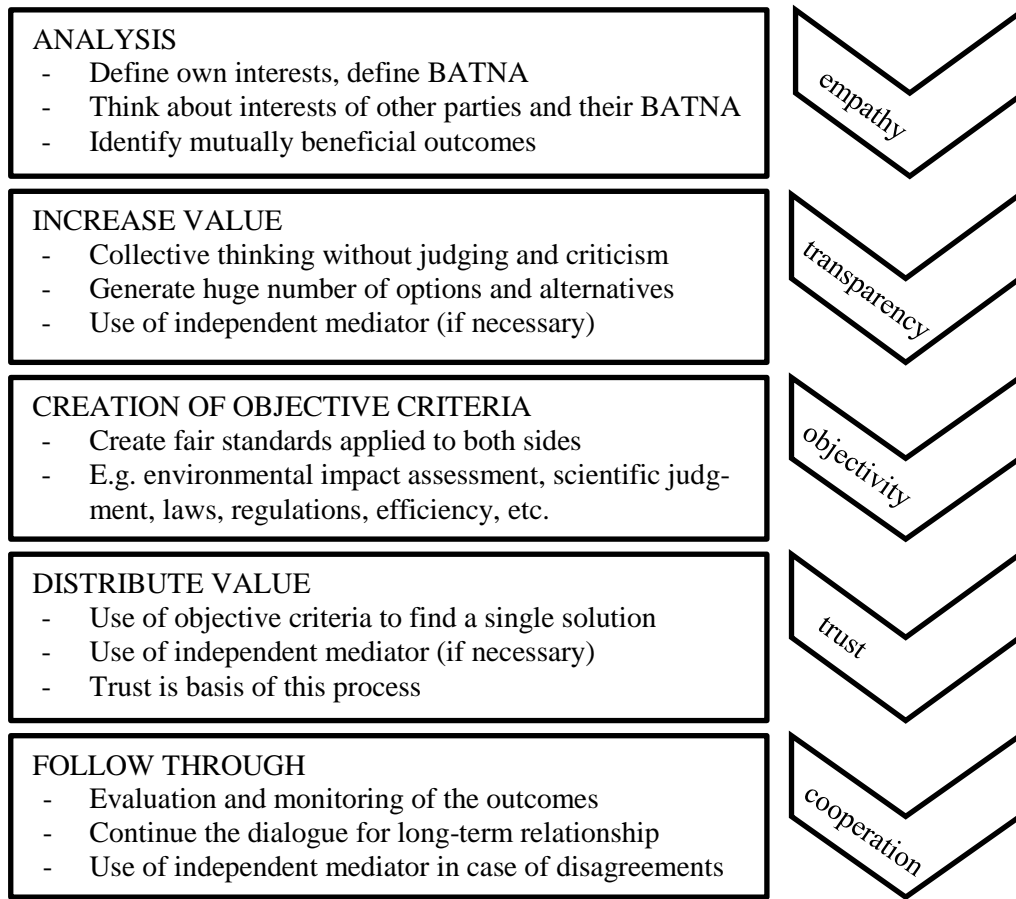


Fig. 2-3 Steps of finding mutual gains with their underlying values and principles (own graphic, based on content of SUSSKIND (2008) & FISHER, et. al (2012))

Additionally, beneficial outcomes of the process are increased by efficiency in the negotiation process and wise solutions, as they are formed in dialogue as a collective effort. The maximized value to all participants increases the commitment to the process and the outcome. This enhances the position of all parties to deal with each other in a common and productive way. Having a single best solution for the problem, everyone agrees upon will reduce the costs for the actual implementation, as quarrel is less likely. The added trust between the participants grants effective and long-term relationships and interaction (SUSSKIND, 2008; FISHER, et al., 2012).

As described above and shown in the figure (Fig. 2-3) the mutual gains approach is also a learning process, which involves the reflection of conflicting interests and alternatives of components. This knowledge generation to find opportunities for possible synergetic collaboration is a time intensive process. The interviews and their qualitative analysis within this thesis can contribute to this process. Synthesizing the outcomes of the interviews and the literature research can be used specifically or in general as example for the preparation and analysis phase of the mutual gains approach.

Nevertheless the mutual gains approach is also criticized as the aspect of power is neglected. It is not very likely, that groups having different interests and unequal power balance act as

needed in the presented approach, which is based on trust, cooperation and empathy. It is unlikely, that a very influential and powerful actor sees a weaker actor or a minority as equal negotiation partner. This approach may not be applicable in every kind of negotiation issue, but a lock-in situation or a complex situation, possibly facilitated by a trigger event, claiming for intense cooperation, could be the ideal arena for mutual gains negotiation. In this case not political power or strength is vital, but the power of knowledge, an appealing idea or design, or the power of commitment and legitimacy (FISHER, 1983). A strong BATNA and the knowledge about the possible BATNA of other parties are important for negotiation in unbalanced power relations. Still a participant with a better alternative or who feels disappointed or left out can block the whole process – which is another factor for the need of having a process mediator (SUSSKIND, 2008).

Despite the critical points, mutual gains negotiation including dialogue as method for joint fact finding has the potential to identify synergies. Going beyond the scope of this thesis the approach can resolve obstacles in locked-in planning situations. Necessary success factors are besides the principles empathy, transparency, objectivity and trust, a general willingness of all involved parties to constructively cooperate and accept the outcomes in any case. Depending on the present complexity, a mediating arbitrator is important as well.

2.4 Conceptual framework

This chapter will deal with the operationalization of the three presented theoretical concepts – climate change adaptation, area-orientation and mutual gains approach. All three approaches are thematically interlinked. Climate change is not the only, but one cause of the problem and climate change adaption one reaction to cope with it. Area-orientation is one method for adaptive planning and an approach used in a new paradigm of coastal management in Germany. But it may face conflicts, when conflicting interests are forming barriers and lock-in situations within a multi sectoral planning process. The mutual gains and consensus building approach may help to identify opportunities for collaboration and negotiate obstacles.

As the approach of area-orientation is not applied in the German coastal protection philosophy the first step of the thesis can only be done theoretically, based on the analysis of literature. The aim of this part is a broader understanding and knowledge base about elements and strategies of area-orientation in coastal management. Additionally it can be determined, how coastal management and protection benefits from this approach in relation to the common philosophy. Involved sectors and stakeholders, namely water management, coastal protection, nature conservation, agriculture, tourism and spatial planning, are identified in this section for the further steps. As connection between the theoretical debate about this approach

and its practical implementation, examples of pilot projects in the Netherlands are used to substantiate the insights in this approach.

This knowledge base can be seen as the basis for the next empirical step. One core characteristic of area-orientation is the involvement of various stakeholders including multiple sectors. These stakeholders in the German coastal protection strategy, which were identified before are asked in expert interviews about their perception and understanding about area-orientation and climate adaptation in coastal management. Additionally their suggestions about which synergies or obstacles derive from the implementation of area-oriented coastal protection will be analysed. The questions are an outcome of and interlinked with the theoretical knowledge base. This empirical part of the thesis has various goals and contributions to the outcomes of this thesis. At first and similar to the theoretical analysis described above it expands the knowledge base, second it is a contribution to the scientific debate and an initial link for the operationalization of theory to practice, and third it is a contribution to the preparation and analysis phase of the mutual gains approach.

BIESBROEK (2009) states that the diversity of policy arrangements and actors in climate adaptation and mitigation makes it hard to identify synergies for all involved sectors. These difficulties in finding opportunities for synergetic collaboration among sectors and orient oneself in the diversity of claims, needs, fears and interests can be overcome by applying the mutual gains approach. In the context of area-orientation, which involves many stakeholders and parties, the mutual gains approach is seen as especially appropriate. Synergies can be identified by this approach, which could generally decrease the opposition against a new philosophy in coastal protection. Instead of legal control, communication and negotiation might give better possibilities to develop innovative concepts, which meet the needs of all involved parties. This might collide, with existing legislative boundaries and the common philosophy of coastal protection, but in the long term perspective new approaches have to be initiated and developed (cf. to chapter 5).

As the mutual gains or consensus building approach cannot be applied in its full extend in this thesis, the analysed interviews and gathered empirical data contribute to negotiation processes in this context or can help to get started with a mutual gains approach. Out of the interviews identified obstacles, synergies are derived and categorized. This expanded data set will be used to conceptualize possible synergetic relationships with sectors having similar interests. A matrix will show the potential for synergetic cooperation between the sectors.

In a last step, synthesizing all data and outcomes of the thesis, success factors will be derived from prior parts of analysis. Constructing synergies is no easy task and depends on various communication and planning techniques, information exchange and willingness to cooperate. Finally this outcome can be applied in practical application of area-orientation in coastal management and closes the link between a theoretical scientific debate about abstract concepts and the generation and application of empirical data.

The conceptual framework in Fig. 2-4 is primarily visualizing, that chapters 3, 5 and 6 are directly related to the introduced theoretical concepts of area-orientation, climate adaptation and mutual gains approach respectively. Furthermore the working steps and how the collected empirical data shows up obstacles and synergies are presented and how they are synthesized to success factors as outcome of the thesis.

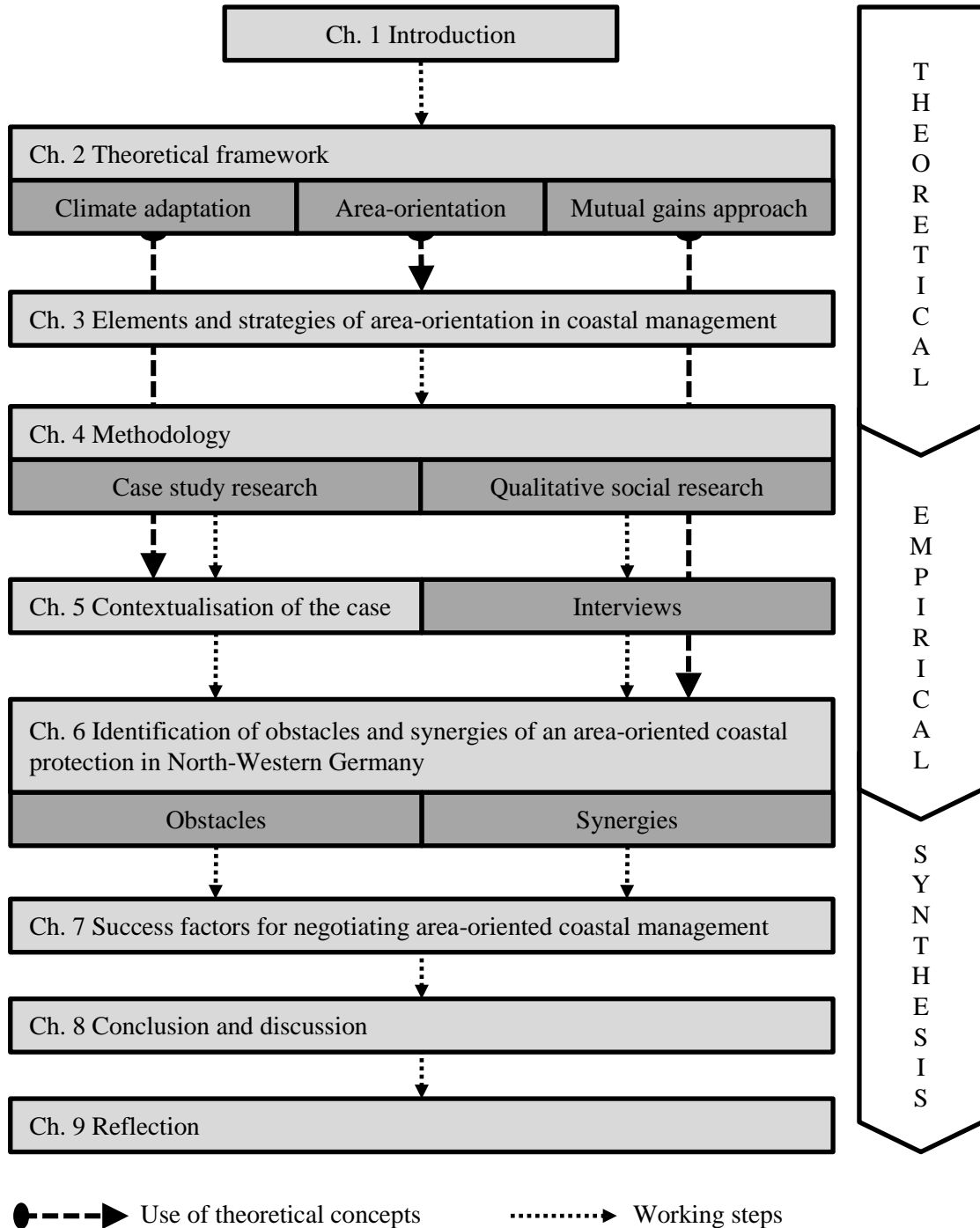


Fig. 2-4 Conceptual framework. Visualization of the used theoretical approaches, the applied methods and the working steps related to the structure of the thesis

3 Elements and strategies of area-orientation in coastal management

Coastal protection has many nuances. From hard structures immuring whole estuaries and river deltas to local scale soft measures for supporting natural resilience^(G) of coastal habitats. These measures range from restrictions and legislation how high dikes have to be constructed to communicative approaches to teach upcoming generations about risks but also about the uniqueness of our coasts and seas. This section has the purpose to build up a distinct knowledge base about these nuances. Common and recent protection measures will be described with emphasize on area-oriented protection and how they can function as elements of this approach.

Main elements of area-oriented coastal protection, which are discussed here, are (a) risk management, (b) risk communication, (c) multifunctionality, (d) structural protection measures, (e) drainage and storage of water and (f) involvement of multiple sectors. These six elements can be categorized in structural and non-structural measures. Besides the obvious difference in using structural and physical measures instead of non-structural, some measures have no clear demarcation, causing a fluent passage amongst each other (HOFSTEDE, 2009b). Risk management and communication are non-structural measures, whereas multifunctionality cannot be clearly distinguished from structural protection. Effective multifunctionality needs both, a thorough spatial planning involving all stakeholders and an appropriate structural basis.

The following chapters deal with the mentioned elements. To enhance the theoretical information given here, some excurses will include facts and experiences from pilot projects.

3.1 Risk management

Coastal protection and its structural measures cannot be seen apart from a wider network of managing risks by various means. Managing these risks is not a linear process, but has to be seen as a circular process (HUTTER, et al., 2007; KLIJN, et al., 2012). HOFSTEDE (2009a) developed a control circle as iterative process for managing risk evolving from storm surges. These measures of prevention, protection, preparedness, emergency measures, recovery and monitoring (rf. Fig. 3-1) are interlinked with each other and they construct a circle of reactive and proactive actions. This circle contains elements of the four sectors spatial planning, risk communication, disaster management and coastal protection. Prevention and preparedness are factors for reducing damages on which spatial planning can be set as responsible for. Preparedness including individual preparedness of goods and properties is also an outcome of effective risk communication. Communicating risk and possible measures for personal preparation can facilitate activities on private and voluntary basis. In case of a flood

event the steps of emergency measures and quick recovery fall into the expertise and responsibility of disaster management. But still the steps of protection (by structural measures) and monitoring of the whole process have to be coordinated. HOFSTEDE (2009a) assigned these two tasks to the sector of coastal protection. Nevertheless it has to be considered whether a superior and cross-border consortium or institution can handle the coordination of all tasks and actions between various sectors, levels and between administrative boundaries better (rf. Chapter 7).

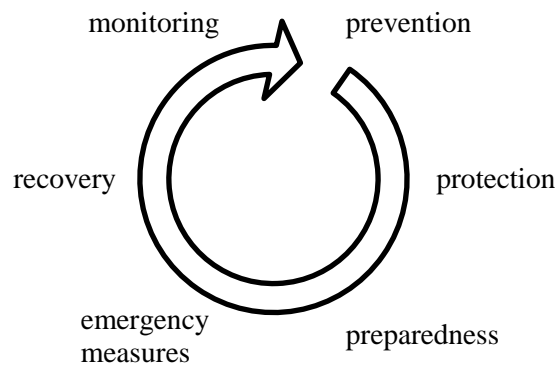


Fig. 3-1 Control circle of coastal risk management describing coastal risk management as continuous learning process of prevention, protection, preparedness, emergency measures, recovery and monitoring (based on HOFSTEDE (2007) in HOFSTEDE (2009a, p. 6)).

Same as the ring model of resilience of GALDERISI et al. (2010), which is comparable to the control circle of coastal risk management; it symbolizes a chain of measures, which are coined by a continuous learning and improvement process. This picture of a holistic coastal risk management is strongly connected with disaster management and with spatial planning as it can reduce the impacts and hazards of storm floods (HOFSTEDE, 2009a). In particular the area-oriented approach needs spatial planning as coordinating actor between various planning sectors. This integration of planning and knowledge fields has to assure, that spatial relationships are considered under the aspect of cause and effect of risks (KNIELING, et al., 2009). Beside the spatial relationship, risk management should also address “*social equity, ecological integrity and economic efficiency*” (KLIJN, et al., 2012, p. 1471). Having the common protection philosophy in mind makes the differences obvious: Instead of one equal protection level, with no link to spatial characteristics in the common strategy, risk management demands for spatially specified management of risk. The spatial diversity underlines that risk is not distributed homogenously, but heterogeneously and varying with spatial characteristics and use patterns (SCHIRMER, et al., 2007a). Hence risk is an area-based variable. KLEIN et al. (2004) define three strategies for risk management and risk reduction, which can be used either combined, mixed, or individually.

- Choosing change, which means the accepting hazards and restructure land use accordingly, up to relocation of settlements

- Reducing losses in the case of a flooding or reduce the occurrence of flood events
- Accepting losses, for instance by insurances, solidarity or simply endure losses in extreme events.

The concept of risk management was implemented in EU-legislation in 2007 by the directive of the European Parliament and of the Council on the assessment and managing of flood risks, 2007/60/EC, or colloquially spoken, the floods directive (EUROPEAN COUNCIL, 2007). Main objectives of this directive are the establishment of a framework for measures to reduce risks of flood damages and negative consequences for the human health and lives, the environment, cultural heritage and economic activity. On available information and experience of earlier events, flood hazard maps and flood risk maps shall be used as information tool. From these maps and further research, flood risk management plans have to be derived until end of year 2015. Flood risk management plans focus on prevention, protection and preparedness and the restoration and maintenance of floodplains. As flood extend, water level during a flood and flow velocity is varying according to the management unit, flood management plans shall contain tailored solutions depending on spatial characteristics. The floods directive is of particular importance, as an abstract risk, such as flooding is projected on maps and operational planning, which is thereby visible and perceivable for citizens and users of potentially flood prone areas.

Parts of this directive contains parallels to the water framework directive 2000/60/EC (EUROPEAN COUNCIL, 2000) allowing synergies and benefits in the workflow and implementation processes of both directives. Local and regional authorities are seen as important actors in flood protection regarding organization and responsibility. All actions on behalf of this directive have to be performed under the principles of sustainability and supporting a high level of environmental protection (EUROPEAN COUNCIL, 2007). Despite the importance and unchanged responsibility of communities and associated water and dike boards, the state has to take responsibility for establishing risk awareness. The Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz (NLWKN), as responsible state agency for coastal protection in Lower Saxony, highlights that proactive measures, such as land-use planning, flood-adapted construction and improvement of early warning systems are parts of the implementation of the floods directive as well. It shall be a collection of proved principles from different sectors (NLWKN, n.d.).

This focus on proactive measures in the context of risk management can be summarized as a shift from hazard control to risk management (VIS, et al., 2003).

3.2 Risk communication and risk perception

“If men define situations as real, they are real in their consequences.” This fundamental norm of behavioural studies coined by THOMAS & THOMAS (1928, p. 572) can be trans-

ferred to societal communication about environment, ecological hazards and climate change. It states, that subjective factors influence our behaviour and perception of reality. In the context of this study an inverse conclusion can be derived from this quote: If climate change and its risks are not communicated, it has no effects on societal behaviour (LUHMANN, 1986), or they are not perceived as risk. PETERS & HEINRICHS (2005) summarize these two notions in a way, that physical changes in the environment remain disregarded in the society before they are not epitomized as problems or risks. This rather fundamental observation on how problems and risks are constructed is essential for the understanding of risk communication.

Risks are present everywhere and are shared globally nowadays. Some risks are well communicated and society is aware of these risks and prepared to cope with them. But especially events, with very low probability, but high impact, or subtle changes in a global context are not considered adequately as risks or are simply disclaimed. These risks, such as catastrophic impacts of climate change, extreme weathers or the slow, but prolonged prognosticated sea-level rise have a relatively low profile in the sense of risk awareness (ALE, 2005).

In a citizen survey about risk awareness and risk perception^(G) in coastal cities of five European coastal states, namely Belgium, Denmark, Germany, the Netherlands and the United Kingdom, only 33% of 411 responses saw high or very high risks of storm floods. One third thought their houses could never be flooded, despite the fact that all asked citizens lived in flood prone areas. 59% didn't know what to do in case of flood and only 7% had taken personal protection measures. In general the people feel safe and risk awareness is underdeveloped. They have trust in the government to care about coastal protection or even disclaim the risks. Additionally communication about risks is underdeveloped – even on local levels. The information flow from administration to society is hindered, done on the wrong channels, or communication is simply not taken seriously (HOFSTEDDE, et al., 2005a; HOFSTEDDE, et al., 2005b).

An open debate about handling risks of storm floods is mainly set in the scope of simple measures fitting in the common coastal management and protection strategies, in which the society has trust. Discussions about moderate or drastic measures are not openly discussed or only with strong reservations. It can be noticed, that a lack of information about a possible paradigm change in coastal protection is the reason for inferior trust in new strategies and protection measures (SCHIRMER, et al., 2007a).

Reasons for the low risk perception are manifold and likewise highly dependent on the personal and spatial context. One reason is the low occurrence of storm floods causing high damages or even take lives. Risk awareness decreases together with increasing timely distance of past events and allows the illusion, that these events will never happen (again) (ALE, 2005). For instance catastrophic storm floods in Germany are 51 years ago (North Sea) and even 141 years ago in the Baltic Sea (HOFSTEDDE, 2009b). However people and

regions hit by severe storm floods in the past, have a higher awareness, as the event is grounded in the region's history and identity. Such as in the city of Hamburg that was struck particularly hard by the storm flood in 1962, but has a comprehensive risk and disaster management programme. Despite the storm surge levels have exceeded the levels of 1953 and 1962, no other comparable event happened in Germany or the Netherland again so far. So the comprehensive protection strategy itself could be seen as reason for low risk awareness. This was accurately summed up in a Dutch strategy paper for water management: "*Ironically, the gradual development of the system with which we gained control over the water created a safety risk in itself.*" (RWS, 2011, p. 37) Meaning that the seemingly control over water and sea by comprehensive technical measures, is leading to a sense of false security and increased vulnerability of the protected areas.

Another reason is the inconsistency between definitions of risks of scientist and administrators and of individuals. Some academic definitions of risk and probability are communicated insufficiently or are not understood practically by a broad range of society (HOFSTEDDE, et al., 2005a). This leads to a discrepancy between objective science based risk and a subjective risk (KNIELING, et al., 2009). Moreover people don't have the feeling to be informed adequately or think they cannot participate in planning processes (HOFSTEDDE, et al., 2005b). However risk awareness is crucial for a quick response of each individual in case of an event. It reduces the consequences of hazardous events, when everyone acts correctly and is prepared well. Finally risk awareness increases the willingness to accept possibly costly measures against floods and hazardous events (HOFSTEDDE, et al., 2005a).

Risk communication is a countermeasure against low risk awareness and risk perception. Communicating risks, impacts, possible damages and hazards is an ideal method to get risks back in people's minds. Sharing the information should be done in a "*neutral, objective, plain, targeted, comprehensive and understandable way*" (HOFSTEDDE, et al., 2005b, p. 135). A factor for generating a clearer understanding of decisions in a complex topic is the communication of the underlying uncertainties. From this broad focus, various tools and channels of communication should be used to narrow the focus down to the individual level and target-group-oriented. Here the possibilities for self-help and personal action in case of a hazard should be communicated (cf. risk management in Chapter 3.1). Risk communication can benefit from external facilitators, such as celebrities or individuals people have trust in, or the communication of best-practice examples (NIEDERSÄCHSISCHE REGIERUNGSKOMMISSION KLIMASCHUTZ, 2012). However risk communication should raise awareness without raising alarm (HOFSTEDDE, et al., 2005b). Therefore it is at least of equal importance to inform about possible instruments for preparation or adaptation to the new situation additional to the information about risks and hazards (SCHUCHARDT, et al., 2007).

One aspect of risk communication is participation in planning processes and discussions about flood protection. Within participation people get known to each other and other involved parties and stakeholders and build a community. A collaborative effort on an issue, which could affect parts of the society increases awareness for risks, hazards and other affected individuals. SCHUCHARDT et al. (2007) proposed to use the historically grown participation structure within the German coastal protection, namely dike boards with their members. Local initiatives, such as Local Agenda 21 can link their actions with the established structures of dike boards. These initiatives can facilitate empowerment and regional or local identity (McGLASHAN & WILLIAMS, 2003; GREIF, 2000).

As conclusion it can be noticed, that there is a general lack of risk communication. People feel safe and possibly forget about suppressed risks. This has to be seen as very dramatic, as a good perception of risk reduces the time of reaction in case of a catastrophic event. Also it raises the acceptance of countermeasures, which possibly will burden taxpayers (HOFSTEDE, et al., 2005a). Risk communication as tool for raising risk perception and awareness can therefore be seen as the key element for a shift in coastal management, as all following elements, changes and processes in coastal development can benefit from a higher risk perception and awareness.

3.2.1 Excursus: Design and visions as communication tool

An example of a vital connection of planning and design will be used in this excursus for presenting a way of how design can contribute to a communication process and shaping opinions. Landscape architects have designed four visions about Germany's coastal region as a dynamic space with multiple uses and protected by an area-oriented protection system. The four visions of (a) a landscape dominated by tourism, (b) a landscape of energy production and agriculture, (c) an urban landscape and (d) a nature landscape are focussed on synergetic uses within artificial lagoons with tidal influence. This concept is visualized by drawings and pictures, not by specific plans, technical specifications or feasibility studies (rf. Fig. 3-2).

This example, which was published in a brochure by the MICHAEL OTTO STIFTUNG (ed.) (2012), is playing with the viewer's perception of landscapes and future places. Landscapes are "*manifested in images, myths, values and other products of the human imagination*" (SELWYN & BOISSEVAIN, 2004, p. 12). Visions and pictures of possible futures can influence or change the perception of landscapes, although it has a low profile (rf. to chapter 7.5). Design is a catalyst for activating imagination, as people react and reproduce the ideas. Surprisingly it is not important, whether the vision coincide with one's own perception or not – both will facilitate new thinking processes and in the end choices (VAN DIJK, 2011). Visioning or designing of visions is not about visualizing a fantasy or utopia, but drawing an appropriate and optimistic picture of what can or will be in the future (MYERS & KITSUSE,

2000). A design is not dealing with how to reach a goal, but with how the concrete physical form of places and landscapes could eventually look like – design is goal oriented, but not operational. It concentrates on uncertainties and the emotional impact of appealing ideas. A re-thinking process can start from designs and it can contribute to set the basis for transitions, as these are driven by dreams and not decisions (VAN DIJK, 2011).

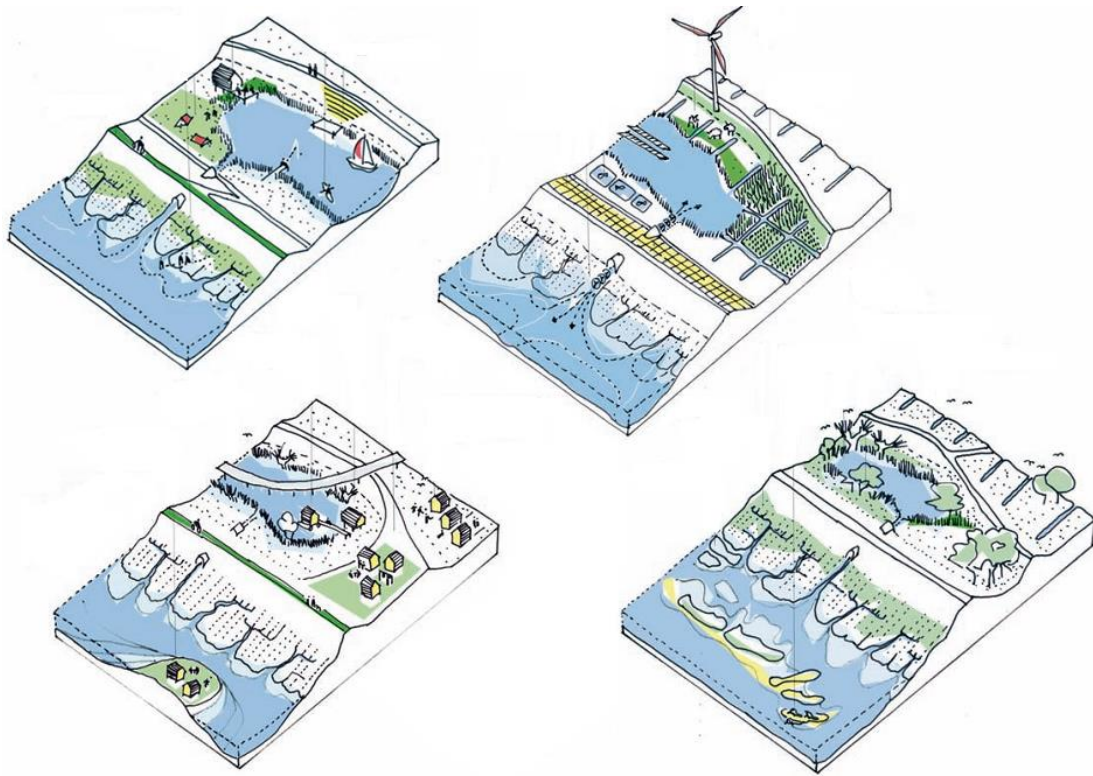


Fig. 3-2 Visions of a future German coast with area-oriented protection and adapted land uses in artificial lagoons with tidal influence: (a) a landscape dominated by tourism, (b) a landscape of energy production and agriculture, (c) an urban landscape and (d) a natural landscape (upper left to bottom right). (MICHAEL OTTO STIFTUNG (ed.), 2012, pp. 37-44)

Concluding, design can be seen as highly influential on choices and plans and contributes to debates as a tool of communication. The easy access of visualization does not predict, but motivate further action (VAN DIJK, 2011). Especially for complex topics, such as the paradigm change of coastal protection, which questions common and deeply anchored societal understandings of risk, safety and coastal landscape, design can be used as a powerful communication tool. With respect to the uncertain time scales of climate change the use of designs and visions has a striking advantage, as they can visualize possible futures as strategic visions and scenarios. Therefore they can enhance awareness for future challenges and simultaneously can be triggers for transitions.

3.2.2 Excursus: Insurability of storm floods

This brief excursus discusses whether insurances against damages of storm floods can be a tool of regulation and awareness rising. Up to now, it is not possible for private individuals to cover damages from storm floods by private or state insurances in Germany.

Two aspects are needed to determine the insurability of storm floods: First, an exact valuation of goods under risk and second, an effective and valid definition of risk zones. Especially those are needed to identify appropriate insurance premiums. The first aspect is partly covered, as some insurance companies already try to value goods and possible damages in case of storm floods (HAMANN & REESE, 2000). Collaboration with research institutes and affected people can even enhance the dataset and its reliability for both sides.

The second aspect is for pricing appropriate insurance premiums for multiple areas with different risk potential. Therefore risk zoning is essential and will lead to higher premiums in areas with potentially high risk and lower premiums for areas with lower risk. Studies have identified, that premiums for high risk areas will exceed the value of the protected good calculated over its lifetime, which makes these insurances virtually uneconomic. A huge solidarity group is needed to cover the enormous costs in case of flood events (BEHNEN, 2000).

But insurances can act as an indirect planning instrument. Instead of building restrictions the costs for construction of houses in high risk areas is more expensive, than in areas with low risk, due to higher premiums. The incentive to move to lower risk areas can contribute to a new awareness of risks. Opposing to that, the insurance of storm floods can also reduce the awareness, as personal goods and monetary values are not lost, but will be paid back. Or from a risk oriented perspective: Risks that are insurable are rather accepted (KUNZ, 2004).

The study of BEHNEN (2000) comes to the conclusion, that the insidious sea-level rise and storm surges are normal rather than abnormal events. But abnormality is a basic condition for insurability. This in addition to the extremely high values which have to be covered makes storm floods at present not insurable. Nevertheless insurance companies in general should be considered as actors for a possible paradigm change in risk communication and risk zoning, as they have an authentic interest in reducing damages caused by storm floods.

3.3 Multifunctionality in the context of coastal zones

In the direct sense of the words multi and function, multifunctionality means “*having or fulfilling several functions*” (OXFORD DICTIONARIES, 2013). The term multifunctionality is often used in the context of agriculture, defined as “*the idea that rural landscapes typically produce a range of commodity and noncommodity use values simultaneously*” (McCARTHY, 2005, pp. 773-774). Meant by this is, that rural areas and agriculture serve beside the classical food production the multiple functions of maintaining jobs, housing,

protection of biodiversity and recreation (McCARTHY, 2005; WORLD TRADE ORGANIZATION, n.d.).

Although this definition might be appropriate in its context, it is too broad and not completely correct for the context of this thesis and of area-orientation. Therefore an own definition is used for this thesis: Multifunctional areas are areas that either have or fulfil several functions or are used for several interests simultaneously. These functions do not necessarily have to serve one sector of land-use, but can also serve multiple sectors in cooperation. Additionally these functions can exist parallel in time, but also within a temporal overlap, for instance seasonally. These interlinked uses and functions of an area may cause problems, when interests are conflicting, but can also be beneficial or even synergetic. But multifunctionality mustn't be seen positive per se: the simultaneous use of a bay for recreation, nature conservation and as harbour for petroleum tankers is a multifunctional use, but the uses are not interlinked and potentially disturb each other (INT_6, 11.Oct.2013). Areas described by this term, should have a spatial demarcation, including very small areas, such as public spaces in settlements in the dimension of square meters or large areas, such as the space between a main dike and a second dike, or between a summer dike and a main dike in the dimension of square kilometres.

The manifold options of combining uses and the variability in spatial size are best described by examples: An example for a small sized multifunctional area is the concept of an urban playground, which stores rainwater in case of heavy rain events, but simultaneously keeps its function as public space and playground. The dynamic water level is implemented in the playground and turns it to a water playground or open water body. This concept serves water management and recreation (BOER (2010) in RESTEMEYER (2012)).

To include an example of a larger scale the previously mentioned vision of tidal lagoon landscape as area-oriented coastal protection zone is used (rf. to Fig. 3-3). The space between the main dike and the second dike line is used multifunctional for energy production, but also for agriculture and aquaculture. Growing reed as energy crop and seafood by pond aquaculture or mariculture is only made possible due to the tidal influence and allowing water behind the main dike. Another example in the context of the case study will be presented in chapter 6.3.

Also single objects can serve multifunctional uses, such as streets and highways. When they are constructed elevated from the ground and with appropriate construction, they can function as second dike line and serve therefore the function of transportation and flood protection and facilitate area-oriented coastal protection (AHLHORN, 2009).

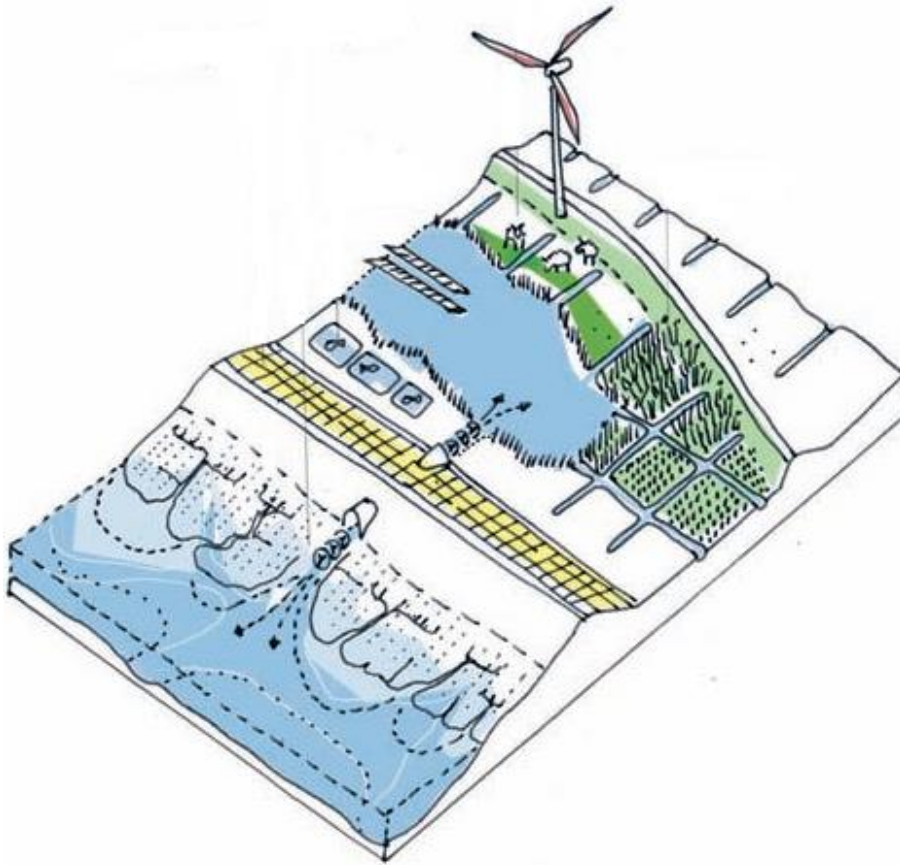


Fig. 3-3 Lagoon landscape with area-oriented coastal protection and multifunctional use of the intertidal area between main dike and second dike line. This visionary example focusses on energy production by various means using wind, water and sun, but also by the use of energy crops. This function is combined with agriculture and aquaculture. All functions exist simultaneously and within a delimited area (MICHAEL OTTO STIFTUNG (ed.), 2012, p. 42).

Possible drawbacks are (a) that stakeholders and users of the areas do not come to a consensus, or are not willing to cooperate; (b) possible collaborations or synergies are not found, due to lack of information; (c) old patterns of thinking, that areas can only be used by single actors may form a barrier and (d) the geographical characteristics of the area do not allow multiple functions. Therefore vital stakeholder coalitions (McCARTHY, 2005), an exchange of information and further research and knowledge generation by implementing pilot projects are success factors for effective multifunctionality.

Multifunctionality is seen as element and strategy of area-oriented coastal management, as the use of the area can be combined under the premise of climate adaptation and serving coastal protection. Or other than that, multifunctional areas can keep their functionality despite possible impacts of climate change. Another reason, why multifunctionality is highlighted in this context is that multiple uses increase spatial diversity and flexibility in and between the involved functions.

3.4 Structural coastal protection strategies in times of climate change

Technical protection against storm floods contains all man made constructions, such as dikes, dams, flood walls, storm surge barriers or other physical structures. Measures, in which physical structures are relocated, such as in the retreat strategy are also counted to technical coastal protection. The IPCC (2001) has defined three coastal protection strategies, namely protection, retreat and accommodation / adaptation, which are shown in Fig. 3-4. The picture was enhanced by a fourth strategy, that is advancing the protection seawards (PROBST, 1994). The strategy in the upper left ‘increase protection’ is illustrating the current strategy best.

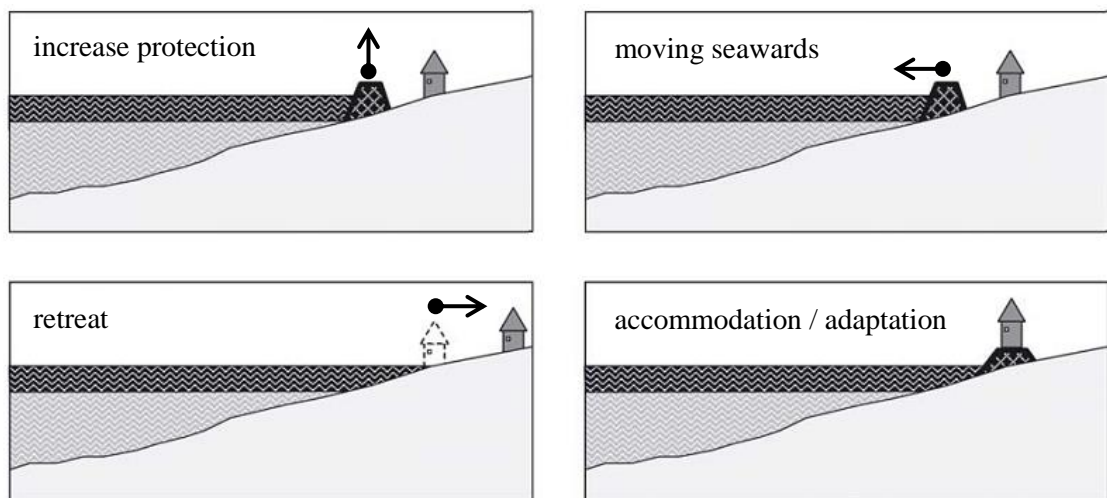


Fig. 3-4 Strategies of technical coastal protection in times of sea level rise: increasing and strengthening the protection (upper left), moving protection seawards e.g. with sand nourishment and embankment of new land (upper right), retreating or managed realignment from flood prone areas (bottom left) and accommodating water and adaptation of land-use (bottom right). Sea level rise is depicted as darker grey layer above the current mean sea level (lighter grey). (Modified graphic, based on HOFSTEDE (2009b, p. 3), PROBST (1994) & IPCC (1990))

A zero-measure strategy, so keeping the current situation, without any changes, will not be discussed here. The main focus of the following sub sections is on showing area-oriented protection measures within the categorized strategies and the potential of a reorientation towards the new coastal protection paradigm of each strategy. The measures, which are described in here, will be categorized in hard engineering, such as common construction of dike enhancement or storm surge barriers and soft engineering measures following the approach of ‘building with nature’. Both structural measures are count as elements of area-orientation, although they are partly connected to the line-oriented coastal protection philosophy as well. Area-orientation needs structural measures, such as dikes, but is not solely based on them. For instance the construction of second dike lines, as structural measure, is proposed by KUNZ (2004) as first measure towards a new area-oriented protection paradigm (rf. also to chapter 5.2).

3.4.1 Hard engineering

Technical measures, which are constructed only by the use of human technology and which are forming solid barriers to the water system of the sea are defined here as hard engineering methods. This includes, dikes, storm surge barriers, sluices, but also measures to protect or enhance these physical structures.

- Overtopping security, enhancing main dikes

A vital strategy of the line-oriented and the area-oriented approach is enhancing the strength of dikes, whereas this strategy is also combined with heightening the dike only in the line-oriented approach. Goal of this method is to enhance the stability of the dike for the case of a storm flood, when water or waves are overtopping the dike. Technical measures, such as the inner slope of the dike (flatter than normal), new materials, such as geotextiles or the use of concrete, allows that huge amounts of salt water can overtop the dike, without severe damages. But accepting and withstanding overtopping will not increase the safety level in the protected areas. The essential additional part would be a second dike line and an appropriate accommodation for the intruded salt water (COMCOAST, 2007). Overtopping secure main dikes and at least a second dike line, which builds a polder system for the intruded salt water, is the basic principle for an area-oriented and staggered coastal protection (KUNZ, 2004). So, an overtopping improved dike does not necessarily be constructed in the same height, than traditional dikes, which could decrease the investments. But in this case a polder with a second dike is essential and overall an appropriate and saltwater resistant use of the space between the dikes. Possible uses in the high-risk area behind the main dike, could be leisure, natural brackish habitats or adapted agriculture (COMCOAST, 2007).

- Foreland protection

Foreland protection is the technical protection of a natural or artificial foreland of main dikes to reduce erosion at the dike and simultaneously decrease wave and tidal energy. A vast foreland of mud flats or saltmarshes influences the impact of waves, currents and tides, by propagation of wave energy to the foreland and a reduced probability, that all floods will reach the main dike. Important for this functionality is the avoidance of erosion, by traditional technical measures, such as the placement of groins and maintenance and constructing of drainage ditches (COMCOAST, 2007). Securing the dike foreland by groins is used intensively as measure to protect dikes in Lower Saxony (NLWKN, 2007). Other measures instead of groins are stone breakwaters, which are situated offshore to absorb wave energy in an early state. Crucial for these measures are an appropriate height of the foreland or breakwaters, otherwise their effect would be neglectable in case of storm surge water levels, when they are needed the most. Saltmarshes itself can enhance the coastal protection by the same reasons, but additionally are forming rare and unique natural landscapes and habitats. Protection of these habitats can therefore contribute to nature reserves, such as the National Park

Niedersächsisches Wattenmeer or help to fulfil requirements for EU legislation (COMCOAST, 2007). The maintenance of existing salt marshes could consequently also be counted to soft engineering coastal protection schemes, as the natural resilience of the Wadden Sea is enhanced and supported.

- Accomodation and adaptation

The centuries old tradition of constructing villages on higher grounds or on artificial dwelling mounts is revisited in this strategy. New constructions will be built higher on dwelling mounts, poles, or on extremely broad and high dikes, called urban dikes, super dikes or delta dikes. These dikes are virtually unbreachable, as the construction is much higher and broader than common dikes and also constructed with other solid materials, such as concrete. These dikes certainly consume more material resources, but can also offer new spaces in the sense of multifunctionality. Under certain conditions, they can be used for urban development, recreation, for transportation and agricultural purposes (MICHAEL OTTO STIFTUNG (ed.), 2012; VAN LOON-STEENSMA & VELLINGA, 2013). An example for urban dikes and development on dwelling mounts is the HafenCity in Hamburg, which is built on an artificial dwelling mount 7.5 m above the mean sea level. This is feasible in spatially delimited areas, but not for spacious projects (HOFSTEDE, 2009a). Due to the prevailing building density and the extreme technical effort, this method is almost only possible for new constructions (NIEDERSÄCHSISCHE REGIERUNGSKOMMISSION KLIMASCHUTZ, 2012). Despite the extreme barrier effect between sea and land, this method can be a good alternative in highly populated urban areas, as urban dikes allow protection and simultaneously new development zones. Another strategy, which is proposed by the MICHAEL OTTO STIFTUNG (2012) is the construction of infrastructure as higher structures or on poles, so that their use is possible even in the situation of a flooding. This adaptation strategy should be discussed in the context with high risk zones, directly behind the dike or in flood compartments, to secure the vital functions of settlement areas in case of a catastrophe.

- Managed Realignment

Managed Realignment cannot be counted clearly to either soft or hard measures. In this thesis the strategy is discussed in Chapter 3.4.2, as more natural and dynamic coastal areas are created and the human-nature interaction is facilitated.

3.4.2 Soft engineering

The approach of soft engineering and ‘building with nature’ is based on the mindset that humans and nature cannot be seen apart from each other, but are interacting as socio-ecological system. The authors VAN SLOBBE et al. (2013) state, that old paradigms of fighting the sea as an enemy by all available technical means are not valid anymore. Instead

they developed a concept of combining resilience, social learning and the use of ecosystem services as three factors and principles for coastal protection:

- Resilience, as the natural ability to react on changing conditions is increased
- Social learning to reduce uncertainties and learn from the involvement of various stakeholders and past events. Knowledge generation about how engineering approaches can facilitate coastal resilience
- Use of ecosystem services, as ecosystems, natural processes of sedimentation, and the maintenance of ecosystems can have a positive and direct impact on common coastal protection systems.

Reasons for soft engineering measures are lack of sustainability, concerns about the environment and the idea, that coastal protection cannot only be focussed on the area to be protected, but also on the water system to be protected from. Despite the focus either on the foreland or the hinterland, soft engineering can also be counted to the hold-the-line strategy, as primary protection measures may benefit and are protected by these measures (VAN SLOBBE, et al., 2013).

In the following brief descriptions, soft engineering coastal protection measures are briefly explained and introduced as alternatives and supplement to current technical and line-oriented protection structures.

- Sand nourishments or foreshore recharge

Sand nourishments are the deposit of sand or gravels in front of line-oriented primary dikes. Nourishments and foreshore recharge enhance the barrier and wave energy absorbing effect of natural beaches. In case of extreme events, it lowers the wave impact energy and stress on the primary protection structures. Nourishments can be applied punctually and in a more reactive way, or in larger scales, which than facilitates the natural deposit of sand along the shoreline at beaches and dunes (rf. to chapter 3.7.1 & VAN SLOBBE, et al. (2013)). From an ecological perspective, nourishments can be the early basis for naturally developing inter-tidal areas, such as saltmarshes. (COMCOAST, 2007).

- Mitigation of storm floods

Another example is mitigating storm floods, which is partly related to sand nourishments and foreshore recharge. Storm flood levels have increased in the last decades by anthropogenic measures, such as straightening and deepening natural river beds and estuaries. These morphological engineering had adverse effects on storm surge heights in the areas along the tidal rivers Elbe and Weser and the cities of Hamburg and Bremen. The authors VON STORCH et al. (2008) described the idea to turn these past interventions around and use morphological engineering in estuaries to lower storm surge levels again. This is partly done by removing or reversing past measures or by targeted new measures in the dynamic system of currents and sediments in an estuary, for instance by placing new artificial sand banks and islands in

the estuary. Primary goal would be the dissipation of tidal energy by the use of natural mechanisms. Up to now, none of these measures were put into practice. Further research is needed to determine the positive or even negative impacts of these new interventions.

- Managed retreat

The strategy of managed retreat is sometimes mixed and partly overlapping with the method of managed realignment. Retreat is defined here as abandon punctually small scale areas, but also larger regions, which are flood prone and let the abandoned areas develop freely and naturally. This seems to be a method of last choice, as potential economic, cultural or agricultural areas are left behind. A retreat from all flood prone areas or large parts of them would only be worth economically, when no technical protection measure could guarantee a safe environment (NIEMEYER, et al., 2012). This worst-case scenario has to be evaluated differentiated, as on the one side a retreat would not happen from one day to another, but managed and step by step within a long-term process; and on the other side the time horizon for such a development, when complete cities and densely populated areas needs to be left. Also moral values might speak against this strategy. Nevertheless it has to be kept in mind, also as medium-term measure for areas, which are not used intensively or from a cost-benefit perspective are not worth to be protected any longer by sophisticated coastal defence (PROBST, 2002).

- Managed realignment

Managed realignment cannot be clearly categorized to either soft or hard engineering, as both approaches are combined in this strategy. Dikes are rebuild, opened and set back landwards, which is counted to hard engineering measures, but new intertidal areas, with natural dynamic and sedimentation are created, which is counted to the approaches of soft engineering. The strategy “*consists of altering the existing defences to allow a previously protected area of land to be flooded by the tides. The defences can be removed, set back landward, decreased in height, or strategically breached*” (COMCOAST, 2007, p. 7). A realignment can form dynamic intertidal areas or lagoons with a more natural and typical form of the Wadden Sea, which allows natural habitats, such as saltmarshes or mud flats. These natural structures will reduce wave and tidal energy in front of the main dike. Secondly tidal exchange in former low lying dry areas facilitates sedimentation and therewith an increase of the land level in interaction with the sea level (MICHAEL OTTO STIFTUNG (ed.), 2012). This sediment input can also be used as local emergency source for clay and sediment in case of a dike breach (NLWKN, 2007). A re-structuring in that form, that a staggered system of first and second dikes is created is basically the idea behind the proposed area-oriented protection philosophy reducing the risk behind the different dike lines. Essential part of this strategy would be the adaptation of uses in the hinterland, for instance that the use behind the first (overtopping secure) dike is relatively independent to possible regular flooding and no sensitive infrastructure is built in high risk areas (KUNZ, 2004; COMCOAST, 2007).

3.5 Drainage and storage of fresh water in the hinterland

As highlighted in Chapter 1.2 the increasing pressure of climate change is affecting also the landward areas of the coastal zone. Land subsidence on the one side and increasing sea-level on the other side is forming a pressure for the sector of water management. Changing precipitation and evaporation levels, seasonal distribution and increasing chance of extreme events contribute to these new challenges (SCHUCHARDT, et al., 2011). In the end, not only blocking sea water out is an issue, but also the drainage of fresh water in the low lying hinterland. Sometimes these areas are lying below the mean sea level and only water management and drainage allow the use of these areas.

Traditionally the natural ability of drainage during low tide was used as a passive way of getting rid of too much water in the low lying hinterlands. In case that the water level in the hinterland is still too high, pumping stations are needed additionally (REGIONALFORUM "CLIMATE PROOF AREAS" DES LANDKREISES WESERMARSCH, 2011). But with the above described problem, the time slots for natural drainage and its effectiveness decrease with increasing sea-level and land subsidence – discharge of the water is increasingly demanding intensive pumping. This problematic is an important aspect of coastal protection, as the usability of the hinterland is dependent on drainage.

As in the section about structural and non-structural measures of coastal protection, water management in low-lying areas can also be categorized in technical measures – pumping – and softer or more area-oriented measures – storage. The technical strategy of pumping is solely based on the discharge of fresh water through pumps and sluices. Factors for pumping are the present infrastructure, meaning the capacity, location and age of the installed pumps (NATIONALPARK- UND BIOSPHÄRENRESERVATSVERWALTUNG NIEDERSÄCHSICHES WATTENMEER (ed.), 2010).

Whereas the strategy of ‘storage’ enhances the ability to store fresh water in rural, but also in urban areas (REGIONALFORUM "CLIMATE PROOF AREAS" DES LANDKREISES WESERMARSCH, 2011). Purpose for that are the reduction of extreme discharge peaks and the storage of water for natural drainage at a later time. Effective storage is dependent first and foremost on morphological and hydrological factors. The relief of the landscape have to provide areas for storage. Existing water bodies are important for the transportation of the water and can by itself be a place for storing water, for instance by varying the water level dynamically (NATIONALPARK- UND BIOSPHÄRENRESERVATSVERWALTUNG NIEDERSÄCHSICHES WATTENMEER (ed.), 2010).

The concept of ‘storage’ has a larger potential for synergies as ‘pumping’: Storage capacity can be used for short term storage of water from extreme events, for instance in the winter season, but can also be used as long-term fresh water basin for irrigation of agricultural areas, in the dryer summer season. Additional storage basins can be used for recreational pur-

poses (REGIONALFORUM "CLIMATE PROOF AREAS" DES LANDKREISES WESERMARSCH, 2011).

Intelligent management of storage and pumping capacity is used in the peninsula of Leyhörn and the lake Große Meer, which are explained in depth in chapter 6.2 and in 6.3 respectively. The research projects 'Speichern statt pumpen' (german for: storage instead of pumping) and 'Climate Proof Areas' deal with the topic of water management in times of climate change and the changing seasonal demands on the sector of water management.

3.6 Involvement of multiple sectors and stakeholders

The most of the presented elements demand the cooperation of stakeholders from multiple planning sectors to form effective and accepted results within a long term and complex transition towards an area-oriented coastal protection. Stakeholders in the context of coastal planning can be defined as individuals or groups, which can place a claim on resources or output, have influence on, or are influenced by decisions related to coasts and regional development in coastal regions. Interests can be represented by lobbies, non-governmental or administrative organizations, which are called institutional stakeholders (McGLASHAN & WILLIAMS, 2003; BRYSON, 1988). In this thesis the scope is set on institutional stakeholder, as they can have a higher influence in planning decisions than individuals. BURKHARD (2006) has listed interests of use within coastal areas, which can all be represented by one or more stakeholders (not in any particular order): Military usage, conservation areas and national parks, fishery, tourism, logistic, shipping and harbours, coastal protection (also sand- and clay management), resources, agriculture and energy production, cables and pipelines, disposal of waste, aquaculture, infrastructure and offshore wind energy including service. In this thesis not all of the mentioned functions are taken into account for identifying interview partners. The following reasons back up the selection of stakeholder for further analysis.

In the sparsely populated regions of the case area, three main usages can be identified: Firstly nature conservation, as the wetlands in the dike fore and hinterlands are important for breeding and resting birds. But, the vast wetlands are declining, due to intensive grazing (WITTIG, et al., 2007). Besides this conflict between nature conservation and agriculture, a long-term conflict between the sectors nature conservation and coastal protection in its common sense can be identified, as their underlying values are conflicting. Nature has to be protected against means of civilisation and technology as one basic principle of nature conservation and contrary to that, coastal protection works to protect the land and the civilisation by the extensive use of technical means (STRIEGNITZ, 2006; KUNZ, 2004). This is another reason for a further analysis of the sector of nature conservation and its relationship to others.

As ‘adversary’ of the above mentioned, the second group of main land-uses in these areas are intensive agriculture, grazing, dairy farming, but also and increasingly the production of energy crops. In some areas, for instance between the Jade and the Weser up to 95% of the land is used agriculturally (WITTIG, et al., 2007).

The third main interest is tourism as one of the most important economic factors. Tourism benefits from the exclusive nature as unique selling point, which attracts tourists. Concurrently extensive tourism causes harm to nature due to high resource demand and need of infrastructure (WITTIG, et al., 2007). This is causing a strong relation between the two sectors, but also a one-sided dependency.

Another field of possible conflicts and urgency is the sector of water management, as the precipitation levels will change and the times for natural drainage through sluices are limited. The sector of water management is therefore also an important stakeholder for coastal management and for climate adaptation.

These sectors, namely nature conservation, agriculture, water management and tourism in addition to coastal protection as the main theme of this thesis are not picked, as they are potentially conflicting, but because they are either (a) huge land users, (b) highly involved in the spatial planning process or (c) affected by possible damages through storm surges. Additionally a relatively high potential for synergetic collaboration is seen amongst these stakeholders. As facilitator for combining the demands and interests of the listed sectors and negotiate their obstacles, a sixth sector is taken into account in this thesis: the sector of spatial planning. Below the sectors are described in brief, whereas the linked stakeholders are presented in Chapter 4.3.2 including the tasks of the related organisations.

- Sector of water management

Water management is beside coastal protection the second main actor for allowing life and usability in low lying areas behind the dike. The responsibility for the sector of water management is to keep a certain water level according to the needs of agriculture by irrigation and drainage. This level is varying due to seasonal changes in the precipitation levels and demand for water. Controlling of the water level is done with a network of channels, sluices and pumping stations. Without these measures a land-use generally and especially for agricultural use would not be possible (SCHUCHARDT, et al., 2011). In low lying areas water management is of particular importance, because it assures, that water is kept in its basins and floods from extreme rain events are prevented. Similar to the organisation of dike boards, water boards have an early form of participation (SCHUCHARDT, et al., 2007). Water and ground boards are paid by the members living in the organisations territory. Water management is therefore financed by the solidary principle. It acts under the precautionary principle to secure health, safety of humans and liveability of their settlements (NIEDERSÄCHSISCHE REGIERUNGSKOMMISSION KLIMASCHUTZ, 2012). Besides the management of water quantity, the ecological quality of the water bodies is another field

of activity. The implementation of the EU water framework directive (WFD) (EUROPEAN COUNCIL, 2000) is therefore also a task for the sector of water management.

- Sector of coastal protection

Coastal protection is part of the common task of the state for improvement of the agricultural structure and coastal protection (GAK; german: Gemeinschaftsaufgabe zur Verbesserung der Agrarstruktur und des Küstenschutzes). It co-finances investments of the states for planning and for technical coastal protection measures with 70% (BMELV, 2012). In Lower Saxony the Ministry of Environment, Energy and Climate protection is the higher authority responsible for coastal protection. Below, the NLWKN is responsible for coordinating coastal protection in Lower Saxony. Similar to the sector of water management, the executing forces are dike boards, which are organized by the solidary union of the dike board members, who are living in the board territory. As only state in Germany, Lower Saxony has an own dike law, which regulates coastal protection from the legislative side; Whereas strategic goals of the coastal protection philosophy in Lower Saxony in cooperation with Bremen are defined in the master plan for coastal protection (NLWKN, 2007; NLWKN, 2010).

More profound information about the status quo, organization and strategies of the German sector of coastal protection can be found in Chapter 5.1 and 5.2.

- Sector of nature conservation

Defined in the Federal Nature Conservation Act (german: *Gesetz über Naturschutz und Landschaftspflege* or *Bundesnaturschutzgesetz [BNatSchG]*) nature conservation has the goal to protect nature and landscape now and for future generations in a way, that biodiversity, performance and natural capacity of adaptation is assured. Furthermore the landscape in its beauty, character and variety should be protected, cultivated and managed allowing and facilitating the dynamics of the natural system (§1 BNatSchG, 2013).

Nature conservation uses legislative instruments to deal with land use competitions and assign nature conservation areas. Environmental impact assessment is one of the main instruments used to protect nature from anthropogenic development. The sector of nature conservation has the strategic goal to reduce barriers such as dikes or extensive agriculture to allow natural flexibility, dynamics and facilitate the possibility of migration of flora and fauna (SCHUCHARDT, et al., 2011). This stands in conflict to development goals of the agricultural sector and the common strategy of line-oriented coastal protection.

In the case area, the National Park Niedersächsisches Wattenmeer is of particular importance as it is (a) the second largest nature preservation area in Germany linked with the other Wadden states of the Netherlands and Denmark and (b) the national park ends directly at the main dike line, so measures, which eventually focus on the use of the dike foreland for coastal protection and clay extraction, might be a potential area of conflict.

- Sector of agriculture

Agricultural sites in Lower Saxony are belonging to the most valuable grounds in Germany and Europe. This sector is also important across state boundaries and for trading in the EU (NIEDERSÄCHSISCHE REGIERUNGSKOMMISSION KLIMASCHUTZ, 2012). Independent of the economic importance, agriculture is very dominant in the landscape and fixed socio-culturally in the identity of the region (HARTMAN, 2012). Its spatial dominance is obvious, as agriculture needs space and is dependent on valuable grounds to guarantee good products and effective land use.

The agricultural sector is dominated by private entrepreneurs of various scales and within various fields of operation, such as greenland farming, cattle farming, production of energy crops, fruits etc. An organization which represents agricultural entrepreneurs is the chamber of agriculture Lower Saxony, which provides coaching, training for sustainable land use, but is also involved in spatial planning (LANDWIRTSCHAFTSKAMMER NIEDERSACHSEN, 2011).

Identically to coastal protection, agriculture is a part of the common task of the state for improvement of the agricultural structure and coastal protection (GAK). Investments in regional development, agricultural infrastructure and also investments by single entrepreneurs can be funded with up to 60% by the state (BMELV, 2012).

- Sector of tourism

Tourism is an important economic factor for Lower Saxony and the importance increases further locally for single municipalities and the islands (NIEDERSÄCHSISCHE REGIERUNGSKOMMISSION KLIMASCHUTZ, 2012). Whereas in the city-state of Bremen the event and city tourism prevails, tourism in rural areas gains its high attractiveness from the uniqueness of the landscape and the nature, such as the Wadden Sea, the Wadden Sea islands and the marshes, as well as the traditional cultural landscape. Tourists coming to these destinations are expecting impressive nature and landscapes (SCHUCHARDT, et al., 2011). This unique selling point for tourism in or near the wadden area is causing a dilemma. On the one side tourism benefits from and is dependent on the nature and biodiversity, but on the other side, extensive tourism can harm the nature (WITTIG, et al., 2007). Tourism is facing a strong, but one-sided dependency on nature and environment.

Setting the bridge to climate change and coastal protection, tourism destinations can suffer short term and long term damages. In the short term and with increasing probability, damages and hazards from extreme or catastrophic events, such as heavy storms or storm surges. And in the long run, economic decline as result of previous events, when tourists do not feel safe in the areas, or impacts of climate change decreases the attractiveness of tourism destinations. Together with possible damage of a destinations image, tourists increasingly are aware of climate change and demand sustainable tourism destinations as criteria for high

quality tourism (NIEDERSÄCHSISCHE REGIERUNGSKOMMISSION KLIMASCHUTZ, 2012). Therefore climate change puts a double pressure on the tourism sector.

The tourism sector is dominated by private entrepreneurs, which are not involved intensively in planning processes. Although tourism associations work for the improvement of growth of the tourism sector, the sector of tourism is not represented by a single entrepreneur or practitioner of the field of tourism in this thesis, but by an expert dealing with regional development and future scenarios of tourism in coastal areas (rf. to Chapter 4.3.2).

- Sector of spatial planning

Spatial planning can be characterized as the sector for combining all others in a comprehensive way. Spatial planning should therefore be independent, interdisciplinary and proactive. Processes of spatial planning should be participatory, considered in a long-term process and under the principle of sustainability.

All land uses are considered in plans, priority zoning and maps, narrowing down from a strategic level with political goals, down to more precise plans of local and regional scale. Coastal protection is considered in the federal state regional planning programme (LROP; german: Landesraumordnungsprogramm) and defines also under which conditions material for dike construction can be mined. But this is only done strategically, which areas exactly could be used for clay extraction can be decided by the local and lower authorities (NIEDERSÄCHSISCHE REGIERUNGSKOMMISSION KLIMASCHUTZ, 2012).

Spatial planning is to a huge part based on legislation. Whereas, and specifically in the context of this thesis, spatial planning and stakeholders in spatial planning can function as moderator in collaborative planning processes, as initiator of ideas and visions for future development and as facilitator for future development.

3.7 Cases of multifunctional coastal zones

The above described approaches and elements are applied partly or in combination within various projects and experimental programmes. Out of several pilot projects, which are running internationally, two realized projects will be shown in this chapter as excurses. Both are located in the Netherlands and can only be described in brief at this point. Focuses of these projects are multifunctional coastal zones and resilient coastal protection considering and respecting natural processes.

3.7.1 Exkursus: Zand Motor

A project, which combines the approaches of multifunctionality, of resilient coastal protection and of 'building with nature', is the pilot project *Zand Motor* (Dutch for: Sand Engine)

at the Dutch North Sea coast near The Hague. For decades the common strategy were small scale and spatially allocated beach nourishments of the scale of about 1 mio. m³. It was a reactive strategy, as the beach nourishments were only done, when the beach width under-shot a certain predefined threshold. A new strategy was discussed in 2006 and executed in 2011. Following the principles of ‘building with nature’ a mega nourishment with a scale 21 times larger as before was applied not distributed at the shoreline, but at one single spot. The peninsula has a maximum height of 7m, initially extends 1 km seawards and generated an area of 128 ha of beach, dunes and water bodies (Fig. 3-5). This hook shaped structure of sand and dunes will not be maintained, but the sand will be distributed by waves, wind and currents in a natural way along the shoreline in longitudinal direction within a time scale of 20 or more years. It will facilitate the natural growth of the beaches and dunes at the shore line north of the Sand Engine (VAN SLOBBE, et al., 2013; PROVINCE OF ZUID-HOLLAND, 2013).



Fig. 3-5 Aerial photograph of the Sand Engine near the town of Kijkduin at 1st of July 2013 looking northwards. The hook, which was initially open to the North closed in late 2011, due to significant morphological changes (picture copyright: Rijkswaterstaat / Joop van Houdt).

Although this project still can be counted to the hold-the-line strategy, it is area-oriented as the protection line is enhanced by a wider foreland. The Sand Engine combines natural enhancement of coastal protection, by enforcing beaches and dunes, it is a new natural habitat, in which pioneer plants, birds and mammals can rest and it is used for recreation and leisure activities, such as kite surfing. The area is multifunctional, planned in a participatory ap-

proach and can even be called synergetic as beneficial effects are (VAN SLOBBE, et al., 2013):

- Improved resilient coastal protection
- Ecological benefit, as a new habitat was created
- Economic benefit, due to extra recreational space and attractiveness
- Financial benefit, due to savings in the nourishment process
- Benefit in research, as natural processes of sedimentation can be observed.

If the cost-effectiveness will exceed the one of the common strategy has to be revealed by continuous and long-term monitoring of the morphology and currents. First results will be available in 2016, but the project will continue until 2021 (PROVINCE OF ZUID-HOLLAND, 2013).

An indirect, but crucial benefit of the project was the political image depicted by the process, and its visibility and experience for visitors. It can contribute to awareness raising and understanding of natural processes and how a society can benefit from ecosystem services. Finally it is accepted and used as accessible and common public space.

3.7.2 Excursus: Polder Breebaart

A cooperative project of the Province of Groningen, the Rijkswaterstaat, the Waterschap Hunze en Aa and the nature protection organisation Het Groninger Landschap was launched in 1991. The aim of the project was to restructure the Breebaart polder from a formerly agriculturally used polder to an intertidal natural area. The impoldering of the area, which is located at the Dutch-German border at the Dollard and river Ems, led to ecological decline over years. The former brackish and valuable habitat for migratory birds turned into grassland, habitats were lost and the water milieu turned into freshwater.

Triggered by nature conservationists it was discussed whether a re-opening of the polder is possible. Although the Waterschap (dutch for: water board) initially was opposing the idea, as the work task of a water board is to keep water out, instead of letting it in, the process of opening the polder was started in 1991. An inlet was built in the main dike that ebb and flood could form a brackish intertidal area. During the years, typical plants for salt marshes repopulated the area and it became one of the most important breeding areas for birds. The brackish water bodies attracted juvenile fish, which was made possible by a fish pass (MINISTERIE VAN LANDBOUW, NATUUR EN VOEDSELKwaliteit, 2009).

Benefits of this project can be mainly found in ecological improvement. But due to the tidal inlet, and the exchange of water, the polder can grow with the rising sea level through natural sedimentation. The disparity between sea level and the hinterland will be decreased and the area between the dikes is forming a staggered protection system. Polder Breebaart serves

therefore multifunctionality with coastal protection and nature conservation as main outcomes. Indirectly other uses, such as recreation, field observation and environmental education is used to raise awareness for the natural dynamic of the Wadden Sea (MINISTERIE VAN LANDBOUW, NATUUR EN VOEDSELKwaliteit, 2009). A guided tour through the area can function as epiphany for people of all age groups to explain the complex inter-linkage between land and sea and the abstract topic of climate change impacts.

4 Methodology

As introduced in Chapter 1.3 the methodological construct of this thesis consists of a grounding or sub-structure – the case study method – and a superstructure formed by the qualitative content analysis and the conduction of semi-structured interviews as part of qualitative social research methods.

This superstructure is dominated by qualitative methods. Qualitative methods are considered as most appropriate, as they focus on meaning (of action), therefore on the contextual understanding of behaviour, values and beliefs of the authors or interviewees (BRYMAN, 2008). This is seen as appropriate, as in combination with the method of case study research, the qualitative analysis provides in-depth information on the mentioned aspects by using the experience of the participating authors and interviewees.

This chapter forms the research outline and describes the applied methods from a theoretical point of view, whereas the interview guideline and the involved stakeholders are presented in Chapter 4.3.1 and 4.3.2 respectively.

4.1 Case study research

The case study approach is seen as most appropriate as it provides the contextual enclosure to this thesis. A case study is defined as an “*empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident*” (YIN, 2009, p. 18). Important is a clear demarcation of the case, which can be a spatial boundary or a differentiation of the theme. According to YIN (2009) a case theme can be a decision, the implementation of political programs and processes, or a paradigm change.

Characteristics of case studies are in addition to the spatial demarcation of the case boundaries, the depth – and not the breadth – of the topic analysed. It generates detailed information and a rich and complete data set about all aspects studied. A case typically deals with a development, underpinning that time is an important factor in case study research. Not only the present is seen as object of analysis, but also how this status evolved from a series of related events and how this possibly affects future developments (FLYVBJERG, 2011). Therefore parallel to the spatial demarcation, case studies should have a temporal demarcation as well, which can be a single point or a period of time. If the case is linked to a decree, law or trigger event, boundaries can be set easily, whereas societal transitions cannot be dated exactly, as their beginnings are dynamic and vague (GERRING, 2007).

In contrast to the case study itself, the outcomes of it can be summarized more easily and forms according to FLYVBJERG (2001) the basis for generating expert knowledge and expertise. If phronesis is applied in a case study, as FLYVBJERG (2006; 2001) suggests, the

researcher can decide about the meaning of the case and thus leaves space for letting the reader draw own interpretation. In dealing with a topic about future developments, this freedom of interpretation is considered as especially important, as it could initiate a thinking process and a reconsideration of how a landscape is perceived (cf. also to Chapter 3.2.1).

This thesis is dealing with a single case study. Single case studies are used to prove theories in practice and for identifying appropriate alternatives. In itself, single case studies can be distinguished in extreme cases, maximum variation cases, critical cases and paradigmatic cases (YIN, 2009; FLYVBJERG, 2001). Critical cases reflect on propositions of a theory, leading to a simplified logical deduction, such as ‘if this theory is applicable or true for this case, it has to be applicable in any other case.’ With respect to the analysed theory, a critical case can have an essential influence on the perception of the fundamental problem. Paradigmatic cases instead are dealing with values and standards, which are deeply anchored in society. A paradigmatic case is hard to identify, as its intention is to set new standards by itself and questions societal values (FLYVBJERG, 2001). The case study within this thesis can be seen as critical case, as a theoretical approach, namely area-orientation in coastal management is analysed. A better understanding about this case can be used as example for other spatial units. But the reviewed theory is also dealing with deeply rooted understandings of risk and safety and requires the rethinking of these societal values and restructuring of a decades-, if not centuries-old tradition of coastal protection. Therefore it can also be seen as paradigmatic case as well.

The spatial demarcation of the case in this thesis is the German North Sea coast in Lower Saxony and Bremen. Lower Saxony has vast low-lying areas and marshes behind the main dikes, which even have a negative slope downwards, until the geest-landscape begin and rise again. Three estuaries of the Ems, Weser and Elbe, each with human interventions, by deepening and straightening, complicate the task of coastal protection. Overall an area of 6,600 km², in which 1.2 million inhabitants live has to be protected against storm floods (NLWKN, 2007). In Lower Saxony around 14% of the state area are flood prone areas and in Bremen even 89% of the state area is prone to fluvial and storm floods (FAK, 2009).

An appropriate temporal demarcation is hard to identify, as coastal protection is done in different forms since thousands of years and will be an everlasting task in the future (VON LIEBERMAN, 2002; NLWKN, 2007). The first debate about an area-oriented approach in coastal management can be dated back to the late 1990s or the early 2000s. Due to the uncertainty in the further development and need of climate adaptation measures a clear future demarcation cannot be set so far, whereas questions about the temporal scale is included in the interview guideline. Further details about the case study area, the status quo of coastal protection and the difficulty to set a temporal scale in this case are discussed in chapter 5.

As stated above, a case study is not excluding other methods, it is rather complementary. The corresponding methods of this thesis are described in the succeeding sections (4.2 and 4.3).

4.2 Qualitative content analysis

Qualitative content analysis, which is also called interpretative analysis, goes beyond reading the text written down. The text is interpreted and reconstructed to identify ideologies and intentions of the authors (STRÜBING, 2013). Or alternatively from a more objective, than interpretative view, the search for underlying themes in analysed material (BRYMAN, 2008). Two data sources are used in this study, written literature and semi-structured interviews with stakeholders and experts to generate a dataset, which covers various notions and philosophies, as well as causal relations between the different interests and positions in coastal protection.

Beside books and scientific articles, laws and directives will be used to reflect both national and transnational approaches on coastal protection measures. Of special importance is the thorough selection of information to identify opposing positions of coastal protection philosophy – either line-oriented or area-oriented – and provide a balanced view on those.

A theoretical content analysis of documents and regulations can give deep insights in current debates and mirrors various approaches, interests and philosophies of thinking behind the topic. But nevertheless it may not be able to reveal fundamental assumptions, personal beliefs and commitments of the involved stakeholders. This is overcome by conducting semi-structured interviews with selected stakeholders, which are further analysed. Particularly for the analysis of synergies and obstacles in Chapter 6 these results are relevant as they include beliefs and ideas of those who are involved.

4.3 Qualitative social research

Interviews will be conducted to have a more distinct look on the stakeholders, which are involved in coastal protection and land-use conflicts in coastal areas. Actors communicating their interests and their acting during an interview will always wittingly or unwittingly involve their deep underlying intentions and ideologies. Their speaking is a reflection of how they attach value to objects, subjects, but also processes and situations (STRÜBING, 2013). From a social-constructivist point of view, the qualitative analysis of interviews answers the questions about how actors come to their deep beliefs and interests and how they react on diverging opinions. Interviews give insights in the context of people's behaviour and help to understand the meaning of these behaviours (SEIDMAN, 2006). In general: the intersubjective relation and the communication between the actors is analysed (MAYRING, 2003). This is particularly corresponding with the case study method, as in both methods the relations upon the actors within certain realms are analysed.

To access this information the interviewer has to show creativity in formulating open questions situationally, empathy in hearing underlying thinking of the interviewee and interpreta-

tive competence to identify non-verbal communication. So an interview is a complex verbal interaction with a more or less undefined end, instead of a closed and simple collection of data (STRÜBING, 2013).

Semi-structured interviews, as conducted in this thesis, combine a number of fundamental structured key questions, which should be answered in addition to a number of flexible and spontaneous questions, which evolve within the interview to probe more information on a specific aspect. Other than in structured interviews the sequence of the questions can be varied and the interviewer reacts depending on the significance of the answer with further questions as response. This openness allows more depth and enhances the freedom of the interviewee (BRYMAN, 2008). Thus they are characterised by their contextual and intertwining knowledge sets going beyond partial and separate information bits. Another advantage of an open and flexible structure, facilitating a natural conversational situation, is that the interviewee reveals her or his structure of relevance and in what way this structure interlinks with the attitude of the interviewee (STRÜBING, 2013).

A subdivision of semi-structured interviews is the expert interview. Experts are persons, who have exclusive knowledge and experience in a certain topic in a marked off field. In contrast to the above mentioned semi-structured interview, not the person itself, but the information given by the person is in the foreground (STRÜBING, 2013). Aspects of both interview types form the basis for the interviews conducted in this thesis. The interviews shall be actor-centred, meaning, not only the personal beliefs of the interviewees shall be analysed, but all the more their positions and opinions as employees of their organizations and institutions (WIESNER-STEINER, et al., 2006). Personal beliefs may be different from the institutional or organizational position and indisputably valuable, but the decision makers are, at least in the current situation, not individuals but organizations and institutions having a certain stake in the planning process. Nevertheless, the situation, that an interview will be published with the name of the interviewee can cause a bias in the answers, as the interviewee might not speak freely (STRÜBING, 2013). To allow the revealing of sensitive knowledge and personal views, all interviews are anonymized, only the organizations, the interviewees work for will be listed and published, except it is not wished for.

A complete or sectional transcription of the interviews is a common way to archive the interview and to generate a comprehensive basis for analysis. Non-verbal communication can be added to the transcript as well. Nevertheless a transcription always causes losses within the dataset, which has to be kept in mind (MAYRING, 2003).

Similar as named in the precedent subsection, the transcribed interviews will be analysed on themes. This analysis method is named ‘thematic analysis’ and constructs “*an index of central themes and subthemes, which are then represented in a matrix that closely resembles a [...] spreadsheet*” (BRYMAN, 2008, p. 554). This is a common method in qualitative research and is particularly helpful in capturing the complexities of the meanings of the ana-

lysed text. It allows studying certain fields of research, in which the interviewer has limited experience (GUEST, et al., 2012). The assignment of text passages to certain themes and subthemes is done by reading and interpreting the interview transcript (BRYMAN, 2008). It is important, that not a fixed predetermined coding is used, as this may lock certain aspects out, which are not assigned to codes initially. The themes and subthemes are directly derived from the interview transcripts: For instance, when ‘sea-level rise’ is named, the matching passages and summaries of the texts are written down in the corresponding cell ‘climate change’ within the matrix (rf. to Table 4-1 as example and the appendix for the complete matrix).

This method of analysis is considered as useful and appropriate for this thesis, as interlinkages between various notions can be exposed. For instance, when the interviewer asks how ‘synergies’ are perceived, the answers may vary significantly and might reveal additional information, such as reasons for scepticism or for a general willingness towards synergetic cooperation.

Table 4-1 Example matrix of thematic analysis of the interviews stating the interviewee and the summarized results of the interviews, which are assigned to the themes in the first column. The complete and filled matrix of the analysis is listed in the appendix.

theme \ sector	water management	coastal protection	nature conservation	agriculture	tourism	spatial planning
INT	INT_1	INT_2	INT_3 & INT_4	INT_5	INT_6	INT_6
	practitioner	practitioner	practitioner	practitioner	academic point of view.	academic point of view.
Climate change						
New coastal protection strategy						
Risk						
Risk management						
Risk communication						
Laws, directives						
Sectoral thinking						
Integrative thinking						
...

4.3.1 Interview guideline

As preparation for the interviews an interview guideline is set up with all fundamental questions and sub questions. Not strictly, but in urgent cases this guideline can be used to come back to the track of the interview. The above mentioned natural conversation situation of semi-structured interviews can benefit from the good preparation and conscious use of the interview guideline. Whereas the guideline can only give structure, but leaves flexibility for

situation dependent sub-questions. The guideline for the practitioners and the interviewee with solely academic background are overlapping, but slightly different. For the practitioners it contains questions about practical projects and existing cooperation among different sectors, whereas the guideline for the researcher contains also questions about planning theoretical issues and bridging the gap between theory and practice. These small differences have the attention to answer uncovered aspects after a first analysis, as the practitioner and researcher interview were conducted with a time interval of two weeks. Both guidelines can be found in the appendix. As mentioned above, open questions are used, which are questions, that cannot be answered with 'yes' or 'no', but leave space for explanation and expression of own thoughts. An example for an open question is: 'What obstacles can you identify, which would hinder cooperation or a synergy?'

The guideline contains 15 main questions in five categories:

- Introduction: contains questions about the interviewee and her or his organization.
- Climate change and adaptation measures: contains questions about uncertainties of climate change, area-orientation, risk management and multifunctional areas and how they are perceived and rated.
- Possibilities for cooperation and collaboration: Contains questions about existing cooperation between the stakeholders.
- Synergies: Contains questions about possible synergies and success factors.
- Conflicts and obstacles: Contains questions about possible conflicts and how they could be prevented.

4.3.2 Selection of stakeholders and interviewees

Linked to the description of the involved sectors in coastal management above, the stakeholders and therewith the interviewees are introduced in this chapter. In total five interviews with six interviewees were conducted. Five of the interviewees (INT_1 to INT_5) are practitioners with academic background and involved in organizations or administration and one interviewee (INT_6) has a solely academic and scientific background, who was giving an academic view on the topic. Additionally an interview with a researcher is seen as important, as an unbiased view, without any influence of sectorally acting organizations is anticipated. There are two reasons, why no practitioner in the tourism sector was interviewed and instead a scientist was selected. First the sector of tourism is hardly involved directly in planning processes about coastal protection. And second the chance of interviewing an expert in the tourism and spatial planning sector is seen as a strong opportunity to involve a broad spectrum of ideas or obstacles and not just the thoughts and ideas of one single entrepreneur.

The interviews INT_1 to INT_5 were conducted in German and INT_6 was conducted in English. All interviews were held personally and lasted between 40 and 130 minutes with an

average of 80 minutes. Dates and organizations of the interviews are listed in Table 4-2, and the covered sectors of the interviewees are shown in Table 4-3.

Table 4-2 List of interviewees with date and time of the interviews and the organization including the location

Interviewee	Date (dd.mm.yyyy)	Time (hh:mm)	Organization & Location
INT_1	19.09.2013	14:30	I. Entwässerungsverband Emden (Emden)
INT_2	23.09.2013	10:00	Bremischer Deichverband am rechten Weserufer (Bremen)
INT_3	23.09.2013	14:30	Nature conservation administration (n.p.), the name of the organization was changed, as the interviewees asked for anonymization
INT_4	23.09.2013	14:30	
INT_5	26.09.2013	10:00	Landwirtschaftskammer Niedersachsen (Oldenburg)
INT_6	11.10.2013	09:00	European Tourism Futures Institute at Stenden University of Applied Sciences Leeuwarden (Leeuwarden, The Netherlands) and Urban Regional Studies Institute at Rijksuniversiteit Groningen (Groningen, The Netherlands)

Table 4-3 List of interviewees and the covered sectors. X: sector fully covered by interviewee's field of operation and profession. (X): sector partly covered by interviewee's field of operation, profession or highlighted in particular during the interview

Interviewee / Stakeholder	Sector water management	Sector coastal protection	Sector nature conservation	Sector agriculture	Sector tourism	Sector spatial planning
INT_1	X	(X)				
INT_2	(X)	X	(X)			
INT_3			X			
INT_4			X			(X)
INT_5				X		(X)
INT_6					X	X

- Stakeholder water management:

The *I. Entwässerungsverband Emden* (german for: first water and sluice association Emden) was established in 1879 to serve water management issues in the association territories. The territory of 49,000 ha in the North-West of Lower Saxony contains the city of Emden, the municipality of Krummhörn, the two sluices of Knock and Greetsiel and the lake of Große Meer (rf. to Chapter 6.3). Land owners delegate the task of flood control and water manage-

ment to the association by paying association fees. Since 1953 and 1973 the measures of the association is co-financed by the state of Lower Saxony by 30%. The water and sluice association Emden is involved in climate adaptation projects, such as COMTESS or KLIFF (I. ENTWÄSSERUNGSVERBAND EMDEN (ed.), 2004).

- Stakeholder coastal protection:

The *Bremischer Deichverband am rechten Weserufer* is a dike board with a territory of 22,000 ha and around 88,000 members (INT_2, 23.Sept.2013; BREMISCHER DEICHVERBAND AM RECHTEN WESERUFER, 2013). Although this stakeholder is located in the city state of Bremen, it can be used in this case study, as the coastal protection strategy is shared cooperatively with Lower Saxony (NLWKN, 2007). Bremen is under flood risk for three reasons: first the possibility of flooding from the North Sea through the estuary of the Weser, second fluvial flooding from the headwaters of the Weser and the Wümme and third flooding from extreme rain events, which have to be drained through the associations' territory. 89% of the city of Bremen are flood prone areas. The council of the dike board is elected every five years from either a conservative or green and nature conservationists group (INT_2, 23.Sept.2013). The constitution of the dike board highlights the consideration of nature protection and recreational issues (BREMISCHER DEICHVERBAND AM RECHTEN WESERUFER, n.d.). The dike board is involved in climate adaptation and risk management projects, such as KLIMU.

- Stakeholder nature conservation:

The German Wadden Sea is a national park since 1986 and since 1993 UNESCO biosphere reserve. Since 2009, the Dutch and the German Wadden Sea is approved as UNESCO World Heritage Natural Site. Several other nature reserves are present in the North-West German coastal area, reaching also landward. The administration of these areas is done by environmental management agencies, which are subordinate to the Lower Saxonian Ministry of Environment, Energy and Climate protection. In the interview it was decided, that the name of the organization will not be published and relevant passages in the interview transcripts were deleted or anonymized. Due to this fact no further information about the stakeholder organization can be given here. One expert on nature conservation and one for nature conservation, spatial planning and the climate change problematic were involved in this interview.

- Stakeholder agriculture:

42,000 agricultural enterprises are members and customers of the *Landwirtschaftskammer Niedersachsen* (german for: Chamber of agriculture Lower Saxony). The chamber with around 2,400 employees is financed by fees of the members and by 43% subsidies of the state Lower Saxony. The chamber of agriculture represents the interests of the workers and enterprises in the sectors of agriculture, forestry, horticulture and fishery

(LANDWIRTSCHAFTSKAMMER NIEDERSACHSEN, 2011). Tasks of the chamber of agriculture is the coordination of sustainable use of agricultural areas, education, training and consulting for the members, as well as infrastructure and spatial planning in the context of agriculture. The Act of Chambers of Agriculture declares, that the chamber is involved actively in the development of rural areas, under consideration of the general societal interests (INT_5, 26.Sept.2013).

- Stakeholder tourism and spatial planning:

The Faculty of Spatial Sciences is the only independent faculty of spatial sciences in the Netherlands and situated at the Rijksuniversiteit Groningen and includes the Urban Regional Studies Institute (URSI) (RIJKSUNIVERSITEIT GRONINGEN, n.d.). At the Stenden University of Applied Sciences Leeuwarden the European Tourism Futures Institute (ETFI) researches about future opportunities of tourism. The institute uses scenario planning methods to create a common vision of all involved stakeholders (EUROPEAN TOURISM FUTURES INSTITUTE, n.d.). Both institutes are involved in the research work of the interviewee, who researches about the concept of leisure landscape, an approach of using landscape for tourism, recreation and leisure. The focus is on the role of the planners that have to deal with issues coming from an emerging transition from rural areas to more multifunctional and leisure type landscapes (INT_6, 11.Oct.2013). Although these institutes are neither situated in the case area, nor the interviewee is a practitioner, this interview is of particular importance, as it could give an unbiased and independent expert view on the sectors spatial planning and tourism in combination, as well as on the problematic of lock-in situation in regional development and the identification of possible synergies.

5 Contextualisation of the case

Before the gathered data is used to identify synergetic cooperation upon the involved sectors or to detect obstacles, this chapter introduces and describes the case in more depth. The status quo and probable changes in coastal protection and management in the case area is given, as well as a brief insight in the discourse about climate change and risk management in Germany. But at first the demarcation of the case is explained and which temporal demarcation can be set so far.

A dichotomy of natural and administrative boundaries in the selection of a case area cannot be avoided, but a turnaround back to natural boundaries as principle for planning can be seen for instance in the Integrated Water Resource Management approach (cf. among others to PAHL-WOSTL (2007)). This approach is partly revisited here as principle for setting the spatial boundaries of the case study. A part of the cause of the hazard and the problem described in the introduction of this thesis is taken as factor for a spatial demarcation – the North-Sea coast, which is influenced by climate change impacts. Another reason for spatial demarcation, but also limiting the scope is the master plan for coastal protection in Lower Saxony, which deals with and coordinates coastal protection in Lower Saxony and Bremen.

As stated in the methodological section about case study research, the temporal demarcation is hard to identify. As the continuation of the linear and hold-the-line strategy has political reason and will be continued at least until 2030 the temporal demarcation is mainly fixed by administrative documents and political will. A possible implementation or concrete execution of the mentioned elements of area-oriented coastal protection and management can start – from an official point of view – after 2030 or even after 2050. KLIJN et al. (2012) proposed a similar time range of around 2020 up to 2050 for the Dutch case, due to backlogs in reinforcing dikes, which have not the required level of safety standards yet and the implementation would last some decades. Nevertheless strategic planning, preliminary measures and a process of visioning and re-thinking can start now, or are having its origin back in the early 2000's. For instance the implementation of risk management and risk communication are facilitated by EU legislative since 2007. As some results of this thesis will show, the process of a paradigm change in coastal protection is deeply linked with societal behaviour and traditions, hence it can last generations.

5.1 Current approaches of coastal protection and coastal management in Germany

Coastal protection in Germany is matter of general interest, meaning the protection of human lives and their settlements is the highest interest. Its historical roots are centuries old, but were improved continuously and especially after the catastrophic floods of 1953 and 1962 in

the Netherlands, England, Belgium and Germany. Regulations were set these years for constructing main-dikes as high as a calculated and prognosticated design water level along the coast in a single straight defence line. Additionally this main protection line should be constructed to withstand wave overrun and guarantee the equal safety standards for every protected area. It was also admitted, that an absolute safety is not affordable (KUNZ, 2004). Now, decades after the catastrophic storm floods and the approval of this technical protection philosophy, it is still valid and thus far potent.

The main-dike is accompanied by other elements forming a protection system in the Wadden Sea (Fig. 5-1). Besides the depicted elements in the figure, storm surge barriers, pumping stations and sluices are included as well. Due to varying geomorphological, hydrodynamic or spatial circumstances, the composition of this system is changing regionally. For instance the islands are not protecting the complete coastline and a second dike line – former main-dikes – is only available in some rare areas. To assure the possibilities for expansion and maintenance of dikes, a building restriction zone of 50 m (in Lower Saxony) behind the dikes reserves space for further dike constructions (SAFECOAST, 2007).

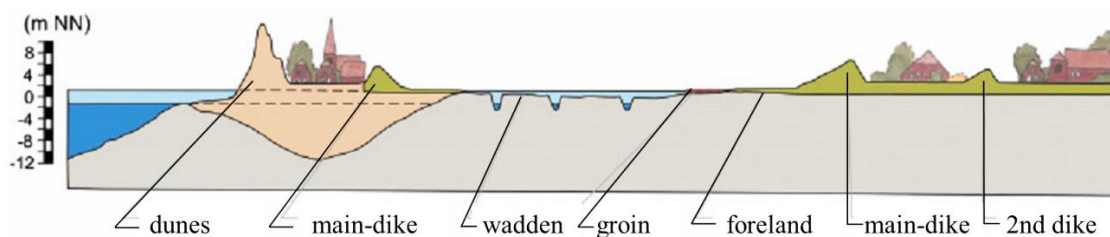


Fig. 5-1 System of coastal protection elements, consisting of the near shore islands, the tidal flats, the protected main-dike as central element and the 2nd dike (if available). The composition of these elements is changing locally and regionally (translated, NLWKN (2007, p. 14)).

State specific strategic directions are manifested in master plans for coastal protection, whereas the master plans for coastal protection of Lower Saxony also cover the city state of Bremen (MLR, 2012; NLWKN, 2007; NLWKN, 2010). An analysis of these master plans shows, that the main strategy for coastal protection is hold-the-line and strengthening the protection line (FAK, 2009). Also the climate adaptation strategy for Lower Saxony states that there is no reason in the foreseeable future to change the current strategy to others, such as full retreat, managed retreat, adaptation, or a staggered protection system, as they are either economically or from a security perspective not equivalent (NIEDERSÄCHSISCHE REGIERUNGSKOMMISSION KLIMASCHUTZ, 2012). These statements have to be seen critical and differentiated, especially with the background of climate scenarios after 2050, by various reasons: (a) an absolute safety is not possible, (b) future developments of climate change are uncertain, (c) adaptation and construction processes in coastal protection are complex, expensive and long-term projects and (d) the chapter about coastal protection in the climate adaptation strategy for Lower Saxony is mainly reasoned by one author, instead of

comparing various notions and research results of the scientific debate about coastal protection. Nevertheless, this strict position against alternatives is not encouraged from all official positions and related authorities. The Niedersächsische Landesministerium für Umwelt, Energie und Klimaschutz (German for: Ministry of environment, energy and climate protection of Lower Saxony), which is the superior authority above the NLWKN, for instance holds a contrary position. It states on its website, that a second dike line is an important tool to reduce storm surge risks and doubles the safety for relatively low investments (NIEDERSÄCHSISCHE LANDESMINISTERIUM FÜR UMWELT, ENERGIE UND KLIMASCHUTZ, n.d.).

Besides this superficial accordance in the protection philosophy, a lot of institutional, legislative and strategic differences can be identified. Differences between the states lie in the based legislation and responsible authorities. Lower Saxony is the only state with a specific dike law, whereas the water resource acts cover the matter of coastal protection in the other states, including Bremen. The last legislative instance is fixed at federal level in the constitution with concurrent legislation, although it was not used until now (FAK, 2009).

Maintenance and monitoring of the dikes is done by diverse agencies, institutions and companies. State agencies, such as the NLWKN have guiding and superior positions over a greater number of dike boards. Also companies, such as the Bremenports GmbH & Co. KG, have the task to operate and maintain the protection measures (FAK, 2009).

The aspects of risk-management are considered differently and only incomplete in the strategic plans. Schleswig-Holstein is the only state, which introduced the term risk-management already in 2001 to monitor and develop protection strategies, increase their effectiveness and minimize risks (MLR, 2012). Within a new integrated coastal defence management concept, a flexible, participative and risk-oriented approach was introduced in Schleswig-Holstein in 2002, but not put into practice so far (HOFSTEDE & PROBST, 2002). In contrast to that a higher focus is put on line-orientation and barriers in Lower Saxony (SAFECOAST, 2007). More local and tailor-made adaptation strategies, such as dwelling mounds, came into practice in Hamburgs HafenCity (FAK, 2009).

A management approach, which pervades planning processes in the coastal zone is the concept of Integrated Coastal Zone Management (ICZM). ICZM is an iterative and dynamic process of planning and managing coastal zones and their resources (EUROPEAN COMMISSION, 2000). All three dimensions of sustainability, namely economy, ecology and society should be included equally. ICZM is also based on interdisciplinarity and participation of the involved actors. It is a counterpart to sectoral management and planning, as it includes intersectoral and multi-level cooperation for long-term conservation and sustainable use of the coastal zone (KNECHT & ARCHER, 1993). It should not be understood as a method, but as an informal model or spirit, which pervade all planning and decision making processes fostering governance and deregulation (BMU, 2006). ICZM is seen as holistic

approach based on cooperation to find solutions, which are principally able to achieve consensus (LÜTKES & HOLZFUß, 2007).

One goal of ICZM – the optimization of legal instruments obliging sustainable development – is partly put into action so far. Examples are the EU-flood directive (EUROPEAN COUNCIL, 2007), the water frame work directive (WFD) (EUROPEAN COUNCIL, 2000) and their coast related aspects, which were implemented in national legislation. Another goal is the support of multi-functional use of space to reduce land consumption. Particularly for smaller projects the strategy paper highlights the possibility for win-win situations and synergies upon the involved actors (BMU, 2006; LÜTKES & HOLZFUß, 2007). Germany launched its national ICZM strategy in 2006 as reaction to the recommendation of the European Union (EUROPEAN COUNCIL, 2002). The strategic paper was designed under the premise of participation, inclusion of all relevant sectors and in cooperation with the coastal states of Germany.

Despite the ambitious goals of ICZM, it is criticized and has become to some extent fragmented and obsolete within the last years. This is in particular due to the successful implementation of EU directives at least from a legislative point of view and the transfer of equal claims and principles into regional planning as strong “*policy rivals*” (SHIPMAN, 2012). A second point of critique is partly overlapping with critique on sustainability. Both are fuzzy terms and have weak political profiles, but are after all often used – sometimes as hollow phrases. ICZM is also lacking of legal status (SHIPMAN, 2012). A precise definition can hardly be achieved, as ICZM is varying within different spatial and governmental contexts. Additionally to that, outcomes and benefits of ICZM are not clearly defined and are to some extent non-strategic (SHIPMAN, 2012). DÖRING (2009) comments on the disparity between ICZM, social sciences and societal issues, stating, that the concept of ICZM has constructed a break against its own principles of sustainability and interdisciplinarity. He highlights that economic and ecological aspects often have priority, but societal and cultural aspects are left out or lack significance. Also social and human sciences are often not involved actively in coastal planning processes. Hence an increased emphasis on social science may enhance ICZM contextually. Even more than that, it would contribute to a large extend towards transitions in coastal management, as it appeals a connection between society and decisions in coastal management. An implementation of local knowledge is also seen as factor for consistent and problem oriented ICZM. Nevertheless these aspects and claims for a modernized ICZM are not put into action. Thus a renewal of ICZM is more than ever needed to cope with the challenges of coastal management in times of climate change.

Although not all aspects are covered in this quick overview, it can be summarized by highlighting several key aspects of Germany’s traditional coastal protection, such as equal security standards for all protected areas and a concentration on mainly technical protection. The basic strategy is protection and holding the line. Central element within a system of coastal

protection is the line-oriented main-dike. Short- and long-term strategic goals of the coastal states are written down in coastal protection master plans and are interwoven to greater or lesser extent by the concept of ICZM. Although climate change and the sea-level rise are considered in the calculation of the design water level, adaptation strategies in the context of coastal protection play only a minor and subordinate role in these documents.

5.2 Paradigm change in German coastal management

The above given introduction and the description of the concept of ICZM gives an appropriate basis for conceptualizing a paradigm change in the German coastal protection strategy as introduced earlier. Nevertheless the comprehensiveness of the German coastal protection system may raise the questions why to change to area-orientation instead of keeping the line-oriented tradition of coastal protection in Germany? What are good reasons for changing a running system? Especially with the background of the even now omnipresent land-use conflicts, this question may be raised. This subchapter gives answer to these questions.

A revision of the concept of area-orientation and the presented work of HEERES et al. (2012) show some striking parallels in the temporal developments to the concurrently considered works of KUNZ (2004; 2005). He and other authors, such as KNIELING et al. (2009), SCHIRMER et al. (2007a) or the MICHAEL OTTO STIFTUNG (ed.) (2012) are supporting or recommending a paradigm change in the German coastal protection strategy moving from a single dike line (line-oriented) towards an area-oriented and staggered arrangement of coastal protection including risk-zoning and risk management.

As stated in the introduction of this thesis a scientific article of KUNZ (2004) reviewed and re-assessed the common philosophy of coastal protection in Germany. He justified a reorientation towards a flexible, risk- and area-oriented philosophy. Although KUNZ call for a paradigm change, the essence of the commonly used philosophy of coastal protection will be kept: An absolute safety cannot be achieved and a loss of life is not acceptable. Additionally intolerably high damages should be avoided (KUNZ, 2004). He rejects the old philosophy as the restriction to one single protection line increases the vulnerability of the protected land and goods towards the hazards in case of a dike breach. Two factors lead to such an increase: the accumulation of natural forces to the dike raises the probability of a dike fail or overtopping and secondly the larger flood propagation and flood height due to higher storm surge levels (MAI, et al., 2004). Besides the mentioned, also other authors underline this new way of thinking and favour this approach. In Germany the risk-based approach is not only discussed in the context of coastal protection, but also for river management and fluvial floods (cf. among others to SEIFERT (2012) and DKVV (ed.) (2003)).

Summarizing the common philosophy is enhanced by new hypotheses (KUNZ, 2004):

- Paradigm change from ‘probability of failure’ to ‘reducing and managing risk’ as guiding principle of an area-oriented protection integrated in spatial planning.
- A re-arrangement can only be managed step-by-step.
- Core method is a comprehensive risk management (rf. Chapter 3.1) which allows accepted residual risks. Further research to reduce uncertainties in this field of science is required.
- High risk zones should be saved first.
- The process should be in line with ICZM and coordinated with regional planning.
- Laws, directives and restrictions have to be adapted to the new philosophy.
- The paradigm change asks for an institution or commission, which can give recommendations across the German coastal states and supports the complete process.
- Citizens, officials and politicians have to be informed about the risk situation. They should be involved cooperatively in decisions and be prepared for the case of flooding.
- A first step should be the quick enhancement and expansion of second dike lines. Higher situated streets can function as dikes or barriers and as evacuation routes at the same time.

The enhancement of second dike lines is not the end, but it will be expanded to a staggered dike system. The system should be flexible to adapt to the particular spatial circumstances (KUNZ, 2004). Risk analysis can be used to implement risk zoning, on which the appropriate protection measures within a staggered or multiple protection system is based on. The staggered or area-oriented protection approach defined by KUNZ is presented in Fig. 5-2 and shows how risk is decreased in this approach. The line and area-oriented approaches are compared with respect to risk and probability. In the left picture the hinterland is protected by one dike line. The probability of failure is equal for the whole area, but the risk in the city is higher than in the rural, as the monetary values and the number of inhabitants are considered much higher. In contrast to the line oriented approach, the risk within the area-oriented approach on the right picture decreases with the number of protection lines. Specific vulnerable areas, such as the city in this example, are protected by additional protection. Rural areas are also protected by a second dike line, whereas the use directly behind the main dike is only allowed conditionally.

A strong spatial variance of storm surge risks can be expected, which stands in contrast to the old philosophy with equal safety standards. Therefore research about spatial distribution of risk is required to reduce uncertainties (MAI, et al., 2004). The premise of multifunctionality in the new paradigm is a further benefit, as efforts and projects in multifunctional land-use can be supported by funds of the European Union (KUNZ, 2004). The approach stands in line with the efforts of the EU and Germany to implement more sustainability, as the proposed re-orientation is described under the principles of sustainability and holism. Such a transition has to be rooted socially to achieve its ambitious goals. Because of that a broad

participation and information is essential to reverse the contrary and contra productive notion, that dikes are safe and the political and public misjudgement that decisions are made under certainty. Decisions have to be made in the sense of proactive measures, despite the prevailing uncertainty (KUNZ, 2004; WIESNER-STEINER, et al., 2006).

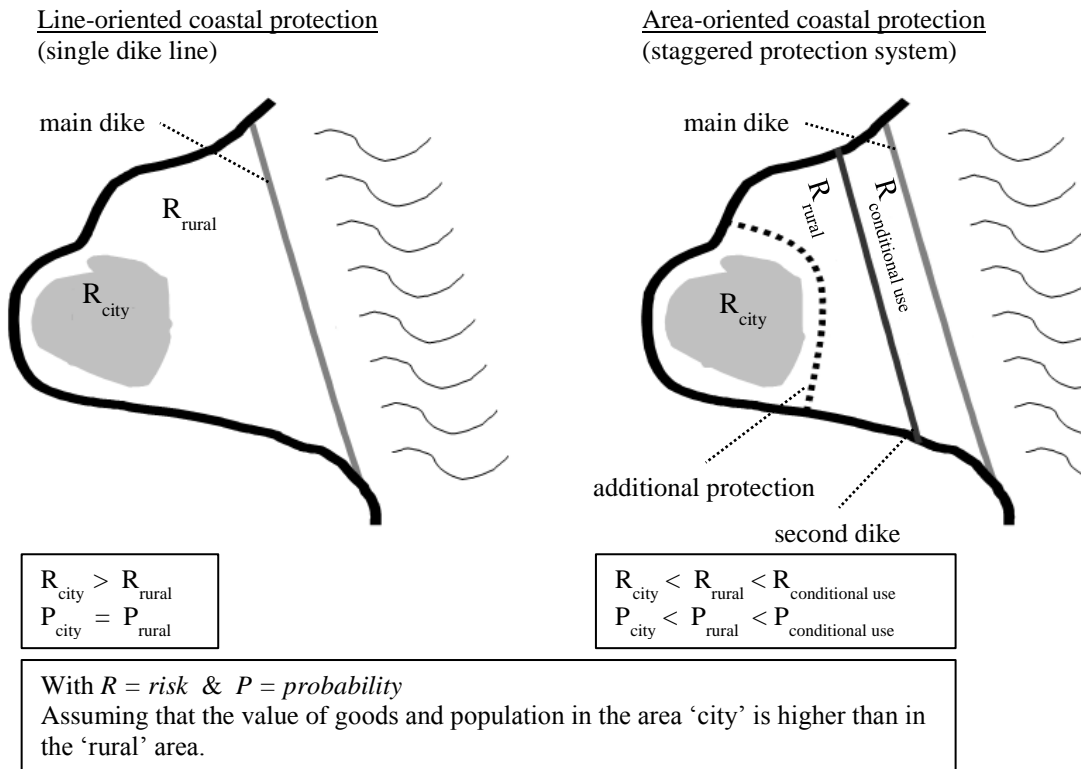


Fig. 5-2 Comparison of line oriented and area oriented coastal protection with respect to risk and probability. In contrast to the line oriented approach (left), the risk within the area-oriented approach (right) decreased with the number of protection lines. Specific vulnerable areas are protected by additional measures, whereas the use directly behind the main dike is only allowed conditionally. The thick black line is visualizing the border between flood prone low-lying areas and higher areas, such as the Geest (Modified graphic, based on VON LIEBERMANN (2002, p. 163) & KUNZ (2004, p. 269))

Reasons for the implementation of the new protection philosophy in Germany can be categorized by problems, that occur due to the continuation of the old reactive philosophy and problems that hinder the continuation of the old philosophy. KUNZ (2004) listed the problems, which results from holding onto the common protection strategy:

- Further increase of vulnerability, because an absolute safety cannot be achieved and material assets are accumulated behind the dikes. Additionally the disparity between sea-level rise and coastal areas influenced by subsidence is increasing
- The concentration on maintaining and strengthening the main-dike devours nearly the complete funds for coastal protection. This leads to a disregard of the second dikes, which are not build, or not maintained sufficiently. Additionally this tie up of

financial capital prevents the neutral and serious consideration of appropriate alternatives

- The current philosophy leads to the misunderstanding that a right for protection exists, which makes pro-active risk oriented protection measures obsolete. This is facilitated by wrong or one-sided medial reporting, which claims higher safety standards and thus a strengthening of main-dike lines
- Implementation of international directives into national law asks for integrative strategies following the principle of sustainability.

Other factors voting for a renewal of the coastal protection philosophy can be derived from the problems, which the common philosophy faces. One of the main reasons is the heightening of the dikes itself, as a dike gets broader and needs more space when heightened. This is especially in densely populated areas a serious problem, as houses are built near to the dike and this could exacerbate land-use conflicts. Additionally an unlimited enhancement is not possible due to statically reasons and conflicts about building grounds and property situations (VON LIEBERMAN, 2002). In some parts of the German coasts, for instance in Hamburg, the building grounds of the dikes or the old dike bodies itself have reached their maximum stress, which means, that further heightening in a traditional way of construction is not possible (FAK, 2009). An additional reason supporting a paradigm change is the already addressed increasing vulnerability leading to a higher economic burden in case of a hazardous event or even the reversal economic effect of stronger technical measures^(G) (SEIFERT, 2012). The common strategy is trapped in a path dependency: Development in low-lying areas asks for an enhancement of the protection, whereas the development in itself is needed to finance the construction and maintenance of dikes. The question is when the time has come to leave this circuitry, or if this point is already exceeded. An enlarged uncertainty about upcoming challenges of climate change requires more flexible, not static measures to adapt.

The implementation of risk management into coastal protection is to a larger proportion discussed in academia, than actually introduced into policy and coastal planning. Schleswig-Holstein has implemented a first step of risk management in its coastal protection master plan by introducing the term of coastal risk management (german: "*Küstenrisikomanagement*", MLR (2012, p. 81)). Risk management is seen as circular process, with the elements prevention, protection, preparedness, emergency, recovery and verification. On this circle or "*chain of safety*" (MLR, 2012, p. 83) is referred in depth in Chapter 3.1 (rf. also GALDERISI, et. al (2010)).

In the international context the re-structuring of coastal protection is further developed as it is in Germany. For instance in Denmark and the Netherlands, the use of risk zoning and varying safety levels is implemented on national level by according documents and strategy papers. Additionally, increasing resilience and consideration of spatial implications are fun-

damental planning principles in the Netherland (KUNZ, 2004; SAFECOAST, 2007; DELTACOMMISSIE, 2008; VIS, et al., 2003; VAN SLOBBE, et al., 2013). In the United Kingdom risk-management and cost-benefit analysis are used for decision making in coastal protection. On this basis area-orientation in England can be considered as being implemented very well, since multifunctional use of coastal areas, creation or replacement of natural habitats and relocation of dikes land-inwards are common strategies (KUNZ, 2004; EA, 2008; EA, 2012).

An argument against this approach can be found in the prevailing uncertainty about the amount of sea-level rise and regional climate change impact. The long-term nature of climate change is seen as reason by some German institutions, that enough time for responses and adaptive measures is available (NLWKN, 2007; FAK, 2009; NIEDERSÄCHSISCHE REGIERUNGSKOMMISSION KLIMASCHUTZ, 2012). The uncertainty is mainly perceived as high, leading to the attitude, that action can only be taken, when a higher degree of certainty is achieved. As it is unclear, whether decisions under uncertainty have the desired effect, decision makers will wait until sea-level rise is considered as certain and impact of climate change can be determined. This discursive argumentation has been noticed in Germany as reason for not acting. A sense of urgency in a complex field of planning is not seen so far (WIESNER-STEINER, et al., 2006).

In a long-term perspective until 2100 or even further, the work of KUNZ (2004) can be seen as relatively moderate. A further intensification of the area-oriented approach and the inclusion of the retreat strategy and eventually a complete restructuring of the coast line might be necessary. Visionary ideas about area-orientation and multifunctional use of land can help to secure the usability of the hinterland and may reduce the reluctance against adaptation measures.

5.3 Discourse about climate change and risk management

One purpose of this thesis is the contribution to a debate about climate adaptation. A concise summary of the relatively broad discourse is given in this sub chapter for understanding contrary positions and structures in this debate in Germany.

A comprehensive study about the discourse of climate adaptation in coastal protection and risk management in North-West Germany of WIESNER-STEINER et al. (2006) is used as basis for this chapter. The authors conducted interviews with stakeholders of coastal protection researchers, administrators and practitioners in Lower Saxony and Bremen. Their goal was to gather actor-centred information about uncertainty of climate change, necessity of climate adaptation measures and resulting risk for the current coastal protection philosophy. Overall the debate about adapting to climate change can be divided in two fundamental streams of thinking: Acting only on the basis of secure knowledge about climate change or

acting not in spite of, but specifically because of the prevailing uncertainty (WIESNER-STEINER, et al., 2006).

Reasons for the first way of thinking are that the uncertainty is generally seen as moderate or high. Contrary opinions about the magnitude of climate change irritate additionally and without secure data no funding is made available from the government. This rather reactive position is facilitated by local observations, expert knowledge about the deterministic design water level and the submission of responsibilities about further action to politics (WIESNER-STEINER, et al., 2006). Strategic decisions are delegated to the political community. The accentuation of power levels and institutional boundaries is taken as reason for awaiting legitimation of the political-administrative levels. But a cabinet decision about further action would have the positive outcome of a consistent boundary condition for dealing with uncertainties (SCHIRMER, et al., 2007a).

Reasons for the latter more proactive rationality of thinking are the precautionary principle and observations of an increase of extreme weather events and storm surges. This in addition to the uncertainty of the intensity of future events, are taken as indicators for urgency of action. The authors WIESNER-STEINER et al. (2006) are highlighting, that the problem of uncertainty is not trivial, as two problems occur when action is only done on the basis of secure knowledge:

1. Waiting for secure knowledge can be too risky, as less time for effective adaptation measures is left
2. It is trusted on early secure outcomes and stabilisation of climate research. If secure knowledge cannot be achieved and the uncertainty about possible extreme storm surges still prevails, it takes pressure from decision makers, politicians and therefore can even worsen risk awareness within society.

This means, the outcomes of climate research are evidently incapable of breaking the trust in coastal protection and engineering knowledge (WIESNER-STEINER, et al., 2006). But despite the dissent shown above, a shift in the implementation of climate adaptation and the perception of climate change can be observed, aside from academia, at least in the national and state documents for climate adaptation (BUNDESKABINETT, 2008; NIEDERSÄCHSISCHE REGIERUNGSKOMMISSION KLIMASCHUTZ, 2012). The recommendation for climate change adaptation for Lower Saxony put emphasize on acting under uncertainties and highlights in this context the importance of no-regret strategies. No-regret strategies are measures for adaptation, which are still beneficial, even when the predicted impact of climate change is lower than expected. Using these strategies as first instance can weaken barriers against adaptation (NIEDERSÄCHSISCHE REGIERUNGSKOMMISSION KLIMASCHUTZ, 2012).

6 Identification of obstacles and synergies of an area-oriented coastal protection in North-Western Germany

The theoretical basis of the topic of area-oriented coastal protection and its underlying theories, concepts and elements is set. Chapter 1 to 5 are vital parts for the understanding of a possible paradigm change and which difficulties and barriers, but also which chances and synergies are connected with a new adaptive strategy of coastal protection. From the theoretical background and the empirical data, which were collected through semi-structured expert interviews, the second and third research questions can be answered in this and the next chapter.

Five categories of obstacles are identified; therefore personal opinions and estimations are included as well. The blocks or categories of obstacles are defined, for instance by the frequency of the named problems of the single actors. These categories contain topics of similar background, such as obstacles within the existing legislative framework. This dataset is highly potential, as it can give an overview, what a single sector viewpoint would not be able to provide. Knowing the obstacles and the different interests and claims of the involved sectors can therefore help to identify and create possible synergies. After dealing with synergies from the viewpoint of each sector, the general potential for synergies is derived and written in a matrix (rf. to chapter 6.2).

6.1 Identified obstacles and barriers

Obstacles can be understood in the sense of a hindrance within a process, or a problem that obstructs the start of a process, plan or debate about it a priori. Obstacles can be delimitable and easy to identify, such as the lack of available funding for developing and executing a process. These obstacles or problems are relatively easy to solve, as a material asset, namely more funding, can guarantee the continuation of the process. Less easy identifiable or soluble are obstacles, which are based on traditions and societal values. Deeply held beliefs about the topics dealt with in the process can differ fundamentally and in such a way, that this obstacle hinders a continuation of an effective planning process or debate. Only inner freedom within a community or mutual understanding and acceptance of varying opinions may solve or weaken these obstacles.

Beside beliefs, the knowledge about and definition of terms to be discussed is a difficult source for obstacles. For instance, the term of consensus is by definition separated from the term compromise, but may be used in the same sense. Also different understanding of how to perform a participative planning process is causing problems. Equal knowledge about terms and conditions of a planning process, or a debate about a topic is therefore vital for an effec-

tive outcome. Else it may cause frustration and finally create an obstacle in the way towards a consensus.

Below, various obstacles are listed, which evolve from the interviews. The categories in the subsequent chapters which are not listed in any particular order or severity are the following: 1. Planning process, 2. Legislative framework, regulations and politics, 3. Tradition and societal values, 4. Communication and knowledge, 5. Financing, resources and work force.

6.1.1 Planning process

The category of obstacles named ‘planning process’ is diverse and several interlinked obstacles are combined in this chapter. Obstacles inside of a process, such as wrong participation or strict sectoral thinking about a topic, which demands integrative handling, are linked with externalities. Time scales or the complexity of a topic dealt with can also be counted to this category.

Coastal protection is an everlasting task as the common strategy needs continuous improvement by heightening main dikes. New design water levels are fixed in the master plans for coastal protection. In the first master plan of 1973 an additional reserve of 25cm to face sea level rise for the next 100 years was added. But in 2007, only 34 years after the first master plan, the next master plan calls for additional 50cm for the next 100 years, although the old level was not achieved at 1/3 of all dikes. This next level is waiting for implementation now (INT_2, 23.Sept.2013). This shows on the one side, that coastal protection is a time consuming issue with planning horizons of several decades and on the other side that the time steps for adaptation are decreasing. Therefore two kinds of time pressure have to be faced by the sector of coastal protection: the pressure to fulfil remnants of past decisions and the increasing pace of climate adaptation measures. Reaching the levels of the current master plans is estimated to last the next 30 years and a shift away from the line oriented coastal protection is estimated to last additional 50 years (INT_2, 23.Sept.2013). Dike boards traditionally plan for generations, so this might not be seen as direct obstacle, but it might be possible that this backlog cannot be caught up again. These long time scales in planning and construction have to be respected and considered now and for future actions (INT_1, 19.Sept.2013).

Beside the time consuming and expensive short term and long-term measures, a conceptual and strategic thinking process about future strategies is needed. This is for various reasons: 1. an early start of introducing a new approach can reduce the occurrence of mistakes and errors (INT_4, 23.Sept.2013), 2. the reservation of areas for dike heightening and broadening has to start now (INT_2, 23.Sept.2013) and 3. a continuation without considering future challenges will shorten the possibility space for adaptation (INT_2, 23.Sept.2013; INT_4, 23.Sept.2013).

A direct obstacle evolving from the above described problematics is that these long-term time scales are hard to capture in an open political debate. Establishing use restrictions and reserving space now for measures, which might start in 30 to 50 years and without urgency or acuteness, is hard to achieve from a political perspective. This may stand in contrast of the political psychology of acting and thinking in scales of legislature periods (INT_2, 23.Sept.2013). This is especially the case, when these measures are planned under uncertainty and possibly hinder economic development. A political embedding of certain topics may not be wanted and is facing opposition. But a new approach is calling for a broad debate, as it has to be anchored in society (INT_2, 23.Sept.2013) and all are asked to think about new strategies for protection not only from a technical perspective, but also under consideration of other uses and sectors (INT_3, 23.Sept.2013).

Not only the time scale of adaptation measures in coastal protection, but also the time scale within the planning process of coastal management itself forms barriers. An issue related to climate adaptation and coastal management asks for the involvement of several sectors and an appropriate time scale to consider all options, which is time consuming. Obstacles lying in here are artificially created and genuine time pressure (INT_3, 23.Sept.2013; INT_4, 23.Sept.2013). Within a planning process a late involvement or information of all stakeholders can cause frustration or hinders even the equal consideration of all aspects coming from various sectors, which leads finally to time pressure. Highly specialized administrations often act on a very late time scale, which makes it hard to include all relevant stakeholders in a fair and effective planning process (INT_3, 23.Sept.2013; INT_4, 23.Sept.2013).

An effect of institutional specialization is sectoral thinking, which is one of the main sources for lock-in situations and one-sided considerations in planning processes. Zoning in land-use plans, which only allow one type of use and prohibit multifunctionality by law is identified as one reason for sectoral thinking. Another one is that people are not used to work together in an integrative way or do not have the freedom to do so (INT_6, 11.Oct.2013). Often time and knowledge is missing. Additionally, in general low willingness to cooperate prevails in single sectors. One interviewee identified tourism as relatively sectoral in acting and thinking, as nature is taken for granted and other sectors will care about it, although tourism is directly benefitting from it. This is also recognized as reason, that tourism plays a more or less indirect role in planning for coastal protection (INT_6, 11.Oct.2013).

To overcome obstacles, participative planning approaches are common strategies to form a joint result, which is accepted in society and among the involved parties. But the interviewees identified obstacles in participative planning processes as well. The process has to be clear and structured. The terms and conditions have to be defined and all have to be informed. Nevertheless participation can be hypocritical, which causes frustration and the feeling of unfair treatment among the participants. Introducing individuals and organizations to participate raises expectations, similar as in informal planning process, and these expecta-

tions have to be fulfilled to avoid disharmony and opposition (INT_6, 11.Oct.2013). The interviewees had diverging opinions about participation and equality in participation processes. The answers ranged from equality in all planning processes to observed inequality between the involved sectors. One interviewee described the equal involvement of various actors as protected by law. The only obstacle lies in the generation of an essence out of different interests (INT_3, 23.Sept.2013). Other interviewees highlight the inequality between the sectors, which could be a subjective perception. Either sectors are treated preferential, due to political will and strategy, or the needs and interests of a sector are not equally weighed (INT_2, 23.Sept.2013; INT_5, 26.Sept.2013). What is clearly stated is, that someone has to have the responsibility in a participative planning process – someone who leads the various notions to an end and central statement and how will in case of urgency ‘cut the knot’ and defines a decision (INT_5, 26.Sept.2013).

A possible solution would be proactive acting and a shift to circular planning processes including learning and evaluation of the process elements. Especially situations under uncertainty ask for continuous evaluation and reflexive planning (INT_5, 26.Sept.2013). Certainly this could be a solution for locked-in trajectories and will be described more intensely as success factor in Chapter 7.2. This is the same for the mediation of planning processes and the establishment of informal structures. Although problems are identified, which will be shown in the subsequent sections, it is seen more as success factor, than as an obstacle.

6.1.2 Legislative framework, regulations and politics

Obstacles for the implementation of an area-oriented coastal protection strategy can also be found in the legislative framework, in regulations and in the political culture. Limitations lie especially in the unclear formulation and complexity of rules or the implicated limits and confinements, which are caused by overregulation.

Phrases and unclear formulations within land-use plans are to some extent intentionally formulated rough and with space for interpretation. This leaves room for how to implement and to follow these rules (INT_6, 11.Oct.2013). But this freedom in formulation can also cause problems in understanding and may facilitate diverging interpretation – a potential for conflicts (INT_3, 23.Sept.2013). The above identified conflict potential in participative and multi-sectoral planning processes, have to some extent no effective and profitable results. It is claimed for a clearer formulation of memorandums of understanding among the partners, to fix a profitable and common end, before it is implemented in the legislative framework (INT_4, 23.Sept.2013).

The complexity of a legal framework and the diversity of rules, plans and regulations, which are interlinked and sometimes even overlapping are another source for hindering a fruitful debate about area-orientation. Against the background of multifunctionality and synergetic

cooperation, some laws prevent or hinder synergies. For instance the cutting of reed as energy crop (cf. chapter 3.3) is often named as a possible element of cooperation between coastal protection, water management and agriculture, but it is forbidden by the nature protection law (INT_5, 26.Sept.2013). Additionally zoning plans forbid development in a multifunctional way, as zones are strictly assigned to single and sectoral uses (INT_6, 11.Oct.2013). Despite the existence of pilot projects for area-oriented coastal protection, intertidal areas and multifunctional water management, the execution of these projects does not emerge out of them and are not linked to voluntary and common motivation, but to compensation measures asked by law (INT_2, 23.Sept.2013). This is indicating that even if a willingness to initiate such projects on a voluntary basis exists, it is hindered by several outer factors.

In a strongly regulated environment, it is hard to consider all aspects, which can be seen as knock-out argument to think out of the box (INT_5, 26.Sept.2013). Referring to the section above, sectoral thinking can also have its origin in laws and regulations: 1. by giving nearly all responsibilities and power to a specialized organization (INT_2, 23.Sept.2013), 2. by assigning strictly sectoral work tasks, which do not allow the integration of other sectors (INT_3, 23.Sept.2013; INT_4, 23.Sept.2013), and 3. the longer the institutions and authorities exist, the more sectoral is the thinking (INT_3, 23.Sept.2013). A work task is indisputably an important aspect of a specialized organisation, but it hinders integrative thinking. Nevertheless rules and legislation can also facilitate integrative thinking and cooperation, by stating that integrative cooperation and the consideration of all societal relevant issues have to be recognized and included (INT_5, 26.Sept.2013).

Besides overplanning and overregulations, the political culture can be a source of hindrance for area-oriented approaches, but has to be considered detached from the above mentioned time scale of political decisions. One interviewee claims a renewal of political culture, as some decisions which should be decided on political level, are tried to be decided by planning authorities (INT_4, 23.Sept.2013). However, politicians, no matter if on federal, state or local level, have the power of decision for planning issues. However to some extent a lack of knowledge, sensitivity or interest can be identified (INT_2, 23.Sept.2013; INT_6, 11.Oct.2013).

One strong obstacle in relation between the above mentioned issues and the category 'planning process' (cf. Chapter 6.1.1) is the difficulty to implement results of informal planning process to a legally binding level. This is crucial, as informal planning can facilitate synergies in coastal management, but it can easily be rejected as not binding (INT_3, 23.Sept.2013; INT_4, 23.Sept.2013). This obstacle is seen as argument for not performing informal processes which could lead to higher participation and interdisciplinarity.

In general the statements of the interviewees about these topics are two-minded as they are either asking for more freedom, meaning less regulation or clearer formulation of rules to decrease the complexity and interpretation space. The balance of regulation and freedom, of

robustness and flexibility is a critical challenge (INT_6, 11.Oct.2013). This limitation could be overcome with a reflexive and circular approach within planning and to some extent by trend watching about political developments across boundaries (rf. Chapters 7.1 and 7.2).

6.1.3 Tradition and societal values

Protection from floods is always connected with a separation of land and sea. Since centuries dikes are constructing a life line for society from severe flooding. This picture of outside, inside, or hazard and safety is deeply moored in societies picture about the coast. A new strategy, which includes risk orientation, is questioning the complete old safety system and the traditional viewpoint that all areas have the same safety level. Starting with the communication of risks and indicating that the old system is not completely secure without raising panic is a tough work. Wrong communication in this sense is forming an obstacle and may result in an unwillingness to support new strategies politically or financially. Dikes are also connected with the perception of coastal landscapes. A change in strategy is not doable in a few years, but can last decades (INT_2, 23.Sept.2013). Fixed views on strategies and the long time scale are forming barriers for the implementation of others than the current strategy.

This fixed strategy and a lack of risk communication (rf. Chapter 3.2) is forming a belief of the society in the safety system and that everybody lives in the same safety status. A new strategy is claiming for a new consideration of risks and a new contribution assessment for dike boards. Risks have to be assessed and managed, which claims for new legislation and regulation (INT_2, 23.Sept.2013).

As described above a change of beliefs deeply anchored in the society can last generations. But not only the time scale, also the characteristics and principles of a generation are important for a change (INT_6, 11.Oct.2013). For instance the willingness of an entrepreneur to invest in multifunctional and cooperative projects is depending on her or his psychology, which may focus on unconditional growth, sustainable growth or even de-growth strategies. It may focus on short term profit or investment and economic activity with a view on next generations (INT_5, 26.Sept.2013).

Traditions are fixed in regional identity of coastal areas and this should not be underestimated in a debate about new coastal protection, as it could form strong opposition. In contrast an activation of regional identity and the consideration of traditions in new approaches could have potential for a change in coastal protection and management.

6.1.4 Communication and knowledge

What is communicated and better what is not communicated forms limitations for the implementation of a new approach in coastal management. As highlighted in Chapter 3.2 the communication of risk is necessary for raising awareness and acceptance of new and probably cost intense measures for coastal protection. Triggering a rethinking of old structures and reflecting traditions can be started with communication. In reverse not communicating about these risks is an obstacle for a political debate.

Communication can also be an end in itself, which is not convenient for the debate. Communication without result is demanding resources and workforce, but is only producing ideas about how it should be done, without their implementation (INT_4, 23.Sept.2013; INT_5, 26.Sept.2013). A good idea also has to be communicated in a convincing way with a good story line stating the motivation or underlying ideology, which fits in the context and is generating political importance. The stakeholder who is communicating must be in the position to have influence. The interpretation of the argumentation and the identification of possible potential also when the reasoning is not perfect is a vital point and could refine in an obstacle (INT_6, 11.Oct.2013).

Above it is said, that some ideas, which are perceived as synergies are simply not realizable due to legislative boundaries, such as reed production as energy crop. But they are still communicated. So there is an interlinkage between communication and knowledge. Also other projects, such as the planning of a new highway near the coast (Küstenautobahn A22), which are perceived as synergies and often used as example for a synergy between infrastructure development and coastal protection are not realizable. In the case of the highway the structure itself shall be used as second dike line, but the position, the building structure and the materials are not appropriate as dike (INT_2, 23.Sept.2013). Misinformation or false information is causing a wrong line of argumentation and may lead to unbalanced decisions and win-loose situations. In general this gap between practice and research or between politics and research is causing one fundamental irritation in finding common goals.

What is also identified as obstacle is the varying definition of terms, such as ‘multifunctionality’ or ‘synergy’. A common understanding of the terms is vital to come to fruitful ends. Multifunctionality can either be perceived as hollow phrase, as all area is used multifunctionally in some way (INT_4, 23.Sept.2013) or as general principle for the development of rural and coastal areas (INT_5, 26.Sept.2013). It can be perceived as desirable end, but it has not to be a positive outcome per se, as uses can be multifunctional, but also contested (INT_6, 11.Oct.2013). This is the same for the understanding of synergies, which are sometimes interpreted as (weak) compromises of uses with various sectors instead of a fruitful consensus.

In conclusion it can be said, that synergies are dependent on knowledge generation: Factual knowledge about the potential and practicability of synergies and the knowledge of each actor about the claims and interests of the other sectors (INT_5, 26.Sept.2013) the basis for reaching mutual gains. A lack of knowledge is an obstacle for identifying synergies. The topic of knowledge generation concerns the interviewees in various ways. The various positions are: 1. no new superior organization for planning and knowledge generation needed, as a vital cooperation of existing organizations would have the same effect, 2. all sectoral organizations have to think about climate change and how to cope with it together and 3. there is a definite requirement for a new central organization, which combines all kinds of research disciplines and has the ability to think integrative, creative and holistic and which acts as an independent think tank. Knowledge generation can come to a halt, when the involved and cooperating parties know each other for a long time. Combining and meeting the same institutions and stakeholders over and over again, is weakening the innovational strength of the group (INT_5, 26.Sept.2013).

6.1.5 Financing, resources and work force

This category of obstacles deals with the lack of resources in a planning process or within the implementation of a new paradigm in coastal protection. Besides the resources space, funding and financing as rather obvious resources, work force is identified in this context as well. All interviewees defined the lack of these three main resources as most pressing independently from each other, but the valuation is differing and reaches also positional and heavily divergent argumentation. A shift to a synergetic area-oriented coastal protection philosophy is a complex task, which claims for these three resources. Not only a proper financing of the planning process and technical measures, also work force for research, planning and finding mutual goals is vital. Whereas the resource of space is the scarcest, the most expensive and overregulated, as low lying coastal areas are highly developed and coined by intense and dense use patterns.

The application of area-oriented measures is one aspect of divergent argumentation. A few interviewees highlight, that a new strategy can only be oriented backwards, so within the hinterland (INT_2, 23.Sept.2013; INT_3, 23.Sept.2013; INT_4, 23.Sept.2013). Whereas the other position is, that a move forward, therefore in the foreland has to be considered as well. Especially with the background of scarce area, possible land reclamation must not be precluded in the first place (INT_5, 26.Sept.2013). Another positional argumentation lies in the acceptance of floods: One interviewee states that a short-term flooding of grassland can be done (INT_1, 19.Sept.2013), whereas the position from the agricultural background is, that a flooding has to be avoided under any circumstances, especially, when the land is flooded by salt water. In general the uncritical dealing with fertile grounds is perceived as a strong obstacle (INT_5, 26.Sept.2013). The conflict arises from the aggregation of use density and

intensification, increasing land prices, the non-duplicability of area and the fact that the grounds directly behind the dikes are the most fertile in Lower Saxony (INT_1, 19.Sept.2013; INT_2, 23.Sept.2013; INT_5, 26.Sept.2013).

Open water bodies, for instance as polders or for storage of water are perceived as hindrance for development. Water bodies inside of the main dike are hindering the common use patterns of land (INT_5, 26.Sept.2013) and are still not a natural habitat, such as a salt marsh (INT_4, 23.Sept.2013). The availability of clay – the construction material for dikes – as one side effect of the resource ‘space’ is through all interviewees seen as obstacle. Firstly the availability, secondly the exploitation in nearshore regions, which are protected as nature reserve and thirdly the mining in low lying areas, which possibly destroy fertile grounds and ask for compensation. Claim for water storage areas, natural habitats and clay pits are conflicting uses, which are present in the direct vicinity of the dike.

Despite the scarcity of space, synergies are possible in a small scale. But benefits and the obliteration of negative effects are only possible to achieve in larger area, as various synergetic use combinations can be spread over a large area. This disparity can be seen as obstacle for going beyond the scale of pilot projects. Yet the possibilities exist, but in the sense of little available space they are decreasing (INT_2, 23.Sept.2013).

The next resource of potential conflicts is money. An appropriate and long-term financing is seen as the basis for any cooperation (INT_3, 23.Sept.2013) or at least as a catalyst (INT_4, 23.Sept.2013). In the context of coastal protection, investment amounts are extremely high and already the current strategy is depleting the complete budget of dike boards and authorities (INT_2, 23.Sept.2013), which hinders the unbiased consideration of new strategies. From the perspective of the other sectors the prospect of an economic loss or decline of profit, due to changing land use or in the need of investment in new technology is a knock-out argument for cooperation (INT_1, 19.Sept.2013; INT_5, 26.Sept.2013). Also the aspect that entrepreneurs, for instance in the tourism sector are paying taxes is a hindrance for further financial cooperation. The indirect contribution by paying taxes without knowing how the money is spent causes frustration and direct investment in projects would cause a double burden for sectors, which might generally have a low investment capacity (INT_6, 11.Oct.2013).

A resource, which is less directly valuable, is work force. A long-term process of raising awareness and communication within the society, of knowledge generation and consideration of alternatives, of planning and execution is a complex task for employees and work force. Nearly all interviewees identified stress and overload in the daily work within agencies, institutions and authorities as reason for not thinking integrative and not considering alternatives (INT_2, 23.Sept.2013; INT_3, 23.Sept.2013; INT_4, 23.Sept.2013; INT_6, 11.Oct.2013). Besides limited time, the freedom to develop own ideas and considering the

interests of other sectors without institutional or legislative boundaries is directly influencing the ability to think and act in an integrative way.

6.1.6 Résumé

It could be observed, that the categories of obstacles ‘planning process’ (rf. to chapter 6.1.1) and ‘financing, resources and work force’ (rf. to chapter 6.1.5) have the most pressing conflict potential from the perspective of the interviewees. They are seen as the main factors for not thinking about a new approach in coastal protection. This could be due to the fact, that the existing planning regime is quite narrow and most actions are predefined. Another aspect is that even the start of a reconsideration demands funding and workforce, which is rarely available.

The obstacles within the legislative framework (rf. to chapter 6.1.2) are seen as second most important. Again a too narrow setup of rules and regulation may hinder multifunctional development, but also political will or weak political commitment, are reasons for continuing common trajectories.

The categories which are seen as the ones with the lowest impact are ‘communication and knowledge’ (rf. to chapter 6.1.4) and ‘traditions and societal values’ (rf. to chapter 6.1.3). This may have its cause in its low provability of usefulness, meaning, that the impact of an increase in knowledge is not as easily measureable as an increase for instance of funding. Coastal protection and development of coastal regions are perceived as deeply connected with traditions and societal values, but nevertheless the impact of them are not seen as substantial.

6.2 From obstacles to synergies

Getting from obstacles to synergies seems to be a complex task, but the consideration of the current situation forms the first basis for doing so. The status quo, the identification of problems, and the trajectory of how the problems evolved with the time are essential factors to understand the situation. But also the recognition how difficult it could be to change the current direction. The reason why the direction should be changed is the other thing, one has to be aware of: Is it urgency driven or motivation driven? Urgency can grow from rising sea level, skyrocketing investments in coastal protection, or the lack of safety (INT_6, 11.Oct.2013). Or is it motivation driven, as a way of principled thinking, self-conception or as intrinsic motivation? This could be for instance the common idea to improve spatial quality and improvement of resilience in coastal regions. Thinking about synergies from an intrinsic motivation, could for instance be a creative process of how the coast could be reshaped. Coasts must not only exist as formal and functional space, but also as cultural space, which

is used and perceived by people and society and additionally serves other purposes, such as coastal protection, tourism or nature conservation.

Two factors need to be added here, that could directly and indirectly support synergies: First, the gigantic scientific effort to reduce uncertainty by research of climate systems and climate change on national and on global level, with unprecedented financial, technical resources and personnel (INT_2, 23.Sept.2013) and second the changing circumstances in agricultural industry. Despite the obvious negative effects and the negative notion of climate change, it is possible to see chances and benefits from changing precipitation and temperature, as crops can grow longer, possibly better or in another seasonal pattern (INT_5, 26.Sept.2013).

In this section two steps of the mutual gains approach (rf. to chapter 2.3) are applied to show how obstacles can be turned into synergies. Referring to Fig. 2-3 on page 16, which describes the cooperative way of thinking, reflection, learning and decision making in a process with multiple actors, the steps of ‘analysis’ and ‘increase value’ are used here:

1. *Analysis*, which is based on empathy
 - a. Define own interests and BATNA
 - b. Think about interests of other parties and their BATNA
 - c. Identify mutually beneficial outcomes
2. *Increase value*, which is based on transparency
 - a. Collective thinking without judging and criticism
 - b. Generate huge number of options and packages

In the analysis phase, each actor defines own interests, but thinks also about interests of the other parties. A sense of empathy and putting oneself in somebody else’ position is vital for this part. This is done by describing the synergies, which are named by the different sectors in the interviews. The suggested and sometimes visionary synergies can identify interests and potential for cooperation among the sectors. A collection of synergies and possible options is forming the second phase of the mutual gains approach – namely ‘increasing value’. From now on the ideas and options can be discussed under the premise of finding common interests.

Synergies, which were highlighted by the experts and were derived from the interviews, will briefly be described below. In the interviews, the experts were also confronted with the pictures of the MICHAEL OTTO STIFTUNG (ed.) (2012), which are also shown in this thesis (rf. to Fig. 3-2 and Fig. 3-3). The reactions of the interviewees to these visions are incorporated in the following section:

- Water management

A variety of synergies can be identified, which run in cooperation with water management, especially in combination with nature conservation, tourism and coastal protection. Some water boards also maintain grassland which can be kept in a natural way. For instance the

early cutting of the grass, allows migratory birds to use the land as resting zones (INT_1, 19.Sept.2013). The channels and ditches, whose maintenance is under the responsibility of water boards can be conserved while considering ecological issues. Respecting the times of growth and reproduction can lead to a rich biodiversity in former functional and artificial water bodies (INT_2, 23.Sept.2013). Another example is the use of clay pits for recreational purposes, tourism or as sites for environmental education. In general areas or structures, which serve water management purposes, can often be used for other purposes, as the open water bodies provide opportunities for swimming, fishing, surfing, boating or sailing (INT_1, 19.Sept.2013). A best-practice example, which was highlighted particularly, is the development project of Großes Meer (rf. to Chapter 6.3). Different measures improved the water quality and typical biodiversity, decreases siltation and enhanced the economic importance of the region (INT_1, 19.Sept.2013). Several sectors benefit from these measures by using a demarked region in a multifunctional and integrative way.

- Coastal protection

The traditional connection between the sectors of coastal protection and water management can also be categorized as a synergy. An intelligent coordination of drainage of the hinterland and the outlets and construction of the coastal protection structures can result in cost-effective solutions or sharing of work-force (INT_1, 19.Sept.2013). An example for this is Leyhörn, an artificial peninsula, which serves the purposes of coastal protection, but also the storage of water in a bay. It allows the timed, automated and improved drainage of two water boards through the bay (I. ENTWÄSSERUNGSVERBAND EMDEN (ed.), 2004). Additionally the area is protected as nature reserve, is used for extensive agriculture and as clay pit (NLWKN, n.d.). As described in the prior section, ecological ditch cleaning enhances the natural biodiversity of those. A site-specific consideration, if a cleaning is necessary or not, saves costs, protects habitats and still grants the hydrological functionality of the drainage (INT_2, 23.Sept.2013).

Realignment of coastal protection to both sides – seawards or landwards – is considered as useful adaptation to other needs. For instance the opening of summer dikes allows the intertidal exchange of polders in the hinterland facilitating the natural dynamic of the Wadden Sea. It can create natural habitats, such as salt marshes or new areas of wadden. Additionally increased sediment import supports the growth of near shore areas (INT_2, 23.Sept.2013; INT_4, 23.Sept.2013). The use of the ‘building with nature’ approach (rf. to Chapter 3.4.2) can potentially enhance the effect. In this cooperation, nature conservation and coastal protection benefit, but agricultural purposes may decline, as most summer polders are also used for grazing. Nevertheless a site-specific application of a mosaic structure with varying use intensities may turn this approach into a real synergy including agriculture. Also the tourism sector may benefit, due to increased biodiversity and near natural environment. Adding envi-

ronmental education may also increase the awareness of climate change and the uniqueness of the Wadden Sea.

What is also seen as a synergy by coastal protectionists, but perceived as wrong synergy by nature conservationists is the unconditional artificial construction of salt marshes by groins in the dike foreland. Salt marshes can reduce the required dike height significantly and are perceived as natural habitat (INT_2, 23.Sept.2013), but an artificial creation of salt marshes may also destroy natural wadden areas and is in any case an anthropogenic intervention in nature.

- Nature conservation

The sector of nature conservation has goal congruence with the sector of tourism. Experiencing the nature is the driving factor for tourism, but is also causing dependencies (INT_6, 11.Oct.2013). Intelligent visitor guidance can protect nature and enhance environmental education. Additionally visitor centres and museums can increase the attractiveness of a tourist destination and simultaneously helps to finance nature conservation. This goal congruence has to be categorized as weak synergy, as the mutual benefits are only indirect and not necessarily created on purpose (INT_4, 23.Sept.2013).

A strong synergy is a changed maintenance of the groins in the foreland. Between the technical structures of groins to protect the dike foot, ditches are constructed for drainage. They are maintained regularly to keep their hydrological functionality. Same as for the ditches for drainage inland, the ditches in the dike foreland can be maintained under ecological aspects. Less maintenance and fewer ditches may keep or even improve the natural dynamics of the wadden area, from which the sector of nature conservation benefits and additionally may save costs, which is a benefit for the sector of coastal protection (INT_3, 23.Sept.2013).

As stated above, the unconditionally creation of artificial fore land and salt marshes is not seen as synergy by nature conservationists. Much more it has to be considered site specifically (INT_4, 23.Sept.2013). Nevertheless salt marshes in general and opened summer dikes, which allow natural siltation and natural development, are perceived as important measures and potentially synergetic (INT_3, 23.Sept.2013). In a direct comparison of the sectors coastal protection and nature conservation it became obvious, that the understanding of mutual goals and synergies is diverging. In some cases the argumentation seems to be positional.

- Agriculture

The agricultural sector is traditionally closely connected to coastal low lands and is also using foreland areas, for instance between summer dike and main dike. Reconsideration whether land reclamation may be needed and possible again, was interposed by this interviewee as only one of the participants.

A synergy, which is practised already to some extent, is the early cutting of grassland before the winter period (INT_1, 19.Sept.2013; INT_5, 26.Sept.2013). This has the effect, that migratory birds can use this land more easily as resting area. A tessellated structure with different use intensities and closeness to nature can be constructed as an interactive pattern between inside and outside the dike, which supports connectedness of different habitats. This puts the basis for other uses, such as bird watching and experiencing nature, which is potentially increasing the attractiveness of tourist destinations (INT_5, 26.Sept.2013). This means the tourist sector can indirectly benefit from a regenerated natural landscape, despite the use for extensive agriculture.

Synergies with the sector of water management are facing a strong obstacle. When the stakeholder of the water management is proposing to allow temporal flooding of agricultural sites (INT_1, 19.Sept.2013), the actor of the agricultural sector is intensely opposing this view: Sea water has to be kept out in any case, as it destroys crops and ground, and fresh water has to be considered site specifically and only in small scales (INT_5, 26.Sept.2013).

A driver for synergies can be urgency. This aspect is seen here as well, as area is a non-duplicable good and the ecologically and economically efficient use of fertile grounds has to be granted with the implementations of other uses (INT_5, 26.Sept.2013).

The sector of agriculture was hardly implemented in the ideas about possible synergies by the other sectors. But in the interview with the stakeholder of the agricultural sector itself, synergies with other sectors were identified and named. Nevertheless obstacles seem to prevail in hardened fronts between the other sectors and the agricultural sector.

- Tourism

Synergies with the tourism sector are mostly seen as indirect, as the contribution is limited on indirect financing or the tourism sector is only a profiteer of measures performed by other sectors. The funding capacity of this sector is relatively low, or the sector sees itself as not responsible. An argument for that is that taxes are paid and other sectors care for the areas, which are used for recreation and tourism. Nevertheless they can play an active role in developing synergies (INT_6, 11.Oct.2013).

An aspect which was not emphasized by the interviewees, except by INT_6, is the impact of ideas and visions and the sector of creative business. The impact of art and music festivals on local economy and as driver for regional development was noted as most important synergy. At first the turnover of festivals can support municipalities financially and therewith indirectly the creation of further synergies with other sectors. Secondly, festival organizer or artists may have another view on coasts and their future development. An example for that is the manager of the OEROL festival at the Dutch island of Terschelling. The festival became so important for the region, that the manager came into the position to discuss his vision of coastal management and the construction of a building in the dunes with the responsible

ministries. By coincidence, the ministries want to build a museum about coastal protection, and it will be discussed whether the vision of using a multifunctional construction serving tourism and coastal protection within a natural surrounding is realizable (INT_6, 11.Oct.2013).

As named in the other sectors, tourism is often a beneficiary of nature conservation, water management, agriculture, but also coastal protection. Tourism faces a strong dependency on its natural and infrastructural environment which is supported by other sectors (INT_4, 23.Sept.2013; INT_6, 11.Oct.2013). Agriculture is also a potential partner, as agro-tourism has become a possibility for upscaling agricultural enterprises in times of increasing land-use pressure (INT_5, 26.Sept.2013; INT_6, 11.Oct.2013). Other partners in more visionary approaches might be the sector of offshore industry and nearshore wind farms, which infrastructures could be used as recreational sites in the long-run, including hotels on wind energy plants, aquariums near shore or surf spots (KRAFT & AHLHORN, 2007).

Also technical coastal protection can contribute to a synergetic cooperation of the sectors coastal protection and tourism. For instance heavy, but nicely designed boulevard type of coastal protection walls, such as on the German island of Sylt, are multifunctional areas. Next, the use of the 'building with nature' approach for coastal protection can enhance, or at least not harm the attractiveness of a touristic destination (INT_6, 11.Oct.2013).

In general, despite its partly indirect role, the tourism sector is a vital contributor to synergies in coastal management, as it also donates awareness raising. Measures of other sectors are often connected with environmental education and information centres, which help visitors and tourists change their perception of nature, risks of the sea and climate change as well as sustainable use of land (INT_1, 19.Sept.2013; INT_2, 23.Sept.2013; INT_4, 23.Sept.2013; INT_6, 11.Oct.2013).

- Spatial planning

It is not the task of spatial planning to be in a synergetic cooperation, its task is to facilitate synergetic cooperation. It functions as neutral moderator for finding mutual gains and constructing a network of all parties. It is the task of spatial planners to identify possible synergies and implement them site-specifically in available areas. Scarce space makes the role of the planners even more important. Nevertheless the synergies, which were identified in the interview with an expert of spatial planning, are listed in the other sectors above. This is also the reason, why the sector of spatial planning is not listed in the table below.

Table 6-1 is combining the potential for synergies and the perceived main obstacle seen by each sector. Potential for synergies is derived from the named obstacles and ideas for synergies in this chapter and the involvement of the sectors in pilot projects. For each sector the

category of the main obstacle is noted additionally to show the priority in negotiating problems.

Concluding the compliant opinions among the interviewees, it has to be noted that synergies often do not emerge out of one's own accord, but are triggered by compensation measures. Another aspect, in which the stakeholders found a consensus, is that synergies are only possible in small scale. Although a larger scale would more easily negotiate negative externalities (INT_2, 23.Sept.2013).

Table 6-1 Table of potential for synergetic collaboration between pairs of sectors in a five-stepped ranking from - - to ++. Additionally the category of the perceived main obstacle is indicated behind each sector.

Sectors of land use (category of main obstacle)	Water management (5)	Coastal protection (1)	Nature conservation (2)	Agriculture (5)	Tourism (5)
Potential for synergy ++, +, 0, -, - -					
Water management (5)		++	+	0	+
Coastal protection (1)	++		-	+	+
Nature conservation (2)	+	-		-	+
Agriculture (5)	0	+	-		+
Tourism (5)	+	+	+	+	
++	high potential of synergetic collaboration with few, but soluble obstacles; some projects already implemented		(1)	Planning process	
+	potential for synergetic collaboration with soluble obstacles, synergies in discussion / in minds		(2)	Legislative framework, regulations and politics	
0	low potential for synergetic collaboration is seen or obstacles prevail		(3)	Tradition and societal values	
-	fundamental obstacles prevail or generally low willingness to cooperate		(4)	Communication and knowledge	
- -	potential for synergies is not seen; low willingness to cooperate due to fundamental obstacles and differences in mindset		(5)	Financing, resources and work force	

6.3 Excursus: Große Meer

A project focussing on multifunctionality, synergetic cooperation and sustainable regional development is the project of redeveloping the lake 'Großes Meer' and the surrounding re-

gion, which lies in East Frisia in north-west Lower Saxony. The shallow lake (water depth: average 0.7m, maximum depth: 1.5m) has a size of 350 hectare, whereas it is connected with two smaller lakes by a number of channels and ditches. This system of water bodies is finally connected to the pump station and sluice 'Knock' near the city of Emden in the main dike. Hence the lake is directly serving water management and indirectly connected to the sea at the Ems estuary. The northern part of the lake is mainly used for recreational purposes, whereas the southern part is separated and is protected as nature reserve together with surrounding land areas of around 7,000 ha size. Agricultural areas and various conflicting and contradictory uses are shaping the surrounding landscape. The uses are: water management, agriculture, fishery, hunting, tourism, housing, reed production as well as, tourism and recreation, such as water sports and hiking (PROJEKT GROßES MEER, n.d.).

Increasing usage pressure, economic decline of the region and ecologic decline of the lake area made a redevelopment necessary. A zero-measure, so keeping everything as it is, would have led to a siltation of the lakes and decline of biodiversity and further increase of eutrophication. Finally economic decline due to less touristic and recreational attractiveness would have been the end result. In 1996 the municipality of Südbrookmerland (19,000 inhabitants) initiated a round table with actors of all involved sectors, decision makers and various experts to design a sustainable development concept for the region (I. ENTWÄSSERUNGSVERBAND EMDEN (ed.), 2004). The project should reform the anthropogenic cultural landscape to a new near natural landscape without stopping economic and social development. At first interests of the stakeholders were gathered, problems were identified and the need for further information was defined. Finally and within the round table the different claims and needs were aggregated to mutual objectives. The approach was moderated by a local planning office and the results were monitored until today (INT_1, 19.Sept.2013; PROJEKT GROßES MEER, n.d.).

A package of measures was done in the following years, which contains an improvement of water management, such as new ditches, locks and maintenance of the channels. The touristic infrastructure was enhanced with a new bike trail and boating stations. Information and education was added to the touristic activities, so ecological education was enhanced and regional traditions and specifics were supported. Grassland was waterlogged again and in general a more dynamic water body was created in the lakes, which improves the possibilities for flood water storage and a natural water body with changing water levels (INT_1, 19.Sept.2013). The ability to store water from extreme rain events made it possible to use the natural and passive drainage to the North Sea through the Knock efficiently and finally with decreasing energy demand for intensive pumping (rf. also to Chapter 3.5).

One stakeholder of the project, states in an interview, that the success factor for the project and its synergetic outcome was the initiation of a round table, the involvement of all stakeholders and the use of moderation by a local planning office, which knows the region and its

people and the local characteristics (INT_1, 19.Sept.2013). Another aspect, which needs to be highlighted, is the focus on education and information, which raised awareness for water management and flood situations of the users and visitors, increases commitment of the project partners, enhances regional identity of the municipality and finally spreads the word of this best-practice example.

After this brief project introduction of a synergetic development in the case study area, the success factors for implementing synergies will be listed in the next chapter. In the preparation and the performance of this thesis it became obvious that the identification of synergies is one problem, but the successful implementation, so coming from a vision to an operational outcome, is detected as a much more persistent and complicated issue.

7 Success factors for negotiating area-oriented coastal management

The main outcome of this thesis are the following success factors for the implementation of area-oriented coastal management. They help to facilitate a paradigm shift in coastal protection and negotiate the identified obstacles.

They should be applied as:

- Principles or code of conduct in decision making processes
- Guidance in socio-political, societal and scientific debate
- Motivation in locked-in planning situations
- Recommendations how to deal with certain aspects and topics
- Idea provider against sectoral thinking and positional argumentation.

They should be applied by:

- Spatial planners for moderation of planning processes
- Decision makers for involving and judging various interests and claims
- Politics and policy advisors for identifying potential for mutual gains and synergies
- Participating parties and sectors which are traditionally not involved in planning processes, such as designers, trend watchers and artists to learn about involved parties and their claims and needs
- People who are interested in the process and the political or scientific debate, leading to increasing knowledge, awareness raising and spreading societal relevance.

They are formulated:

- Demanding, to raise a sense of urgency and sensitivity for the set of topics
- Open and broad, to state that the result of the process is unknown and not anticipated a priori
- Appealing and creative, to enhance an open thinking process about visions and synergies
- Provoking, to stir up fixed structures and trigger a critical reflection of common strategies and thought patterns
- Informal, as they can be the basis for future implementation as policy framework, thus these recommendations are not called 'policy recommendations'.

The following sections and the described success factors are not in any specific order or weighting, as they can be used freely and partly if demanded and depending on the situation of the planning process and state of the proposed paradigm change in coastal protection.

7.1 Insist upon the right for political commitment

Coastal protection, coastal management and the underlying processes and obstacles are political topics. Solutions without political involvement are not possible. However administrations on lower level try to make decisions, which should be made on political level and by elected representatives of the people. Additionally the topics discussed in this thesis are rather underrepresented in the daily political agenda.

The large investments, the complexity of including all involved actors and the long-time scales of decades up to generations clearly make it obvious, that decisions with a time scale of legislative periods have not the correct scope and have to be overcome. It may treat the symptoms of climate change impacts, but in the long run these decisions are not appropriate for the matter. Strategic decisions have to be made carefully and not under time pressure, which asks for foresight, sensitivity and professional competence of political advisers and politicians. These new strategies in coastal protection also have to be implemented on various levels, from national, down to local level and they have to be done under the premise of sustainability. What is called political commitment here can bring a new level of closeness to citizens and helps improving the trust in political actors.

An idea for using political structures as improvement of the work of executing agencies is the open election of advisory boards, for instance for dike and water boards. Different political camps available for election, such as liberal, conservative or green camps, bring new dynamic in dike and water boards (INT_2, 23.Sept.2013). A participation in the elections of the people living in the board territory can influence decisions, actions and the profile of the dike and water boards. Additionally the work inside of an agency is renewed in each legislative period, but has to keep the strategic direction.

Politicians are elected representatives of the people with specialized responsibilities. Topics which are of societal relevance and have an accordingly high profile in the daily political debate are handled with more care than those which are underrepresented. Therefore people, who are affected by climate change impacts or live in flood prone areas, have to insist upon the right for political commitment and solutions for socially relevant issues. This right has to be acceded from the one side, but it also has to be utilized by the affected people on the other side.

7.2 Reactive, proactive, reflexive or: A circle can be the shortest way

Dealing with risks of storm floods and coping with climate change and its impacts, such as coastal protection cannot be done in a reactive way. Reactive planning in this matter can lead to extreme monetary and human losses. A better way of coping with slowly changing cir-

cumstances and increasing probability of extreme events is proactive action in coastal protection and planning.

What has to be added, and what is perceived as vital but missing, is the dimension of monitoring, evaluation and reflection. Planning decisions, projects and participative processes have to be monitored and evaluated, not just, but particularly after completion of a project outcome or decision. It has to be monitored, whether the outcome is implemented. It has to be evaluated, whether the decision was appropriate for the problem. And the process has to be reflected and brought back to the participants as element of learning within and after the process. A circular system emerges out of continuous feedback and feed forward circles and problems can be identified and directly fed into the process (INT_6, 11.Oct.2013). To check, that an outcome of a process is not ending in a drawer, circular or reflexive planning is the only fair way to deal with the participants (INT_5, 26.Sept.2013). Monitoring and evaluation can be used for research projects, strategic papers and reports as well.

An independent supervision must not be seen as control, but as incentive to keep up a high level of quality and independence in planning processes. It has to be seen as an assessment system of the results and as an incentive scheme for planners and involved stakeholders. The reputation of planners, companies or decision makers may rise and fall with good or bad evaluation. Nevertheless it can be a motivation. A good reputation can also increase the trust in the involved people, agencies or politics.

Another reason for facilitating reflexive planning is that strategies mainly focus on rapid changes and events, but slow and prolonged changes such as the sea-level rise, are considered with less intensity. This may lead stable systems slowly in increasing vulnerability and instability (VAN SLOBBE, et al., 2013). A continuous monitoring and feedback into the planning process may identify that a common strategy cannot handle persistent, but slow changes. Better results according to the current problems can be expected.

Concluding, the use of circular planning processes and evaluation is not only a motivation and fair treatment with stakeholders, who have invested a lot of work force; it can also be an incentive for keeping up a high level of process quality. Finally feedback and feed forward circles may improve the results and appropriateness of planning processes. This is particularly valid for complex problems and highly dynamic environments, such as coastal management at the Wadden Sea coast.

7.3 Exploit possibility spaces in legislative boundaries

Strict and narrow sets of rules and regulations – the legislative framework – is, to some extent seen as obstacle for synergies. Despite overregulation, there is space for new measures in coastal protection that also serve the principle of multifunctionality. For this purpose some rules are formulated intentionally in a broad sense (INT_6, 11.Oct.2013).

One example is the concept of ‘process requirements’ that allows development, but regulates which aspects have to be considered during the planning and construction. This could be for instance the consideration of ecological principles by using the ‘building with nature’ approach, the implementation of multifunctionality, or the harmonic inclusion of the surrounding landscape. Although these requirements are controlling and steering the process, they leave spaces for negotiation, argumentation and relatively free, but sustainable development (INT_6, 11.Oct.2013). When these rules are implemented in the regional development plans or strategic plans they can be a facilitator for pilot projects.

However the possibility spaces are depending on political decisions and the balance between regulation and freedom, between robustness and flexibility. This balance is vital and hard to identify, as future developments need to be forecasted, in order to allow more or less freedom accordingly. Monitoring, trend watching and policy transfer from other states is needed to identify development trajectories and the right balance of steering and autonomy. Besides watching trends of adjacent states or regions, the implementation of circular and reflexive planning (rf. to chapter 7.2) is a good tool for balancing regulations. One aspect of using legislative structures is mentioned in chapter 7.1: the implementation of political structures and election in dike and water boards or other sectoral organizations. It can bring new dynamic and inputs in decades old and traditional work. Another one could be European funding programmes, which could help to finance multifunctional coastal zones and the adaptation to rising sea-levels and increasing risks.

As résumé the apparently restrictive legislative framework, which is also perceived as over-regulation, still leaves possibility spaces and freedom for development, which differs from common strategies. Essential for this is a flexible framework which is based on trend watching, circular process management and reflexive organization of the institutional setup. Process requirements moreover help to preserve unique characteristics of landscapes and harmonize old structures and new developments.

Other possibilities, which can be exploited but that did not belong to the legislative framework is climate change itself. Despite the overwhelmingly negative notion and perception of climate change it also may bring positive effects, such as the gigantic global scientific effort to reduce the uncertainty about climate change impacts and the possibly changing elements for effective agriculture. Also these aspects and above all a positive view point may help to identify synergies and mitigate negative impacts of climate change.

7.4 Money can’t buy it

The funding of projects and the available budget in coastal protection is important and it is sometimes seen as hardest criterion, but it is not the only thing which has to be assured. At least identically relevant are commitment, empathy and willingness of the involved parties.

An appealing project, which triggers regional identity and has the backing of a whole community can gain a strong momentum and evolves out of itself. From that point on, money becomes important, but may also be accessed more easily by funding programmes or investors, who are affected by the project and its good story or argumentation. If the project is moreover backed by local or higher levelled politicians it could also develop into a vanity project or symbolize a leading role of a region or country. In the context of the case study, this could be for instance the project of redeveloping Große Meer or the possible future pioneer role of Lower Saxony in area-oriented coastal protection at the German Wadden Sea region.

Money is therefore not the first-rate argument. Nevertheless funding can be a decision tool for changing common strategies. For instance, when a cost-benefit analysis is performed for flood prone areas and different strategies of coastal protection are compared by means of probability of failure, costs of a hazardous event and investment and maintenance costs. Despite the abstract content of these studies, which are still under uncertainty, they visualize whether a new strategy is worth its money from a certain time on and in case of a flood.

Money can furthermore have an indirect effect for synergies. Synergies might be less uncritical rejected, when they promise a certain amount of economic benefit. This might be interesting for instance for the tourism sector, which has a low capacity or willingness to invest. The other way around large scale events with touristic and recreational focus as well as high revenue can help to finance synergies and new projects. So money is a success factor, but it has to be seen critically and only in combination with backing and acceptance within the community.

7.5 We came to play, or: The power of ideas

As named in the excursus about design and visions as communication tool (rf. to Chapter 3.2.1), especially in complex topics, such as the paradigm change of coastal protection, design can be used as a communication tool. As this topic is a matter of technical but also non-structural and societal means the activation of people's minds and their subjective feeling about new development trajectories has to be used as trigger and has to be recognized in decisions. Apart from legal boundaries, regulations and abstract strategic plans, design, visioning and art make possible future developments visible. Although the ideas might continually never be implemented, they force a thinking process and critical reflection on how society or coming generations might live in the future (VAN DIJK, 2011). They play with imagination and perceptions of landscapes, of the separation of land and sea and of the coast as socio-ecological and socio-economic realm.

Particularly the openness and vagueness of visions allows room for imagination, discussion and interpretation. Also, involved personalities (not only of the creative sector) may have the

power or communicative purview to act as facilitator for change. Sometimes an unconventional artistic idea of a single person can become reality (INT_6, 11.Oct.2013) when enough momentum is gained and the person or group has enough strength to be heard by officials and decision makers. Important for this is a strong communication to reach a broad audience and attention.

The creative sector, which is often not directly involved in planning, has to be included in the earliest project state to broaden the range of options, visions and ideas. Doing so will implement subjective feelings of the society in the process, which grants higher acceptance of the outcomes. Also unorthodox ideas and visions can release power and have to be accepted as enrichment and part of a project or proposed change in development. All other involved sectors can benefit from including the creative and cultural sector as visionaries have a completely new and unbiased view on locked-in planning situations. Moreover, the creative sector can even play with old structures and thinking patterns and may adapt and transform them to new situations. The acceptance of this new stakeholder and her or his ideas can also facilitate free thinking of the other sectors and may slowly silence scruples of being visionary by themselves.

7.6 Think out of the box

Sectoral thinking is one reason for hindering synergetic cooperation in coastal management and developing multifunctional coastal protection systems. Integrating all sectors in projects is one aspect of negotiating this obstacle. But not only institutional integration is important, also thinking about and the understanding of other sectors is vital for an effective cooperation.

The following reasons for sectoral thinking were identified above: institutional specialization, zoning in land use plans, people are not used to work together, no freedom, time or knowledge to work together and low willingness to cooperate. Institutional specialization as reason for sectoral thinking can be overcome by formulating laws and directives with claims to consider other sectors in decisions. More generally, interests of the communality have to be included. This is also done by some sectoral institutions and agencies, for instance by the chamber of agriculture (INT_5, 26.Sept.2013). Zoning allows only single and sectoral usages in areas, which could potentially be appropriate for multifunctionality and synergetic cooperation. Avoidance of strict zoning in land use plans and instead a facilitation of more strategic goal formulation and discretionary plans can be used to support integrative planning.

A less institutional, but all the more individual obstacle is knowledge, time, freedom and willingness to think integrative and out of the box. Organizations may not be designed for thinking integrative and won't give freedom and time to personnel for doing so. But institu-

tional patterns can be restructured, for instance by adding integrative working and thinking in statutes and mission statements, effecting the work of all employees.

People may not be used to work together; however, this can be trained. Several techniques, tools and approaches are available, which allow and foster integrative thinking and communication between different sectors. For instance the mutual gains approach can be applied as such a technique. The main focus lies in defining own needs and interests, but also think about the needs and claims of other sectors. Generating knowledge about the other sectors is one key instrument in identifying synergies (rf. also to chapter 7.7).

Employees may not have enough time to think about needs and interests of other sectors, but investing time can be triggered by incentives and prizes. All the more time for integrative processes can be reserved and kept clear in process management. Nevertheless work overload due to the daily business is a serious and omnipresent problem. Finally, cultivating courage and overpower convenience can only be changed by the involved actors themselves.

Effective participation, as another success factor is depending on the above mentioned measures. Only the appreciation of integrative thinking and the corresponding results allows participation between various sectors. One argument against participation in an informal process, is that the results may never be implemented in the legal framework and don't have the same legal obligation than formal processes. This might be true to some extent, but the outcomes of informal processes are the very first basis of new rules and regulations. First they might only be implemented due to an existing possibility space (rf. to chapter 7.3) and on local level, but good results may also lead to the final implementation within legal frameworks.

As outcome of the interviews, sectoral thinking was identified as main obstacle. Integrative working and thinking out of the box could be the solution and is the next success factor. Nevertheless institutional and individual barriers stand against enlightened and effective integration between the involved sectors. And it seems that the latter is the most complicated barrier as personal change, literacy or courage can barely be initiated or changed by legal frameworks or political setting.

7.7 Let's be open about this

Mutual understanding of interests, claims and needs of various sectors is only possible with communication. Communication should be true, honest, fair, free and open. Truth and honesty is needed to avoid inequalities in the power balance. Fairness and freedom are useful to respect all kinds of interests, claims and ideas; also when they seem to be unconventional or out of context (rf. to chapter 7.5). Open communication means not concealing any information, which could finally tip the scale. Openness in describing ones deeply held believes and interests is the counterpart of empathetic understanding of these believes of other parties.

Identifying interests is one of the main points, as overlapping interests among two or more sectors are the starting point for further discussion. A discussion, which is only based on sectoral positions, will not end in a mutual goal or synergy, but in disputes.

These principles might sound as a matter of course, but they are not. By circumventing these fundamental principles, inequalities in power, knowledge and status within a participatory process or project can occur. This might happen unwittingly or intentionally, with the goal to change or manipulate the outcome of a decision making process. Only the strict observation, that these principles and rules of cooperation are adhered can avoid these inequalities. Therefore moderation and mediation is considered as strong success factor. Not only the moderation itself is vital, also the possible inclusion of new ideas of these moderators. Therefore and to avoid reluctance, the mediating person needs to know the local circumstances and the culture of the region and the negotiating parties (INT_1, 19.Sept.2013).

Closely spaced and intertwined with communication is knowledge. Knowledge generation and mutual understanding is bound to communication. On the contrary, superficial knowledge about other sectors hinders synergies. For instance the artificial construction of salt marshes is perceived from the sector of coastal protection as good measure for serving coastal protection and nature conservation. On the other side the sector of nature protection is strongly opposing this opinion (INT_4, 23.Sept.2013). In this setup of knowledge about the respective other sector, no synergy seems to be possible. Prejudices and possibly wrong knowledge about another sector is an obstacle, which can be negotiated by communication processes, which are moderated and monitored.

Raising awareness about risks through open communication is necessary to produce a sense of urgency. As described in earlier chapters of this research a generally low risk awareness can be observed. Today risk communication is not effective, as it is not reaching the people living in flood prone areas, or communication about risks and hazards has no effect on behaviour. Still the concepts of 'even safety levels for everyone' and 'the dikes are save' characterize the broad opinion about coastal protection, as they were communicated by media and politicians throughout decades (INT_2, 23.Sept.2013). Inhabitants and communities having these notions in mind will not believe in statements, that there is no absolute safety and the system has to be changed.

Open and free communication in the form of dialogue is seen as success factor generally, but for the underlying processes of participation, identifying synergies and integrative working specifically. Mediation and moderation is a tool to support fair social intercourse. But the appreciation and following of communication principles is a matter of individuals, although it could be facilitated by mediation. The open and honest communication about risks, hazards, but also about solutions may increase the speed of discussion and enhance the chance for a paradigm change in coastal protection.

7.8 United in diversity? Coastal protection measures in times of climate change

The motto of the European Union – United in Diversity – is used here as statement to show that there could not be one single generally usable coastal protection strategy. In fact a diversity of coastal protection measures either categorized as structural or non-structural have to be united to serve the protection of land and society.

It is observed, that a new paradigm cannot be implemented within a short time and with just one step. It is a long-term process, which asks for temporary approaches between the expiration of the old paradigm and the complete implementation of a possibly new paradigm. A new paradigm might not be fixed in beforehand, but will perambulate an evolutionary development. Therefore a combination of old and traditional approaches, such as groines, foreland protection or massive structures and new strategies, such as ‘building with nature’, mitigation of storm flood events and area orientation as principle for coastal protection will emerge out of the existing coastal protection philosophy. Also non-structural measures, such as risk management, risk assessment and risk communication has to be enhanced and set as the basis for decisions in coastal protection.

A step-by-step change may be started with the ecological maintenance of existing structures, such as groins, ditches and channels. The initiation of risk assessment and studying of possible risk management approaches has to start, but is also facilitated by legislation. Pilot projects in this context will help gaining knowledge and acceptance of new measures, especially when all sectors and relevant stakeholders are included in the planning processes.

The belief, that there is one single and universally valid strategy which is applied stringently and without calling it in question, has to be overcome. Site specific and individual strategies have to be implemented, which accept and follow the interaction of nature, society and economy. As uncertainty prevails, such as in the context of climate change and in the case presented in this thesis, no-regret measures have to be preferred (INT_4, 23.Sept.2013). The presented approaches of area-orientation and risk-orientation have to be used as principles for considering which strategy might fit best for a specific site. Despite the fact, that geographical externalities also play a decisive role.

Differing coastal protection strategies in a useful combination to each other have to be seen as an enrichment, instead of a hindrance of development or a needlessly complication of coastal protection. Enrichment used in the sense of socio-ecological coastal management establishing a connection between economic development, social structures and ecological conservation. United in Diversity – including a double meaning of ‘united’: United as group of stakeholders acting in one direction to form synergies, and the unification of different as well as diverse approaches of coastal protection serving one overall goal of sustainable coastal protection. Considering both meanings will enable this claimed diversity.

8 Conclusion and discussion

In this thesis the coastal protection philosophy of Germany is analysed from a socio-political perspective with the focus on the processes behind a possible paradigm shift. The elements and theory behind area-orientation are included in this thesis as knowledge base, but the negotiation of obstacles and the identification of synergies have a greater weight. It is observed, that not technical capabilities or incapacities are hindering a change in coastal protection, but all the more ideological reasons in the negotiation about the areas, which have to be reserved and are demanded for an area-oriented approach. Additionally low risk awareness and missing sense of urgency are inhibiting a neutral consideration of a new and the critical reflection of the old coastal protection philosophy.

Coastal protection is deeply anchored in the tradition of Germany's coasts. Since centuries coastal protection has faced backlogs and successes in saving the society against the hazards of the sea and storm floods. Also the picture of inside and outside the dike – of safety and danger, of a separated land from the sea – has changed the face of the once dynamic nature of the Wadden Sea area. But with climate change and rising sea level, the sector of coastal protection is facing new problems and challenges, which are probably never seen before and hardly to predict in their full extent. Increasing sea level, land subsidence and intensification of land-use in the hinterland are worsening the hazards of flooding or overtopping of the existing dikes – vulnerability of flood prone areas and storm flood risk is increasing overall. A continuation of the common and reactive philosophy of coastal protection, so having a single main dike line and heightening it gradually, may cope with increasing storm flood levels in the short-run, but in a long-term perspective it is trapped in a path dependency. The claim for areas, which allow economic development, saving areas of natural habitats and coping with new challenges of climate change can be summarized in the term coastal squeeze. An integration of various sectors, other than coastal protection is required. Hence new adaptive strategies to cope with these socially relevant issues are demanded. It is observed, that the inclusion of other sectors in coastal protection management has a significant thematic proximity to regional development, which has to be seen as chance.

Contrary to rigid and inflexible structures of coastal protection, more flexible and adaptive methods are needed to cope with climate change and different morphological, hydrological and spatial situations. The concept of climate adaptation gains importance in political and all the more in realms of spatial planning. In contrast to the regional, local and relatively quick adaptation measures, the concept of mitigation loses significance. Adaptation as tool for reducing the negative effects and symptoms of climate change on economy, nature and society is generating trade-offs and benefits in a proactive, flexible and context dependent way.

One concept, which could be counted to climate adaptation, is area-orientation in spatial planning. This concept follows the need for considering spatial implications, unique charac-

teristics of the surrounding and interests of various stakeholders to form a holistic solution. Results shall correspond with their surrounding and granting or improving spatial quality and harmony. As described above the consideration of interests and claims of more than one spatial policy sector forms the term integration as the new paradigm in planning. But both internal and external integration are the source for problems and struggles. Still sectoral thinking, problems in joint fact finding and implementing claims and needs of other sectors in planning decisions are identified as most pressing issues in the realization of area-orientation.

In this thesis the mutual gains approach is combined with the former two theoretical approaches, as it is observed, that sectoral argumentation and action in coastal management are perceived as main problems. Especially the aspect of participation in area-orientation is a source of problems. The mutual gains approach can be used as tool to overcome these problems. Generally based on fair communication and more specifically based on the principles empathy, transparency, objectivity, trust and cooperation, this approach can be counted to consensus planning. The identification of common interests of all involved stakeholders through open communication, following logical argumentation, and transparent process management is the main goal of mutual gains negotiation. Obstacles can be negotiated and win-win situations can be conceptualized in mutual effort. This approach combines process management, joint fact finding and participation to a powerful tool for implementing synergies. And the provided theoretical framework is combining spatial planning with socio-politics.

8.1 Summary and discussion of the main outcomes

This section is summarizing the main outcomes briefly according to the three research questions, which are raised in the introduction. For each question, a discussion of the results is directly attached to the summaries:

- I. What are the benefits of an area-oriented approach to coastal management, which strategies and elements can be ascribed to such an approach and which stakeholders need to be involved?*

The provided knowledge base about area-orientation as proactive and adaptive approach to coastal protection is describing a move away from ‘probability of failure’ to ‘reducing and managing risks’ as guiding principle. Not an equal safety level for all areas, but a risk dependent consideration of the needed safety level improves the current coastal protection philosophy. Therefore a staggered arrangement of coastal protection guided by risk-zoning and risk management is seen as a more flexible and adaptive solution for coastal protection in times of sea-level rise. Spatial circumstances and spatial variances in the impact of storm floods are taken into account to design a site specific coastal protection system. Areas or

regions with higher risk are protected additionally, for instance by additional dike lines or by object protection.

Elements of area-orientation can mainly be categorized in structural and non-structural measures, whereby a mix of old and new strategies is created. In the sense of climate adaptation, structural measures are again categorized in hard engineering measures and soft engineering measures, which are following principles of natural resilience and the concept of 'building with nature'. Some former hard measures could either be substituted, enhanced or ecologically improved by soft engineering measures. The below listed elements are detected and ascribed to area-oriented coastal protection:

Non-structural:

- Risk management and risk zoning
- Risk communication
- Multifunctionality in utilization of land
- Participation and involvement of various stakeholders

Structural:

- Overtopping security of dikes
- Foreland protection
- Accommodation and adaptation
- Drainage and storage of water in the hinterland
- Managed realignment
- Managed retreat
- Sand nourishments and foreshore recharge
- Mitigation of storm floods

Participation and the involvement of active stakeholders in the process is an important part of the area-oriented approach. Besides the sector of coastal protection, the sectors water management, nature conservation, agriculture, tourism and spatial planning were identified and interviewed in the empirical section. These sectors were not selected, as they seem to be conflicting sectors, but as they are perceived to have a relatively high potential for synergetic cooperation. Additionally these sectors are large land users, they are highly involved in spatial planning processes and they are affected by possible damages through storm floods and vulnerable for the hazards of climate change.

Discussion

In the context of the new challenges for coastal protection the presented case study deals with the status quo of coastal protection in Lower Saxony and Bremen in northwest Germany. The approach of area-orientation is not implemented and the main protection strategy is based on holding-the-line and heightening the dikes. Instead of risk-orientation an equal safety level is determined for every region, no matter if it's an urban or rural area. Up to now

there is no reason seen to change or adapt the current strategy, although this statement is not hold on all institutional levels. For instance the NLWKN and the Ministry of environment, energy and climate protection of Lower Saxony are stating contrary ideas of the current and possible future coastal protection strategies (rf. to chapter 5.1). That there is no conformity and unity in various levels of administration dealing with the same topic, is a result worth a critical reflection; a critical reflection of the organizational setup and of the commonly used strategy of coastal protection. But in a scientific debate a new paradigm about area- and risk-orientation is discussed and initiated by publications of among others KUNZ (2004), KNIELING et al. (2009), or SCHIRMER et al. (2007a).

In the new paradigm of coastal protection, the old guiding principle ‘probability of failure’ will be changed to ‘reducing and managing risks’. This will be done by comprehensive risk management and risk zoning, in which high risks zones are saved first. Laws, directives and restrictions have to be adapted accordingly, whereas a new institution or commission supervises and supports the process in an overall view and task. Risk communication as well as the inclusion of various stakeholders, officials and politicians is also a vital element of this new proposed paradigm by KUNZ (2004). Finally the construction or reactivation of second dike lines will reduce the risk according to the assessed risk level of an area or region.

As it will be further highlighted in chapter 8.2, this paradigm has to be seen as mixture of traditional and innovative measures. This intelligent combination of traditional coastal protection and innovative renewal can be figuratively described as a discourse. A balance of traditions and renewal can be formed by communication and accessing local knowledge: On the one side the acceptance of traditions and the societal relevance of traditions, norms and values, which are deeply anchored in society; on the other side, renewal and innovation which possibly breaks traditional patterns and may cause fear upon the society. Both have to be discussed and combined in a collective effort. To negotiate opposition and fears against innovations and renewal in the traditional sector of coastal protection, success factors are presented as solution.

The need for a combination of old and new, of traditional and innovative approaches in coastal protection makes it obvious that area-orientation cannot be seen as universal remedy. It has to be seen as guiding principle underlying various concepts of coastal protection. Risk as next principle to be used in coastal protection is seen as an area dependent variable. Hence site specific solutions have to be implemented and spatial circumstances following societal, ecological and economical needs and claims have to be considered. The above described categorization of structural and non-structural does not imply any rating of the single elements. Nevertheless non-structural strategies should be developed with increased attention in the sense of knowledge generation and implementation of new approaches in existing legislative framework. As these new approaches, such as risk management and risk zoning, are not implemented so far, learning and the generation of experience is needed. Moreover

coastal protection is dealing with deep societal values and feelings, so the change of the current type of operating with risks of storm floods is a difficult and sensitive task. Changes might not be accepted or opposed strongly. Therefore risk communication plays a vital role within the implementation of area-orientation and the enlightenment and sensitization of the affected people.

II. What synergies and obstacles can be identified in the case that area-oriented coastal management is implemented?

In the empirical section of this thesis, semi-structured interviews and their analysis provided the data for identifying obstacles and synergies. The observed obstacles can be categorized in the following five categories:

1. *Planning process:* Time pressure is a strong aspect in this category. Also the long time scale of several decades in coastal protection planning is hard to capture in an open political debate, especially when a sense of urgency is missing. Sectoral thinking due to institutional specialization is seen as next big obstacle: people are not used to work together, or do not have the freedom, or knowledge to do so.
2. *Legislative framework, regulations and politics:* Overplanning, complexity of the existing legislative framework and zoning is hindering the implementation of synergies. Political influence is missing in some sectors. Furthermore the implementation of informal or participatory processes has hardly any legislative validity. A balance of regulation and freedom is demanded, but this is likewise a central problem.
3. *Tradition and societal values:* A fixed view and positional argumentation for commonly used traditional strategies is forming the main obstacle. Changing these strategies is questioning fundamental values and norms of the society. A lack of communication about risk and deeply anchored perceptions about coastal landscapes is even impeding this issue. This is also lowering the willingness to cooperate in synergies.
4. *Communication and knowledge:* Missing communication and knowledge about risks is forming limits for new approaches in coastal management. Even communication itself is seen as obstacle, when no results emerge or the results are not put into action. Superficial knowledge, misinformation and false information are forming imbalances and hinder the identification and implementation of synergies.
5. *Financing, resources and work force:* The most discussed obstacle in this category is lacking space for area-oriented coastal protection and the diverse existing usages in the case study area. Furthermore economic loss is a knock out argument. Invest-

ments for coastal protection are extremely large and work force is missing, which is forming barriers for testing and thinking about other measures than the common.

From this basis of obstacles, which represent needs, interests and claims of the single sectors and stakeholders, several synergies were derived following two initial steps of the mutual gains approach. Only a few are presented here in brief:

- Considering ecological principles in construction, planning and maintenance of water management, coastal protection (building with nature) or agricultural structures
- Measures for the enhancement of the water quality can form synergies among the named sectors and help to fulfil the goals of the WFD
- Use of clay pits for recreation and environmental education or for the construction of fresh water storage
- Water bodies serving water management can serve recreational or agricultural purposes (irrigation) and vice versa
- Intelligent coordination of drainage of the hinterland facilitating natural drainage and storage of fresh water either for irrigation or for lowering peak runoffs
- Use foreland protection as source for synergies by considering the natural dynamic and the ecological importance of the wadden and salt marshes
- Constructing tessellated structures of varying use intensities and site specific solutions forming cooperation between all involved sectors
- Tourism can be an indirect, but active part in synergetic collaboration. Visions of entrepreneurs and the creative sector may facilitate unprecedented synergies.

A general willingness and potential for synergetic cooperation is detected, whereas also small scale cooperation is perceived as real synergy. What is also observed are varying definitions of the term ‘synergies’ and ‘consensus’, which are often seen as synonym of ‘compromise’; This can cause conflict potential in negotiation processes. Despite the detected potential, positional argumentation seems to prevail and mutual understanding of the needs and demands among the stakeholders is largely missing.

Discussion

The categories of obstacles ‘planning process’ and ‘financing, resources and work force’, have the most pressing conflict potential from the perspective of the interviewed actors. The implementation of new strategies for coastal protection and also their initial testing in real conditions needs a flexible legislative framework. But most processes are predefined and the construction of coastal protection measures is bound to laws and norms as well. Besides this legislative narrowness, knowledge generation, the planning of unprecedented measures and the implementation of synergies needs funding and work force. Personnel in administration are often overloaded with everyday tasks. Therefore not enough time and freedom is available to adapt to new situations or think integrative about new strategies and principles of

coastal protection. The initial process of idea generation, planning and negotiation needs funding. This closes the circle to the initially mentioned path dependency: Efforts for the current coastal protection philosophy and remnants of the past, such as reaching the goal of the master plans for coastal protection are consuming all available funding. This means that no resources are left to reflect the old reactive strategy or implement new approaches.

The comparison of the listed measures of coastal protection in the theoretical section and the perceived obstacles in the empirical section is showing that not technical issues or engineering skills are hindering the implementation of area-orientation, but all the more ideological reasons in the negotiation about the areas, which have to be reserved for an area-oriented approach. Ideological reasons, such as positional argumentation, traditionalism, sectoral thinking or lack of empathy, trust and willingness are superior obstacles for an implementation of area-orientation. Missing sense of urgency or risk awareness and large time scales contribute to that. Surprisingly the categories of obstacles ‘communication and knowledge’ and ‘traditions and societal values’, which are representing these ideological backgrounds, have a rather small importance according to the interviewees. The low concreteness of these aspects could be a reason for this. Nevertheless they are deeply anchored in the society and therefore hard to change.

This dichotomy has to be overcome, by raising the importance on the aspects of communication, knowledge generation and considering the significance of traditions and societal values in planning processes, as well as in open debates about coastal protection and climate adaptation. Ideas and tools how to negotiate this contrast are presented with the eight success factors, which are summarized in the next section.

III. What success factors are needed for the positive implementation of area-oriented coastal management?

Synthesizing all prior results and working steps is identifying eight success factors for the implementation of area-oriented coastal management. They can help to facilitate a paradigm shift in coastal protection. Additionally they support the emergence of synergies within a joint planning process and will therefore ease the access to and the implementation of area-orientation:

1. *Insist upon the right for political commitment:* Decisions concerning the coastal protection strategy could not be made without political involvement. Despite a partially lack of sensitivity and expert knowledge for the topic on the political level, strategic decisions are needed on national, state, and local level. They should overcome thinking in the scale of legislative periods. Direct commitment of elected representatives for the topic and more severity in the political agenda has to be claimed by the affected people and acceded from politics.

2. *Reactive, proactive, reflexive or: A circle can be the shortest way:* Evaluation and monitoring of planning processes is perceived as vital, but missing. The dimension of learning included by feed-back and feed-forward circles has to be incorporated in planning and decision making. Supervision can function as successful tool to keep high quality in the work flow and deals as a classification and rating system. Reflexive planning has to be included, all the more, when slow and prolonged changes occur, such as in the context of sea-level rise.
3. *Exploit possibility spaces in legislative boundaries:* Despite a narrow set of rules and regulations, there are possibility spaces leaving freedom for new development, such as multifunctionality and area-oriented coastal protection. A correct balance of regulation and freedom, of robustness and flexibility has to be included in the legislative framework. Essential for this is trend watching, and circular and reflexive process management. Process requirements moreover help to preserve old structures and harmonize them with new developments.
4. *Money can't buy it:* Money as first-rate argument has to be seen critically: It can function as decision tool, for instance within a cost-benefit analysis of various scenarios and coastal protection measures. But at least equally relevant is the backing and commitment of involved parties. It can form a strong momentum and political pressure, which probably eases the access to funding from national or EU-level. A strong regional identity and political backing on higher level can even upheave an initial idea to a vanity project of national importance.
5. *We came to play, or: The power of ideas:* Synergies can have their basis in visionary and artistic ideas. The creative sector, which is supposed to have an unbiased view, should therefore be included at an early stage of the planning process, to increase options and harmonic alternatives. The inclusion of subjective feelings about the landscape may increase the acceptance of the outcomes. Input from visionaries and artists can also facilitate free thinking of the other sectors and may slowly silence scruples of being visionary by themselves.
6. *Think out of the box:* Sectoral thinking is seen as main obstacle in planning processes with more than one sector involved. The reflection of other interests, so the integration of various sectors and stakeholders in the planning process is vital for new approaches, such as area-orientation. What is needed is training of integrative thinking, forming empathy and cultivating courage. The mutual gains approach with its principles empathy, transparency, objectivity, trust and cooperation can be used as underlying technique to negotiate sectoral thinking.

7. *Let's be open about this:* Mutual understanding of interests of various sectors is only possible with true, honest, fair, free and open communication. Observance of these basic principles, redress power imbalances and superficial knowledge. Communication between sectors is required, but also between political, scientific and societal realms: Risks and hazards have to be communicated in an open debate to raise a sense of urgency and awareness. Mediation can be used, but following the mentioned principles is a matter of the negotiating individuals.

8. *United in diversity? Coastal protection measures in times of climate change:* The belief, that there is one universally valid strategy has to be overcome. In fact a diversity of coastal protection measures, either categorized as structural or non-structural, as traditional or innovative have to be united and combined to serve the protection of land and society. Area-orientation is not an universal remedy, but it has to be used as underlying principle for site specific and context dependent solutions to adapt to climate change and sea-level rise.

Discussion

These factors aim for different points of application spreading from personalities and individuals to national or even international level. Individuals for instance are asked to train integrative thinking, forming empathy and cultivating courage. They are also encouraged to insist for political commitment and avoid convenience. Local stakeholders, participating groups, the administration and spatial planners need to follow the principles of fair and open negotiation, in which the mutual gains approach may give a guiding hand. New sectors, such as the creative sector or visionaries need to be included in the planning process. Politicians on all levels are asked to enhance the position of climate adaptation and coastal protection in the political agenda. Moreover a professionally guided and subject-specific socio-political debate is required to initiate a sense of awareness and long-term and sustainable solutions. Finally the solidary principle of the community of states may act as financier, as trend generator or as catalyst due to its strategic legislative setup.

As stated above a close thematic proximity exists between area-oriented coastal protection and regional development. This proximity is also present in the validity of these eight success factors – they can be adapted and transferred to the scope of regional development or spatial planning. Even more important as this transferability of the results is the consequence, that both subject areas are dependent and interlinked with each other. Decisions in coastal protection cannot be made without stakeholders of regional development and vice versa. Finally this transferability closes the circle back to area-orientation, as this concept was initially implemented as guiding principle for spatial planning by HEERES et al. (2012) (cf. to chapter 2.2).

8.2 Conclusion

Area-orientation coastal protection is a flexible and proactive alternative to the common coastal protection strategy. It is also a means of climate adaptation. The consideration of the surrounding landscape and various conflicting usages can form a harmonic interaction of land and sea, of hinterland and foreland, or regional development and coastal protection. Area-orientation is context dependent as externalities, such as hydrological and morphological circumstances, as well as anthropogenic activities and use patterns are included in planning. But the most important aspect is the construction of flexible protection systems, which reduce the risks of storm floods and vulnerability. The assessment and communication of risk and its implementation as principle for coastal protection is the next aspect, which allows context and site-specific solutions.

Through the conducted interviews and the identification of obstacles and possible synergies, a general potential and willingness for synergetic cooperation can be named. Nevertheless problems in cross sectoral cooperation are still omnipresent and will be a source of hindrance for the final realization of synergies in the context of area-oriented coastal protection. Fixed land-use and thinking patterns are prevailing; however moderation and the application of the mutual gains approach in pilot projects may prove the applicability of area-orientation.

Some aspects, which are framed as a new paradigm by KUNZ (2004), are congruent to the analysis of area-orientation in this thesis. Nevertheless, it has to be seen critical, whether the proposed paradigm change is universally valid. The outcome of this research highlights, that not one strategy or a single principle underlie Germans coastal protection, but a variety and diversity of measures and strategies, either structural or non-structural, traditional, or innovative, line- or area-oriented, have to be combined depending on the context. This result is concluded in the term ‘united in diversity’: A diversity of measures and strategies following defined principles are united in the overall goal of serving sustainable protection in times of climate change; united in the collective effort to identify and implement synergies among the involved sectors. This implies that area-orientation cannot be called a universal remedy, but a guiding principle.

A predetermination and fixation of a paradigm will hardly lead to a successful end, as the change of one paradigm to another is an evolutionary process, which is not straight forward, which may have several lines of development and will possibly fail. Therefore an exact predetermination of a paradigm may be less valuable as a vision and conceptual idea, which is shared and cultivated, which respects drawbacks and holds space and time for alternatives. Another aspect of a proposed paradigm, which has to be reflected critically in this context, is that not a paradigm, but a set of measures form a mosaic structure of measures and are only fragmentally used. So a paradigm in its strict definition has to be much more open, broad and less precise. It mustn’t include specific measures but more principles and theories, which underlie coastal protection. These principles are presented in this thesis: area-orientation as

proactive and adaptive principle for coastal protection, risk as principle for coastal protection – including its management and communication – and innovative principles, such as soft engineering solutions. Universality, which characterizes a paradigm, will therefore hardly be reached, unless a quite abstract level is maintained.

This thesis ends with the demand, that coastal protection may in principle not be understood as solely technical measure, but more and more as process, which is characterized by various interests, problems, pressures and actors, but also by synergies and potentials. A process which can – in a collaborative effort – cope with future challenges of coastal regions, but all the more leads to more awareness regarding spatial references and interacting, common and multifunctional ways of utilization of coastal areas.

9 Reflection

During the research progress a gradual shift from solely dealing with area-orientation in coastal protection towards regional development occurs and was admitted on purpose. It was observed, that area-oriented coastal protection is also a matter of regional development. This is especially the case when various sectors are involved to form synergetic collaboration. Therefore the initially set goal of this thesis – a matrix of the identified synergies – was enhanced by the identification of success factor for negotiating about area-orientation and implementing these synergies.

The second aspect of this reflection is the fact, that the study was handled as paradigmatic and critical case study and not with transition management theory as the authors ROTMANS et al. (2001), PAHL-WOSTL (2007), LOORBACH (2010), HUITEMA & MEIJERINK (2010), and HUITEMA et al. (2011) are dealing with. The use of transition management as theoretical backbone was considered as not appropriate, as the basis for a transition is not set so far: a low awareness about this topic prevails in society and a kind of political, institutional or catastrophic trigger event is missing – luckily enough one can say, when catastrophes are seen as trigger events. For further research, and if the status quo has changed or a sense of urgency exists, the transition management theory might be another approach for dealing with a new coastal protection philosophy in times of climate change.

As the results of this thesis show, ideologies, missing communication and sectoral thinking are seen as obstacles in a paradigm shift. Especially this socio-political focus is an indicator, that the performed interviews might not be representative for a topic with a high societal relevance. Nevertheless in the context of this thesis the interviews delivered a rich dataset for a stakeholder based analysis. Quantitative social research methods, such as large scale questionnaires or interviews of coastal inhabitants could enhance further research and will include perceptions, thoughts and fears of directly affected persons. This setup would even increase the relevance of societal values and individual perceptions for the discussed processes. Therefore and only in this case, the use of transdisciplinary, instead of interdisciplinary research methods as proposed by SCHMIDT et al. (2012) could be more appropriate, as local and practical knowledge will be combined with various scientific disciplines. In combination with a possible transition, it could be investigated, how practicable this transition could be or how it could improve the quality of life in coastal regions.

As it was shortly discussed in chapter 7, policies and trends from other countries could be used to enhance the view on the topic. Consequently comparative case studies of various regions or countries could reveal both weaknesses and strengths. Together with the mentioned transdisciplinary approach, the use of quantitative and qualitative research methods and possibly a policy analysis, would exceed the scope of a master thesis, but could be worth the consideration to design a doctoral study or a joint research project.

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Appendix

A Interview guideline for practitioners

The interviews INT_1 to INT_5 will be conducted in German, therefore this guideline is printed in German as well:

Interviewleitfaden

Stimmen Sie der Aufnahme des Interviews zu?

Stimmen Sie der namentlichen Nennung / Ihrer Institution zu (oder anonymisiert)?

Einleitung

Zur Einordnung – können Sie bitte kurz ihren Tätigkeits- und Aufgabenbereich beschreiben?

Klimawandel und Anpassungsmaßnahmen

Die Ergebnisse von Klimamodellen zum Meeresspiegelanstieg und Niederschlagsverteilung und –mengen sind wahrscheinlich, aber immernoch von Unsicherheiten geprägt. Glauben Sie die Umsetzung von Klimaanpassungsmaßnahmen (Beispiele: Großes Meer (?), aus Projekt Speichern-statt-Pumpen) sollte erst auf Basis sicheren Wissens oder insbesondere wegen dieser Unsicherheiten vorangetrieben werden?

Warum?

Eine mögliche Anpassungsstrategie des Küstenschutzes an den Klimawandel und einen steigenden Meeresspiegel ist ein flächenhafter Küstenschutz also der Wandel von einer einzelnen Deichlinie zu einem System aus mehreren Schutzlinien abhängig von den vorhandenen Risiken. Ist Ihnen diese Strategie bekannt und welche zusätzlichen Elemente würden Sie zu diesem Konzept zählen?

Ein weiterer Aspekt ist z.B. die multifunktionale Nutzung des Deichhinterlands aber auch des Vorlandes. Was verstehen Sie unter multifunktionalen Räumen?

Welche Vor- und Nachteile sehen Sie in multifunktionalen Räumen?

Ein weiterer Aspekt ist z.B. Risikomanagement, um Gebiete mit unterschiedlichen Risiken entsprechend zu schützen. Was verstehen Sie unter Risikomanagement?

Diese drei Begriffe können thematisch dem integrierten Küstenmanagement / flächenhaften Küstenschutz zugeordnet werden. Halten Sie diese Konzepte – also einen flächenhaften, risikoorientierten Küstenschutz mit multifunktionalen Räumen – als Klimaanpassungsmaßnahmen für sinnvoll?

Wie – und mit welchen Schritten – glauben Sie könnte dieser Ansatz implementiert werden – Paradigmenwechsel?

Wenn ja, in welchem Zeitraum sollten Ihrer Meinung nach diese Maßnahmen umgesetzt werden?

Kollaborationsmöglichkeiten

Multifunktionale Räume sind durch die gemeinsame Nutzung des Raums durch mehrere Sektoren geprägt.

Gibt es bereits, oder gab es in der Vergangenheit Kooperationen / Kollaborationen zwischen Ihrem Sektor [Küstenschutz, Tourismus, Landwirtschaft, Naturschutz, Wassermanagement ...] und den anderen Sektoren [Küstenschutz, Tourismus, Landwirtschaft, Naturschutz, Wassermanagement...]?

Welcher Art sind diese Kooperationen? Wie kamen diese zustande?

Welche Vor- oder auch Nachteile sehen Sie in diesen Kooperationen für Ihren Sektor?

Wie schätzen Sie generell den Erfolg dieser Kooperation ein?

Glauben Sie, dass es Aufgabe von Raumplanern oder der Raumplanung auf regionaler- oder Länderebene ist, solche Kollaborationen zu fördern oder zu ermöglichen?

Sehen Sie Chancen und Nutzen in einer übergeordneten / landes- und sektorenübergreifenden Planungsbehörde?

Glauben Sie, dass ein Planungsprozess, der von einem/einer unabhängigen Mediator/in (Moderatoren / Obleuten) begleitet wird eher erfolgreich sein wird?

Synergien

Eine Kollaboration kann im Idealfall für alle beteiligten Akteure mehr Vorteile bringen als ein Alleingang. Gibt es, oder gab es ein solches „synergetisches Verhältnis“ in ihrem Handlungsbereich?

Was wären Ihrer Meinung nach mögliche Synergien, die im deutschen Küstenraum allgemein und insbesondere in Ihrem Handlungsbereich entstehen könnten?

Welche Faktoren würden Ihrer Meinung nach den Erfolg von Kooperationen oder die Entstehung von Synergien fördern?

Konflikte

Können Sie konkrete Faktoren nennen, die eine Kooperation behindern?

Wurden oder werden Ihrer Meinung nach bestimmte Sektoren in Planungsprozessen bevorzugt behandelt oder haben eine stärkere Position als andere?

Sehen Sie Ihren Sektor in diesem Bereich in einer schwächeren (oder stärkeren) Position gegenüber anderen Sektoren?

Visionen eines möglichen flächenhaften Küstenschutzes

Vorbereitung: Eine Vision oder visionäre Darstellungen eines möglichen Zukunftsbildes Wattenmeer. Hier sind Lagunenlandschaften dargestellt mit einem dynamischen Austausch durch den teilweise geöffneten Hauptdeich in dahinterliegende Polder / Lagune die multifunktionalen Nutzen fördern. Dies kann einerseits zu einer Aufsedimentierung führen, aber auch zu neuem Raum für Wasser als Überflutungspolder mit paralleler Nutzung als multifunktionaler Raum.

Sind nach Ihrer Meinung auch radikalere Maßnahmen (Beispiel: Michael-Otto-Stiftung) nötig um dem Klimawandel zu begegnen und tiefliegende Gebiete weiter nutzbar zu machen?

Glauben Sie diese Maßnahmen sind in dieser oder ähnlicher Form umsetzbar?

Zusätzliche Fragen

Wollen Sie noch etwas anmerken, oder einen Aspekt besonders hervorheben?

Abhängig von Antworten oben:

Welche konkreten Klimaanpassungsmaßnahmen werden in Ihrer [Organisation, Sektor, etc...] diskutiert, oder sind bereits umgesetzt worden?

B Interview guideline for academic

The sixth interview was conducted in English and in another context, than the others. Therefore it is printed in English here and contains slightly different questions, than the interview guideline above.

Interview guideline (INT_6)

Do you agree with a recording of this interview?

Do you agree with the mentioning of your institution? _____

Introduction

Can you please explain shortly, what your working background is and what your research topic is at the moment?

Climate change and adaptation strategies

A possible adaptation strategy to sea level rise in the context of coastal protection is an area-oriented protection. Meaning the transition from a single dike line to a staggered system of dikes, which are constructed due to the present risks and hazards. Do you know this strategy and how is it implemented in the Netherlands?

Which additional elements, would you count to this kind of protection strategy?

A further aspect of this strategy is multifunctionality. How would you define multifunctional areas?

Which advantages and disadvantages do you see in multifunctional areas?

A further aspect is risk management to protect various areas appropriately, due to the prevalent risks. How is the approach of risk management implemented in the Netherlands?

Possibilities for collaborations

Multifunctionality is dependent on the effective collaboration of multiple stakeholders. In my thesis I analyse the collaboration between the sectors of water management, coastal protection, agriculture and nature conservation. What role do you think is the sector of tourism playing in such planning processes?

Can they act as financiers?

How can they act as partners for synergies?

How could they be kept at the table? Is it a voluntary act, or is it forced by formal measures, or supported by informal moderation?

Do you think a planning process is more successful, when it is moderated by an independent mediator or supervisor? Is this a common or even mandatory strategy in the Netherlands?

Synergies

Ideally collaboration can be more beneficial for all stakeholders, as a solo action of one stakeholder – this is defined as a synergy.

What kind of synergies can you imagine in the context of coastal protection of low lying areas and with the stakeholders water management, coastal protection, agriculture, nature conservation and tourism?

Examples, projects?

Which factors would facilitate synergies?

Conflicts

What obstacles can you identify, which hinder cooperation or a synergy?

Further questions to your research and regional planning

When I read texts of planning theory, I see approaches how to deal with complex planning situations and uncertainties, but I also see disparities between this literature and the reality of regional planning and coastal management (at least in the German context, which is strongly focussed on legislative structures).

How can synergetic collaborations be initiated on a voluntary basis?

How could results of self-organization and informal planning practices be implemented in legally binding processes?

How can locked-in development trajectories and path dependencies (Example: German coastal protection philosophy) be identified?

From my interviews I have the feeling and it is confirmed by the interviewees, that each m² is planned by various institutions, laws and directives – how is it possible to set up, implement or only notice self-organization in this context?

In Germany each ministry and authority has a specific working field and is per se sectorally organized, but encouraged to act integrated. How do you think is it possible to enhance integrative thinking in a highly specialized administration?

Additional questions

Do you want to add something, or do you want to highlight a specific aspect?

C Interview transcripts

All interview transcripts are available on the attached CD-ROM and only for the few prints, which were handed in for grading and archiving in the faculties of the University of Oldenburg and the Rijksuniversiteit Groningen.

D Matrix of thematic analysis

The thematic analysis of the interviews is available on the attached CD-ROM and only for the few prints, which were handed in for grading and archiving in the faculties of the University of Oldenburg and the Rijksuniversiteit Groningen.

E CD-ROM with interview transcripts and analysis

Declaration of Originality

I hereby declare that I am the sole author of this thesis and that no part of this thesis has been published or submitted for publication in beforehand. I certify that, to the best of my knowledge, my thesis does not infringe upon anyone's copyright nor violate any proprietary rights and that any ideas, techniques, quotations, or any other material from the work of other people included in my thesis, published or otherwise, are fully acknowledged in accordance with the standard referencing practices.

I declare that this is a true copy of my thesis, including any final revisions, and that this thesis has not been submitted for a higher degree to any other university or institution.

Oldenburg, 20. Dec. 2013

(Steffen Schwalfenberg)