

Facing the threat from the North Sea

*Cross-state comparison of perceptions and instruments
of high-level policy makers with regard to storm surge risks*

Final thesis

for the Systems Engineering Policy Analysis and Management programme
of the Technology, Policy and Management Faculty
of the Delft University of Technology

March 2004

Roel van Raak

Kanaalweg 20, 2628 EC Delft, The Netherlands

Preface

This document forms the conclusion of my study on how the states bordering the North Sea deal with their risk of flooding by storm surges.

The wide scope of the research has resulted – almost unavoidably - in a lengthy report. However an attempt has been made to keep the components of the study understandable independent of each other. The reader with a specific interest is advised to look at the table of contents or ‘readers guide’ and then consult specific chapters as his interest dictates.

KPMG Economic Consulting provided me with the opportunity to combine the research for my final thesis with an internship on one of the projects they are undertaking for the National Institute for Coastal and Marine Management (RIKZ). This is subproject 1 of the European “Common Strategies to Reduce StormFlood Risks” project.

This document however, reflects only my findings and opinions. For further information on, and results of, the ComRisk project the reader is referred to the ComRisk secretariat and the ComRisk partners (see www.comrisk.org).

Acknowledgements

First off all I would like to thank KPMG Strategy Economics for providing me the opportunity to combine my final thesis with an internship at their firm and the provided means for this research.

More specific, I would like to thank Jeroen Klooster, as supervisor, discussion partner and roommate. Furthermore I would like to thank Heleen Verlinde and Frank Uithol, for the good cooperation in Also thanks to Wendy Klein, for her support on the logistics of some of the interviews.

Those involved in ComRisk from other organisations are also acknowledged for the raising the subject discussed in this thesis and thanked for the opportunity to join some of their workshops.

I would like to thank my final thesis committee for their time and especially for the freedom and trust they gave to converge and focus my work over the course of the thesis. Special thanks to Jill Slinger, my primary supervisor, for the many long enriching, substantial discussions on – amongst others – coastal flood risk management.

Further I would like to thank Tineke Ruijgh for giving valuable comments on the methodology and Tibor Lapikas for his last minute comment on the thesis.

Lastly, I would like to thank the many the interviewees and other persons who found time to meet me. Their – often very different – stories and information made the issue come to live for me.

Summary

The low-lying areas of the North Sea Region are populated by 14 million people and of considerable economic, ecological and cultural importance. These low-lying areas are prone to flooding by storm surges from the sea. The governments in this region are all involved in managing this coastal flood risk.

However there seem to be apparent differences in their practices and instruments. For instance: the citizens of the Dutch city of Rotterdam have a legal right to be protected against storms that occurs only once every 10 000 years, whereas the citizens of the Danish town of Ribe are only protected against every 200 years, without a legal guarantee. However the city of Ribe is well prepared to evacuate its citizens and if damages occur, they are usually compensated.

This study has compared the way the high-level policy makers (at the state level) deal with the risk of flooding due to storm surges. The research question is:

What are the problem perceptions of the high-level policy makers bordering the North Sea with regard to storm flood risks, which instruments do they choose to deal with their problems and which additional insights in their choices can be gained from other analytical view points?

Approach

A cross-state comparative analysis has been made with regard to the management of the coastal flood risk. This has been done by analyzing from the so-called substantive decision-making perspective. This perspective assumes that policy

makers' perception of the current situation, their desired situation and the options they see for change explain their choice of instruments.

To gather the information necessary for this analysis about fifty interviews have been conducted with civil servants, other persons involved in policy-making and experts. In addition an extensive study of literature and policy documents has been conducted

To broaden and enrich the analysis the differences and similarities found in the substantive analysis have been discussed the light of the geography of the countries. In addition it has been how cultural factors might explain certain behaviour of policy makers. For this discussion an additional literature study was conducted, as well as the composing of a map of land-use and topology of the region.

Findings

In all the studied countries, a high-level policy maker concerned with coastal flood risk could be identified. These policy makers are mostly ministries, which are located at the state level in federal systems and located at the national level in non-federal systems. The task fields present in the policy makers departments differ, but coastal defence is usually handled by the same department.

These policy makers differ in their perceptions of the situation and their goals (the problem perception). This leads to significant differences in their choice of instrument. Roughly, three groups of policy makers can be distinguished with regard to their perceptions and chosen instruments:

- the United Kingdom (UK) policy makers focus on material risks and use a combination of instruments to reduce the risk to a collective 'optimal' level.

- Danish policymakers also uses a combination of instruments, but tries to eliminate virtual all the risk for its citizens.
- The Flemish, German and Dutch policy makers focus on catastrophic events and emphasize coastal defences to reduce this risk in such a way that individuals are protected in a societally acceptable way,.

The policy makers in the UK focus on more frequent events with relatively limited consequences. Another important common perception is the presence of nearby higher land, which means that alternative ground for desired developments in flood-prone areas can usually be found and evacuations are more feasible.

The UK policymakers consider the citizens to be first of all self-responsible for the risk and encourages them to take action themselves. The policy makers and government in general has a discretionary power to act. Their chosen interventions are a combination of reducing the probability of flooding, reducing the consequences in cases of flooding and redistribution of costs after flooding (by insurance). They choose these instruments by analysing a range of alternatives.

The UK policy makers do have a goal of zero loss-of-life, but thereafter the main goal is to come to an optimal ratio between societal costs and benefits.

The Danish and UK policy makers are much alike, but do have significant differences. They both acknowledge a risk to human life and both have set goals to eliminate this. However, in the UK the focus is on material risk, in Denmark the risk to human plays a more important role. For instance, flood management in the UK is

about sandbags and moving valuables to higher floors, in Denmark it is about evacuation of people

Another important difference is that the UK policy makers do not wish to eliminate all risk, but to come to 'optimal' levels of risk reduction. In Denmark the ambition is eliminate virtual all risk. Defences stop most surges. In the case of extreme surges people are evacuated and their material damages compensated.

The Flemish, Dutch and German policy makers focus on more rare, catastrophic events. The emphasis in their approach is on coastal defences to protect human life. As the focus is on the protection of human life, equity in protection is at least as important as economic effectivity.

The Dutch and German policy makers take their legal duties to provide coastal defence as the starting point to reduce the flood risk. Flemish policy maker does so without legal duty. Any other intervention is considered an additional, secondary instrument.

Discussion

The substantive analysis has been able to offer *an* explanation for most of the behaviour of the policymaker, however some questions do remain. Firstly, some policy makers have different problem perceptions of different areas in their region, but still use only one type of instrument. Secondly, the organisation of flood risk management within the government is probably more dependent on the general institutional structure of a state, than the specifics of the problem perception. Thus

the analysis did not explain why some governments implement defences directly, whilst others leave this to lower levels of governments?

The results also give rise to new questions: if much of the choices can be explained by the perceptions and aims of the policymakers, what is then behind these differences in perception and aims?

Geographic factors such as topology (altitude of the land) and the presence of flood-prone urban areas are able to explain the differences in perception of the situation held by the policy makers and much of their chosen solutions. However, the goals policy makers formulate with regard to these risks and the way they choose their instruments has been found to be also influenced by cultural differences, at least in the Netherlands and England. These cultural factors probably interact with geographical factors.

Recommendations

The primary aim of this study was to compare, not to judge. However based on the discussion of the results some suggestions are made to policymakers.

Although a common strategy is probably not possible due difficulties inherent in the term ‘common strategy’, as well as large differences in geography and societal attitudes, good opportunities to adopt practices on certain aspects exists. The policymakers are therefor encouraged to continue the initiative to exchange information on practices with each other.

Two opportunities for such exchange are suggested. Firstly, those policymakers that face a high risk in general, usually also have areas with localised risks in their region. For these areas adoption of the instruments of policymaker that are more used to dealing with relative limited risks are is interesting.

Secondly, For some policymakers, especially England, the risk to human life is started to be incorporated in to the policy. Those policymakers could anticipate on the difficulties with societal perceptions and attitudes this could very well bring along by studying the high risk countries.

Furthermore the Flemish and Dutch policymakers are encouraged to expand their till now limited activities on the field of flood disaster management to make their strategy more robust.

Reflection

No major difficulties were encountered in the gathering of information and analysis of information. A minor difficulty has been the distinguishing of a policymaker where arrangements such as agencies exist.

Insight has been gained in the importance of differences in level of responsibility and set aims to differences in chosen instruments. In addition is has been learned that geography is probably one of the most important underlying factors in differences between practices of policymakers, but that cultural factors play a significant role as well.

Readers guide

The structure of the report (which is allied to the structure of the research) is depicted in figure 1. In the first part of this document, the aims and the approach will be adopted. Part II contains the theoretical considerations of how to describe, and compare the policies of the authorities concerned in an unbiased fashion.

In Part III, the individual states are described from the substantive decision-making viewpoint. In part IV - the core of the study – a cross-state comparison is made. In part V the findings are discussed in the light of two other analytical viewpoints. Finally, in part (VI), the main question will be answered as fully as possible and the chosen approach and methodology is reflected upon.

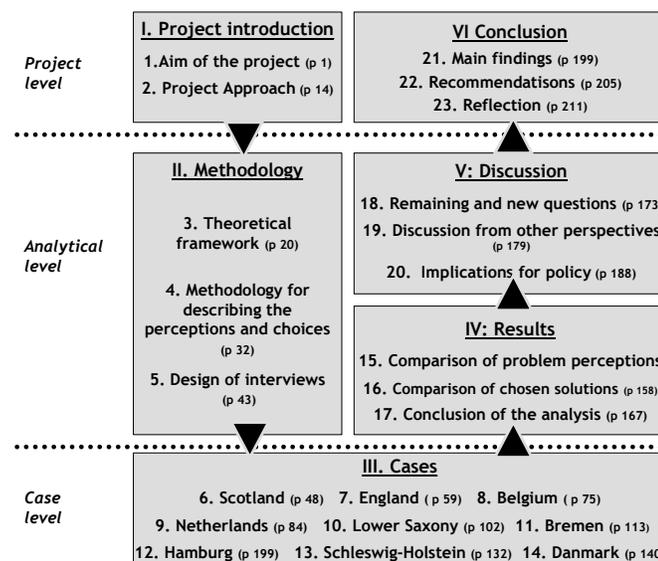


Figure 1 Report structure (in brackets the page numbers of the chapters [pm])

Table of contents

Preface	i
Acknowledgements	ii
Summary	iii
Readers guide	vi
PART I INTRODUCTION TO THE PROJECT	1
1. Aim of the project	1
2. Project Approach	14
PART II. METHODOLOGY	19
3. Theoretical framework to the analysis	20
4. Methodology for describing the cases.....	32
5. Design of interviews	43
PART III THE CASES: THE PROBLEMS AND CHOICES OF THE POLICY MAKERS	47
6. Scotland.....	48
7. England	59
8. Flanders.....	75
9. The Netherlands.....	84
10. Lower Saxony	102
11. Bremen	113
12. Hamburg.....	119
13. Schleswig-Holstein	132
14. Denmark.....	140
PART IV RESULTS: COMPARISONS FROM THE SUBSTANTIVE PERSPECTIVE	151
15. Comparison of problem perceptions.....	152
16. Comparison of the chosen solutions	158

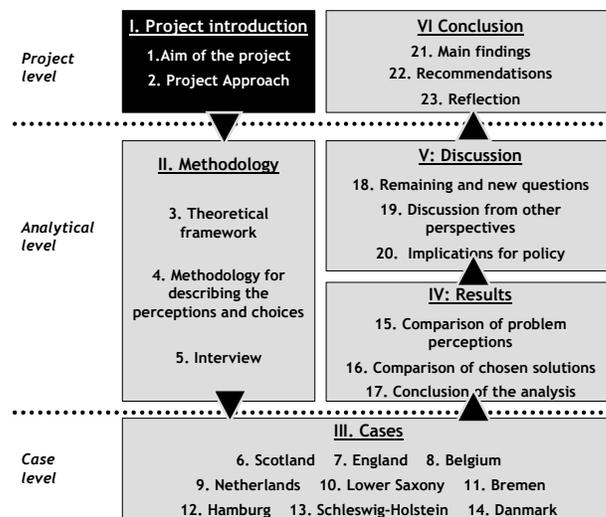
17. Conclusion on the relation between problem perception and instruments	167
PART V DISCUSSION	172
18. Questions for discussion	173
19. Discussion using other perspectives of questions by use of other perspectives	179
20. Discussion of implications for policy	188
PART VI CONCLUSION	198
21. Main findings	199
22. Recommendations	205
23. Reflection	211
BIBLIOGRAPHY	219
APPENDIX A. POLICY MAKER INTERVIEWS (interview reports only in thesis committee version)	
APPENDIX B. EXPERT COMMUNICATIONS (reports only in thesis committee version)	
APPENDIX C. OTHER CONSIDERED PERSPECTIVES	
APPENDIX D. DERIVATION OF INTERVENTION POINTS	
APPENDIX E. SOME BACKGROUND TO THE GEOGRAPHY PERSPECTIVE	

Abbreviations

ComRisk	Common strategies for storm flood risks (Interreg project)
DEFRA	Department of the Environment Food and Rural Affairs (UK)
EA	Environmental Agency (UK)
EU	European Union
MSL	Mean Sea Level
NLWK	Niedersächsischen Landesbetriebes für Wasserwirtschaft und Küstenschutz
NSCMG	North Sea Coastal Managers Group
RIKZ	Rijksinstituut voor Kust- en Zeebeheer (Dutch national institute for coast and marine management)
Schl. Holst.	Schleswig-Holstein
SEPA	Scottish Environmental Protection Agency
SEPAM	Systems Engineering Policy Analysis and Management programme
UK	United Kingdom

Part I Introduction to the project

In the first chapter of Part I the research questions are determined. In the second chapter, the approach to be adopted in answering these research questions will be discussed.



1. Aim of the project

This chapter will set out the aims of the thesis project. After a short introduction to the subject (paragraph 1.1), the problem statement (paragraph 1.3) will be derived from the context of the project (paragraph 1.2). This statement, will lead in turn to the main research question (paragraph 1.4) and the sub-research questions (paragraph 1.5). In paragraph 1.6 the scope of the study in space and time will be defined.

1.1. Coastal flood risk management in the North Sea Region

Over 14 million people live and work in the low-lying areas of the North Sea Region. Cultural and economic centres such as London, Antwerp, Amsterdam and Hamburg are located in this region as are unique nature areas and some of the most productive agricultural land in the world.

Throughout the centuries, storm floods have struck this area from time to time, they have resulted in thousands of victims and the setback of the economy of entire regions.

All concerned governments have long considered that their citizens and their possessions should not be left vulnerable to the dangers from the sea. However the way the governments reduce the vulnerability of their citizens to storm floods has – despite many similarities – many differences.

To name a few examples: The slogan of the UK government is: “flooding you can’t prevent it, but you can prepare for it” [EA 2003]¹, whereas the Flemish government states: “The population of the coastal zone and low-lying polders must be protected against any danger of flooding” [LIN 2001]

¹ References are throughout the report placed between straight brackets:[]’s. See chapter 27 for the source list. References starting with IV are references to the interviews (see appendix A and B).

The German and Dutch governments are proud that further development of low-lying land has been made possible by their dikes, whereas the Scottish government considers dikes as an ‘alleviation’ for people living in the wrong place when it comes to flooding and has forbidden developments in low-lying areas.

The Dutch citizens have a legal right to dikes that at least withstand storms that occur once every 2 000 years. English citizens have no legal right to protection whatsoever. It is at the discretion of their government to act.

The Danish and Flemish citizens are obliged to take flood-insurance. The British citizens may take flood insurance, whereas it is unavailable to the German and Dutch citizens.

These apparent differences in the practices of policy makers raise questions. Are the practices indeed different upon closer examination? And if so why? Are the policy makers dealing with situations in a different way? Or are their differences in practice caused by the fact that they face different problems?

These questions are of societal importance, as many of the policy makers are at the moment considering how to deal with the (possible) increase of the risk due to climate change. Moreover the role of the European Union (EU) on many aspects of water management is increasing. If the EU also becomes involved in storm flood management, a thorough understanding of the differences and similarities between countries is essential, both for national policy makers and the EU..

In the light of such developments the governments of five countries recently expressed their desire to exchange information on practices and explore common strategies to storm flood risks within the project ComRisk (see paragraph 1.3).

1.2. The organisational context

Educational context

The project is - first of all - a final thesis project of the Systems Engineering, Policy Analysis and Management (SEPAM) programme of Delft University of Technology. It is an independent piece of scientific research, which provides a professional orientation for the engineering student. A contribution to scientific insight or a societal aim is considered to be an added benefit².

Host firm context

On the other hand a match with ComRisk subproject 1 has been sought. ComRisk stands for “Common Strategies for Storm Flood Risk”. This project, involving six coastal management authorities aims at “improved coastal flood risk management through a transfer and evaluation of knowledge and methods, as well as pilot studies”. [ComRisk 2002a].

The ComRisk subproject “1. Policies and strategies for coastal risk management” consists of an inventory and evaluation of national policies and strategies. It aims to inventorize current policies, perform an assessment on these inventories and recommend improvements [KPMG2003a].

The responsible ComRisk partner, the National Institute for Coastal and Marine Management (RIKZ) has contracted a consortium lead by KPMG Economic Consulting to undertake this subproject.

² This criterion is not within the written terms, but discussed in the first final thesis committee meeting. See [TPM 2003] for full description of terms.

1.3. Problem statement

The coastal defence authorities have expressed the desire to explore the adoption of each other instruments and possibly to come to common strategies (sets of instruments)³. A first condition for such an exploration is that the instruments of the different policy makers are described in a comparable way, that is in such a way that policy makers can understand their differences and similarities.

However this alone will not be enough information for such an exploration. If a policy maker learns that another policy maker uses different instruments, the next question he needs to ask himself is: “what will be the effects of such an instrument in my situation?” For instance: how will the public react when I build less dykes and try achieve better insurance coverage?

A first, important step in answering this question is to learn how the (set of) instruments fit into the general practice of the policy maker. The term ‘practice’ refers to many aspects that are important for the feasibility and effects of an adoption of an instrument.

If for example the risk in the country of the other policy maker is much more limited, a point of attention for the policy maker is that the potential damage in his country is not beyond the limits of what can be insured. Such differences in situation are important points of attention in judging the feasibility of an instrument.

Another example of an important aspect is the intention of the policy maker. Is he trying to reduce the risk or perhaps meeting budget cuts? Or is he trying to win

³ I interpret that with policies and strategies in ComRiksk [2002] the coastal authorities mean instruments and sets of instruments.

votes for the next election? Thus the following problem statement is formulated (see 1.6 for definitions):

The high-level policy makers of the North Sea Coast want to be able to exchange information on practices and instruments with regard to storm flood risks and perhaps even adopt instruments from another. However their present practices and chosen instruments are not described in a comparable way. Little is known about why certain instruments were chosen and so the feasibility and effects of adopting each other instruments cannot be predicted with any certainty.

This problem statement is formulated as an societal concern. As explained in the paragraph 1.1, climate change and the increasing role of the European Union are leading to an increased importance of mutual learning between countries. The information from this these can directly put to use in the ComRisk project

Besides the societal concern, this problem statement is also of scientific interest. It is at the junction of coastal zone management, risk management and water management, all subjects that in recent years have been of considerable interest to (policy) science. However to the best of my knowledge no comprehensive cross-country study has been done in to this particular subject, at least not for the North Sea Region.

Note that if the identified information gap is resolved, further might steps be necessary before actual adoption of instruments can take place. For instance more normative judgements (which are 'good' practices to adopt). This is part of later phases within the ComRisk project, but given the available time and the scientific difficulties, normative analysis .I have not performed such an analysis

1.4. Main research question

To address the issues detailed in the problem statement, an answer to the following main research question is needed:

What are the problem perceptions of the high-level policy makers bordering the North Sea with regard to storm flood risk, which instruments do they choose to deal with their problems and what additional insights in their choices can be gained from other analytical view points?

The necessity of describing the chosen instruments follows logically from the problem statement. These instruments will be explained from the problem perceptions of the policy makers, this does not follow logically from the problem statements. Multiple perspectives are possible.

A specific perspective had to be chosen, because it is simply not possible to offer a comprehensive explanation for the policy makers' choice of instruments. This is both due to limitations in resources as well as more methodological reasons.

The chosen viewpoint is the substantive decision-making perspectives. It assumes that policy makers' perception of the current situation, their desired situation and the options they see for change explain their choice of instruments. This is the so-called substantive decision-making viewpoint.

The results of this analysis from the substantive viewpoint will be discussed in part V. In this part the difference in risk perceptions and perceived feasibility of instruments will be discussed in the light of the geography of the countries. In addition it will be discussed how cultural factors might explain behaviour of policy makers that the substantive perspective cannot explain.

Definition of key elements in the research question

What are the problem perceptions...

Problem perceptions have been defined in 1.3 as the perceived gap between the situation one desires (goals) and a perception of the current and/or future situation.⁴

“Goals” is used as an overarching term, referring to both the aims and objectives. An aim in this study is regarded to be the long-term high-level ambition, responsibility and/or task of a governmental organisation. An objective is a more specific standard within the overall aim.

...of the high-level policy makers.....

Policy for coastal flooding is made at several governmental levels. In this study I have chosen to look at the highest policy level⁵. These policy makers are not bound by higher authorities, which mean they (implicit or explicit) have to choose themselves an approach to the issue. It also matches well with ComRisk (see paragraph 4.3). Furthermore organisations, rather than the individual civil servants or the governments as a whole are regarded to be the actors in the analysis. The term “organisations that are responsible for the highest level of policy development and implementation with regard to flooding due to storm surges from the North Sea” would be most accurate, but to avoid such lengthy terms, policy maker is used further on in this document⁶.

⁴ This is based on the definition of Hoogerwerf [1987]

⁵ The high-level policy maker is usually at the national level and in federal(like) systems at the state level.

⁶ To this subject term ‘coastal manager’ is often used. As managing the coast encompasses both more (such as transport) and less (measures further land-inward) than coastal flood risk management this term was chosen not to be used.

... *with regard to storm flood risk...*

A *storm* (in combination with high tides) that will cause the sea to inundate or suddenly wash away land is defined as a storm flood⁷.

The term *risk* has a different meaning in social studies, technical studies or risk analyses and even within these disciplines⁸. To prevent bias and confusion, the specific interpretation used by the policy maker in each case will need to be identified. Unless specified otherwise, in general considerations “risk” is defined as the undesired effects that storm floods may have, when they occur, for individuals, the society as a whole and/or the environment.⁹

...*which instruments do they choose..*

The term ‘instrument’ is taken from administration science. An instrument can be regarded to be “a mean that is intended to regulate or steer society”¹⁰.

....*to solve their problems...*

As stated in the previous paragraph, a problem is regarded to be the gap between the desired and perceived situation of a policy maker.

which additional insights in their choices can be gained from other view points?

This refers to the discussion of two other perspectives. Note that only existing information will be reviewed (after being made comparable if necessary).

⁷ This may be through estuaries or rivers.

⁸ Vlek [1990] found 15 common used definitions for the term risk

⁹ Risk to the policy maker himself (such as “political risk” or “organisational risk”) or to construction projects (such as labour-safety and financial risk) is not meant. Risk is not necessarily probability times consequence.

¹⁰ Van den Heuvel (1998)

1.5. Sub-research questions

The main research question can be split up into sub-questions. This will be motivated in part 2 of the report. These sub-questions are the following:

The high-level policy makers and aims:

1. Who should be regarded as the high-level policy maker?
2. What aims do these policy makers have with regard to coastal flood risk management?
3. What changes have there been in the high-level policy makers and their aims with regard to storm flood management over the last years and decades?

The problem-perceptions and objectives:

4. What are the policy makers' perceptions and objectives with regard to flood risk? And with regard to indirectly related aspects?
5. How do they trade competing or irreconcilable goals off?

The chosen instruments:

6. How do policy makers reason from their problem perceptions to instruments?
7. Which interventions in the physical system and/or society do the policy makers aim at and how do they try to realise these?

The other analytical view-points:

8. What are the most interesting viewpoints to discuss the perspectives?
9. What additional insights into the substantive choice of the policy makers can be gained from discussing the results in light of these other perspectives?
10. What insight do they offer, into the behaviour of the policy makers that cannot be explained from the substantive decision making perspective?

1.6. Scope

Scope with regard to space



Figure 2 The study area. The North Sea is depicted in light blue. The territories of studied high-level policy makers are in light green and the names of these territories are underlined. See paragraph 4.1 for the identification of these policy makers. France and Sweden have been excluded because only a small fraction of their long coast borders the North Sea (compare this to Belgium whose short coast entirely borders the North Sea) . The gained insight from studying France and Sweden has been deemed not to outweigh the needed resources to study them. Norway has been excluded because there is virtual no risk of coastal flooding from storm surges.

Note that the North Sea can be defined differently. This depends on, if small waterbodies are considered separate from seas or not. In this study the choice is made to consider the Channel, the Kattegat as separate, but to consider the coast along the estuaries and the Wadden Sea as part of the study area.

The study area is depicted in figure 2. The territories of high-level policy makers that border the North Sea Region form the general study area.

The seaward boundary of the study is the coastline of main land of the countries. For policy makers bordering more than one water body, only their North Sea coast is taken into account.

The landward boundary is more vague. Multiple and gradual definitions of flood-prone exist, this boundary depends on the perception of the policy maker.

Moreover the discussed actors (among which the general public) are sometimes outside the flood-prone areas.

Conclusions are not considered valid for other regions than the North Sea Region, simply because the North Sea Region as a whole has also a number of specific common institutional, socio-cultural and geographical characteristics.

Scope with regard to time

The choice implicitly made in the problem statement was to look at the present situation. Future plans of policy makers will be noted, but comparisons are made for the present situation. The main reason for this is, that plans are deemed to much subject to change for a proper analysis.

For a good understanding of the present situation (especially ongoing changes), some understanding of the past is necessary. How much the past will needs to be considered and the way which this needs to be undertaken, are complex questions, as the instruments and related process take place at very different time-scale.

In figure 3 an inventory of related processes and the timescales on which they occur is provided. The standpoint of the research project with regard to these processes is listed on the extreme right.

Time-Scale	Examples of processes at this time scale:	
Hours or less	Emergency dike repairs. Flooding of area, rescue and evacuation operations.	<i>Actual crisis management and recovery: out of scope (only looked at preparation and effects afterwards on policy)</i>
Days		
Weeks	Emergency housing, dike repairs. Infrastructure repairs. Compensation decisions and insurance handling.	
Months		
Years		
	Budgets decisions, dike reinforcement cycles, passing laws, spatial development permits, calamity plans, minor construction projects	<i>Time scales within research scope: to be considered variable</i>
Decades	Long term budget trends, long term spatial planning, high-level strategy documents and changes, large construction projects. Land-use trends. Public flood risk perception. Time between floods. Climate change. Institutional changes, peat subsidence	
Centuries or more	Geological movements, constitutional /institutional changes, long-term land-use patterns. Risk culture of people and attitude towards nature. Main protection philosophy (for instance dike or living on hills).	<i>Long term (historical) changes: regarded to be static entities</i>

The small time-scales

At the small times scales, crisis management takes place¹¹. Crisis management is quite different from normal policy-making. Decisions need to be taken under pressure and often with little or no consultation [Rosenthal et al 1998]. The time available for completion of this final thesis project has constrained the study of these processes. Thus the small time scales (months and less) are out of scope

¹¹ Of course, the time scale does in fact not determine if a process is crisis management or not. A war for instance could be regarded to be a crisis management of years. However with regard to flooding, normal policy making and crisis management does take place at different time scales.

The long timescales

Information on long-term changes is not necessarily present in the memory of current staff¹² of the organisations concerned, nor in easily available documents. Searching foreign libraries and archives is practically not feasible, within the time constraints. Therefore processes on time scales of centuries and longer will be regarded as static and part of the (perception of) the factual situation.

For instance, the polders of the Netherlands will not be regarded to be an implemented instrument but as a part of the situation. The considerable decline of the ground after will not be regarded as an effect of policy, but will also be considered to be part of the situation.

The timescales in the middle

The remainder of the timescales (years to decades) will be considered variable and attention will be paid to changes in them.

1.7. Recap: Important choices made in this chapter

In this chapter, a number of crucial choices with regard to the set-up of the research have been made. Briefly summarised these are:

- To study the management of the negative consequences of storm and tide induced flooding from the North Sea.
- To study the decisions of the highest-level policy-making organisations.
- To look at which instruments they choose to use with regard to manage the the negative consequences, how they choose these and which goals they serve.
- Not to study crisis management and to consider processes that occurs over centuries or longer as static part of the situation.

¹² If present day staff would be asked for motivation on historic choices, this would result in "a perception of a perception", namely the perception of the present organisation of why choices have been made in the past. This is not necessarily equal the original problem perceptions.

2. Project Approach

In the previous chapter, the questions at the core of the research have been identified. In this chapter, an approach to answer these questions will be elaborated on at the project level.

2.1. Project structure

As said in the reader's guide, the structure of the project and the report are allied. The project approach, as depicted in figure 3, is thus similar to the document structure (figure 1). The roman numbers are the main research steps. These will now be elaborated on.

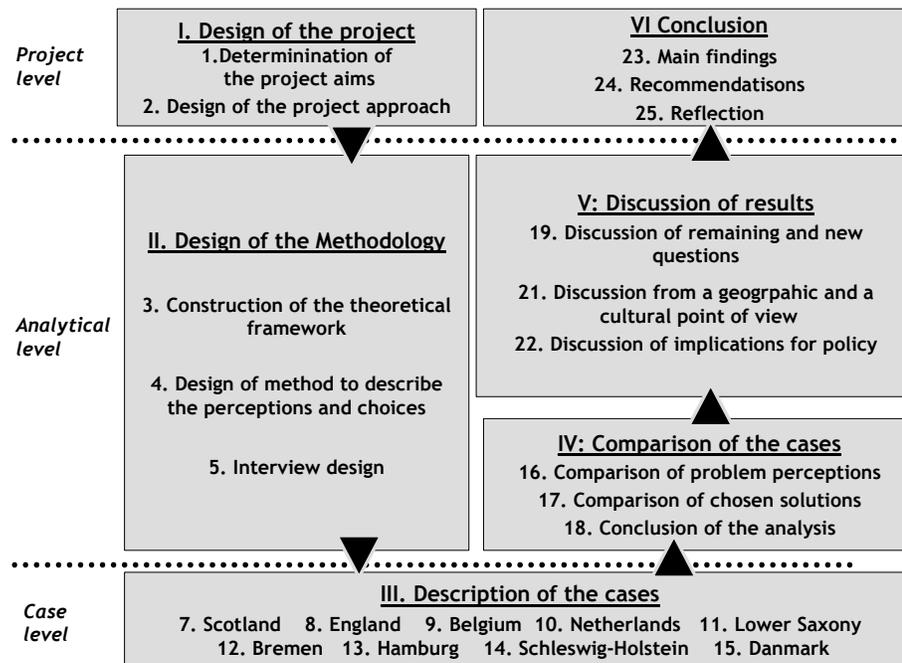


Figure 3 Structure of research and report

I. Design of the project (introduction)

The main research question and sub-research questions are specified in the introduction and the design of the project plan to address them is described.

II. Design of the methodology

A general theoretical framework is constructed in this part. The choice for the substantive decision-making perspective is justified and the use of other perspectives as part of the discussion of the results is elaborated on. Lastly the design of the interviews is discussed.

III. Description of the cases

In accordance with the research methodology, information is gathered on the perceptions, goals and choices of the high-level policy maker. Each policy maker constitutes the basis of a separate case description.

IV. Comparison of the cases and conclusion

The cases are compared on their elements and the relations between elements is discussed. After this it will be concluded which key factors in the perceptions of the policy makers explain the choice of instruments of policy makers. These findings form the core results of this research.

V. Discussion

With the results of the substantive decision-making analysis, most choices of the policy makers can be explained, but not all. To explain these choices, information in literature on cultural factors will be examined.

The results also raise new questions. Most importantly why the risk perception of the policy makers differs. Some insight on this can be gained from the cultural perspective mentioned above, but in addition the geography of the territories of the policy makers will be discussed.

VI. Conclusion step

The main findings are summarised, and after this recommendations are made for further research and recommendations towards policy makers.

As this project refrains from normative analysis, the recommendations to policy makers do not follow directly from the results of the analysis, but they follow from the discussion part.

Lastly upon the whole project will be reflected. Reflection on all levels of the project (case, analysis and project) will take place in order to reflect if the aims are met. Process aspects of the study, such as planning, will be discussed in appendix E, as this reflection has no relevance to the substance of the study.

2.2. Information sources

Information was needed at all three levels of the project. This is depicted in figure 4. At the project level the goals from the programme and host-firm context provided the necessary information on this context.

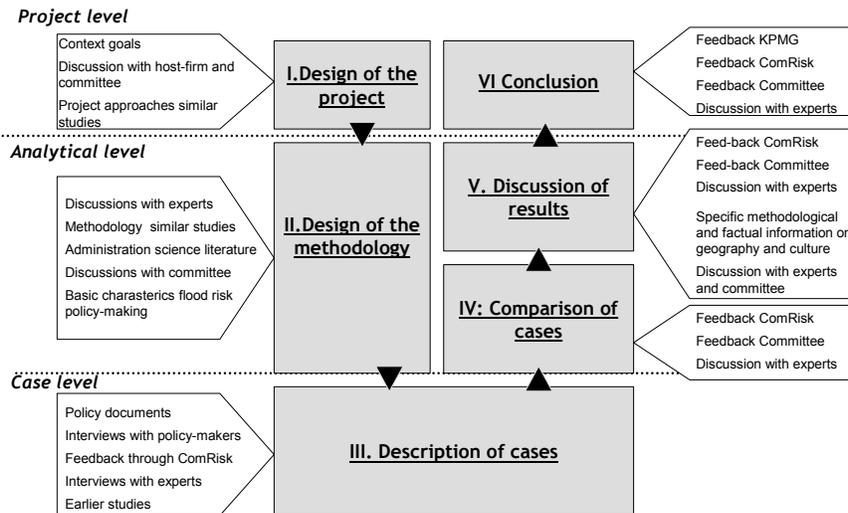


Figure 4 Information flows into steps of the project

Information at the analytical level

At the analytical level mostly theoretical literature was needed to set up and ground the analytic framework. This has been found in administration science literature (such as policy analysis literature). Also approaches of other studies have been considered.

In the discussion of the results, specific information on geography and cultural factors is required, for which additional literature has been studied. Also maps and databases have been processed for the geography perspective.

The discussions held with various experts are another source of information for the design of the methodology. These discussions have within interviews (see appendix A and B), but the methodological discussions in the ComRisk project and the KPMG project team have also been valuable.

Case level information

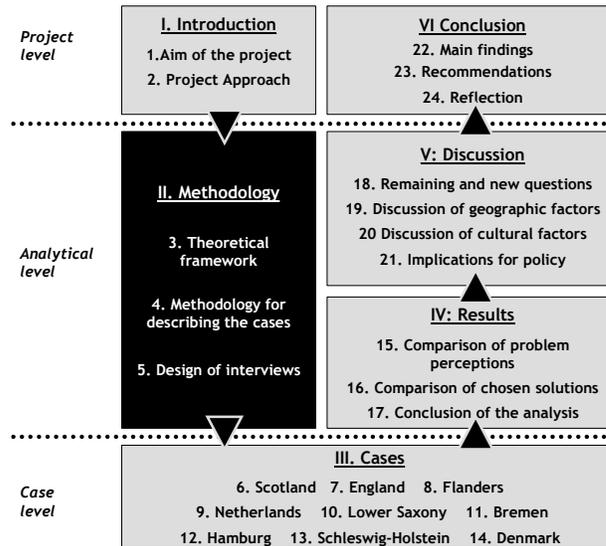
At the case level, the problem perception and choices of the policy maker need to be captured. This information is can first of all be found in the various policy documents, guidelines and regulation on flooding and related issues of the policy makers. However these alone did not fulfil the information need.

Firstly because some countries have only limited written policy (or even none at all) on the subject. Secondly, policy documents are written in the specific context of a country. Some (implicit) choices are not motivated, because they are considered to be self-evident. Moreover certain terms may have a specific meaning.

Therefore early on, I decided to interview some of the policy makers to verify the interpretation of the policy documents, inform about motivations of choices and to fill specific information gaps.

Part II. Methodology

In this part the methodological choices in the research question will be elaborated on. Furthermore the elements of the analysis will be detailed and the design of the interviews is discussed. The reader with a practical interest may wish to skip forward to part III or IV.



3. Theoretical framework to the analysis

In this chapter the research's theoretical framework is discussed. First some general consideration to the possible analytical viewpoints will be given. After this it will be motivated why one perspective has to be chosen (paragraph 3.2) and why the substantive decision-making perspective is the best choice (paragraph 3.3).

3.1. Dealing with multiple perspectives on coastal flood risk management

Policy problems (and problems in general) can be considered from different analytical viewpoints or perspectives. This might sound quite philosophical, but has played an important role at the more practical level in the project, as no analytical viewpoint is self-evident.

Developments such as the increasing role of the EU and climate change may in the future lead to urgency among policy makers to learn and corporate on specific points. However at present there is no specific problem foreseen. The interest of the policy makers in each others policy is of a more general nature. This leaves room for different types of analyses.¹³

For instance: both a study into the design of dykes and a study into how societal views on the risk are constructed and can be influenced will contribute to the information need of policy makers

Figure 5 depicts some of the many perspectives that are possible.

¹³ The SEPAM programme regards itself to be multi-disciplinary, thus the educational context does also not prescribe a certain viewpoint.

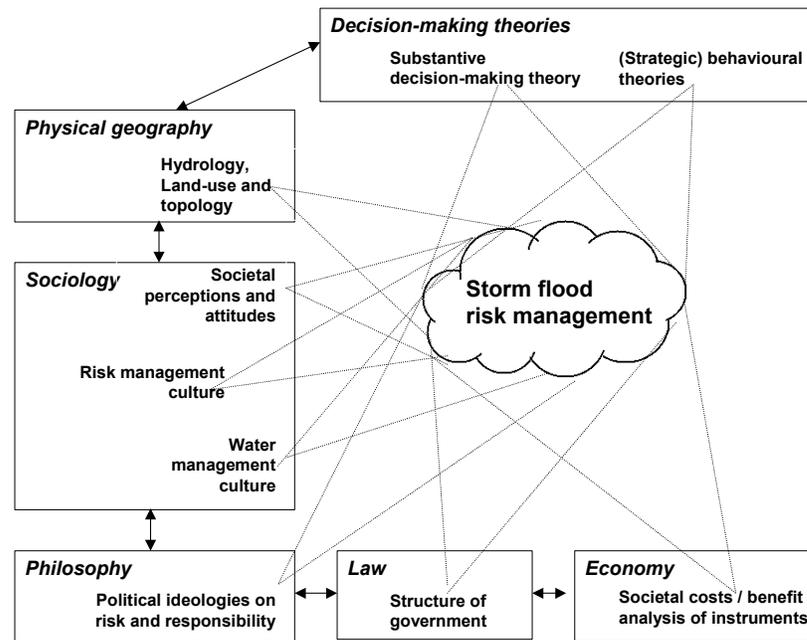


Figure 5 Many analytical viewpoints on storm flood risk management possible. The management of the risk itself cannot be objectively described and is depicted as an intangible cloud. From various disciplines, various models could be applied to describe storm flood risk management. The depicted disciplines and theories are only examples, many more models could also be mentioned. Furthermore subclasses of these models exist.

Theories also incorporate aspects of other theories in each other, which is depicted by the two sides arrows. For instance from a lawyers point of view the law sets out the goals of a policy maker as it assigns duties, whereas from a strategic point of view, laws are sources of power (or restrictions) to pursuit ones own motives. One could from political ideology discuss if this is correct, etc. etc.

Not all these interrelations are depicted. Between the depicted 11 viewpoints, more than 100 relations could exist. The complexity is even further increased by the fact that multiple relations can exists between two viewpoints. For instance, there is most likely a relation between the geography and the perceived risk underlying substantive decisions, but the geography also affects the perceived effects of instruments (can an area for instance be evacuated) or even the entire approach of the policy maker (he might for instance be inclined to take a cost-benefit approach if the risks are limited)

The next logical step would be to integrate these perspectives into one model. For this project a full integration into one model would be ideal to gain insight in the relation between factors from all perspectives. Unfortunately, this is impossible.

The impossibility of a comprehensive view-point / model

There are number of reasons why this is impossible. Firstly, because no complete list of possible viewpoints can be made: one would never know for sure that a perspective is not missed, especially because explanations can come from different disciplines.

Secondly, it will be very difficult to capture multiple viewpoints in a single analysis. The model needed for such an analysis would become extremely complex and virtual impossible to verify, due to the many interrelations between perspectives, this model. Thirdly - at a more practical level- the enormous amount time and means that would be required for such an in-depth investigation of a large number of factors. are simply lacking

Balancing bread and depth of the study

Thus the desire to take a perspective that is as broad as possible on one hand needs to be balanced against the available means and demand for an analysis of scientific quality on the other hand. This dilemma has been one of the key challenges in this study and is depicted in figure 6. [pm]

To as best as possible adress this dilemma, an approach has been designed in which one primary analytical viewpoint is selected, whilst incorporating other aspects to make the study as comprehensive as possible. This is done in two ways.

First, a perspective is selected that can incorporate a number of important aspects of other theories.

Second, after the analysis the results will be discussed in the light of two other possible perspectives¹⁴. In this discussion available information in literature from and on other perspectives will be used.

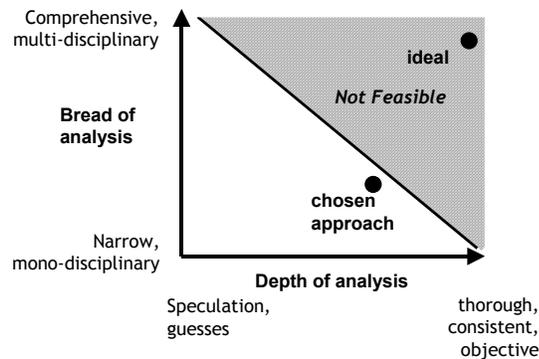


Figure 6 Impossibility of a comprehensive analysis. This diagram illustrates that within the available means an analysis cannot be truly multi-disciplinary and of sufficient depth at the same time. The chosen depicted 'second-best' is to take a mono-disciplinary viewpoint, but to keep this viewpoint as wide as possible and to use other perspectives in the discussion of the results.

3.2. The substantive decision-making perspective

The choice for this viewpoint will first be explained, after which it will be justified why the caution encountered in some literature with regard to using this viewpoint for risk-issues is not applicable to coastal flooding in the North Sea Region.

¹⁴ Rue [1998] finds a more or less similar dilemma. He suggests 'triangulation': the enclosing of an issue by taking two or more models with opposite starting points to explore the different possible viewpoints, but to be careful not to use too many models. For him the dilemma is between "analysis paralysis" and "triangulation sophistication".

The reason for the substantive decision-making discipline

First, a discipline is decided upon. The issue is currently already considered in terms of government action. This is a strong argument for the decision-making perspective, which is often used for analysing government action.

Furthermore, many aspects can be quite well addressed *within* the decision-making perspective, as attention can be paid to the different aspects governments address in their decision-making.

Attention can for instance to the role economics, geography, societal attitudes etc. play in the motives of the policy makers. Analysing the perceptions is for course a different method from analysing facts.

Substantive vs. process decision-making perspectives

The major division of perspectives within this discipline is into more substantive and more proces-based or strategic approaches. Strategic approaches have as the core element of analysis the parties involved, their interests, resources and views , whereas the substantive perspectives analyses the substance of the problem from the viewpoint of a problem-owner¹⁵.

There is no right and wrong perspective. The two perspectives can even co-exist. The policy of a policy-making organisation may be determined by internal struggles for power, but this does not mean there is not a consistent, analytical motivation for the policy at the same time.¹⁶

¹⁵ Based upon Heuvelhof and De Bruin [2002]

¹⁶ See for instance "The essence of decions" of Allison [second edition, 1999] on this subject

Between these two perspectives, I have chosen for the substantive perspective for two reasons. The first reason is practical: the strategic or procesed-based perspective would require the detailed analysis of how actors have interacted. To gather this information in a number of foreign countries involves a great deal of work and interviewees may be reluctant to discuss these matters.

The second reason, is that the analytic viewpoint aligns better with the questions raised in the introduction. The policy makers are in my estimation, currently more interested in (substantive) arguments for choices than in (strategic) motives for making these choices.

Basic characteristics of the substantive decision-making perspective

The basic underlying assumption of the substantive decision-making perspective is that policy maker's reason to solutions for the policy problems they perceive. As said, a policy problem is regarded to be a gap between the situation one desires (goals) and a perception of the current and/or future situation.¹⁷

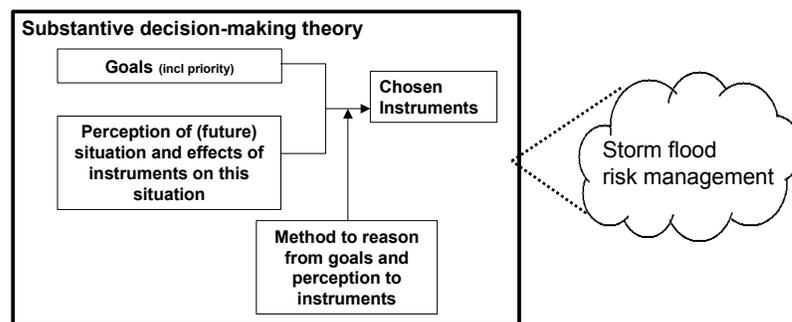


Figure 7 The basic structure of the analytical decision-making perspective

¹⁷ This is based on the definition of Hoogerwerf [1987]. Note that a problem in this definition does not have a negative connotation, i.e. problems are not necessarily problematic.

The structure of this perspective is depicted in figure 7. The policy maker will choose to undertake actions (instruments) to close the gap. He will base his choice on the expectations of the effects they will have on the current and/or future situation. He can close the gap by changing the situation (using instruments), by changing *his* goals (the desired situation) or a combination of these action.

The focus in this study will be on closing the gaps by the chosen instruments, though changes in goals (for instance because they turned out not to be feasible) will also be noted.

Justification of the substantive decision-making perspective

A number of potential difficulties can be noted with these characteristics. First, this view assumes an explicit set of goals and perception of the policy maker, but sometimes policy makers act on tacit knowledge. A policy maker may for instance be guided by the ‘gut-feeling’ from years of experience in his field.

Secondly policy makers do not always act ‘rationally’, they may become subject to sociological traps that lead to illogic behaviour. Their behaviour may even be in the pursuit of self-interest (for instance an increase of their status). This does not exclude a substantive reasoning necessarily, but it might do so.

Thirdly policy makers are often faced with a strategic behaving environment, to which they may respond with dynamic, strategic behaviour themselves. Often multiple strategic issues with common actors occur at the same time, complicating the behaviour further.

If such strategic, dynamic behaviour is dominant the substantive viewpoint will be less useful. In such a case it is nearly impossible to precisely capture the ever-changing actions of the policy maker. The strategic perspective is in such a case more suitable.

Wildavsky's warning on the wickedness of many risk problems

Wildavsky [2000] (and others), argue that risk management is usually highly complex. Wildavsky argues this by using a two dimension conceptual model of complexity (see figure 8). One dimension is social complexity. This dimension relates to the amount among actors about the desired situation. The other dimension, scientific complexity, relates to the amount of uncertainty about the situation and effects of instruments on the situation

		Technical uncertainty	
		Little uncertainty	Much uncertainty
Social consensus	Much consensus	Tamed problems	Technical problems
	Little consensus	Political problems	Wicked problems

Figure 8 Wildavskys classification of policy problems. As similar model is used by Hoppenbrouwer. Adapted from Wildavsky [1982]

In wicked problem situations, actors have very different views on the situation and how it should be, which leads to a dynamic situation. In these conditions the substantive perspective encounters difficulties as contradicting views on what the substance of the problem is, exist.

North Sea coastal flood risk not a wicked problem

Thus if coastal flood risk problems are in both dimensions highly complex, difficulties with the substantive decision-making perspective will arise¹⁸. However, as will be explained hereafter, the complexity of storm flood risk management in the North Sea region is in fact in both dimensions limited.

The *scientific uncertainty* in coastal flood risk management is certainly considerable. These are physical: for instance the uncertainty under which conditions a structure will fail, but also more sociological: for instance the difficulty to estimate the social and psychological damage of floods.

But it should be realised that there does exist a considerable amount of reliable knowledge. On matters such as dike building or water levels a vast body of literature exists. Flood events have occurred many times before, also in the North Sea Region and there are some records of its sociological and economic effects. Thus, there is scientific complexity, but only to a limited extent.

The *social complexity* is also limited. There are discussions on more operational matters, for instance on funding (who funds what) or the damage from maintenance activity to the ecology of the dyke. But on the more fundamental normative issues, such as the high-level aims there is – by large- consensus.

¹⁸ It is important to note the complexity *within* the regions of the policy makers is important (see further chapter 4). The differences in goals and perceptions *between* policy makers and their regions are addressed in the comparison itself.

Thus, coastal flood risk management in the North Sea region has only to a limited extent the characteristics of wicked problems. Within the studied regions the uncertainty is limited and mostly scientific, which means that the substantive decision-making viewpoint is justified.

This contrast with the findings of Wildavsky and others might be due to the fact that their work study risk such as nuclear accidents, or more recent, genetic modification. These are probably far more societal controversial and unpredictable than coastal flood risks.

That the model is justifiable, does not mean that there will be no difficulty at all in application of the model. Throughout the report observations of possible disturbances will be noted and reflected upon in the final part (see paragraph 23.2).

3.3. The use of other perspectives in the discussion of the results

In the beginning of the chapter it has been concluded that many analytical perspectives are possible. It is interesting to examine how understanding these perspectives can enrich the insight gained from the analysis from the substantive perspective.

Two types of additional insight can be distinguished: First, the decision-making analysis is able to offer an explanation for most choices of the policy makers, but not for all. Information from other perspectives can shed light on why the substantive have made these choices. Second, the results of the substantive analysis raise interesting, new questions, which will be discussed.

Which perspectives?

In order to offer additional insight, the perspectives should first of all have relevance to gaps in the explanation offered from the substantive perspective or have the potential to give further insight into the results of the substantive perspective.

Second, sufficient information, specific to the North Sea Region, from this perspectives needs to be available in literature, databases etc. The available time and means for this study constrained the gathering of new information.

How to relate perspectives to each other

The perspectives will be related the substantive perspective on two levels: The level of the relationship and the specific information

The relationship itself

First of all on the relation itself will be discussed: which aspects of one perspective relates to which aspects of the other perspective?

For instance: the larger and deeper the flood-prone area (geography), the more disastrous the risk is perceived to be and thus the higher the risk reduction goals will be.

The discussion at this level will be done by reviewing information in literature, as well as the suggestions made by policy makers in interview and policy documents on the relation.

For instance policy makers may have stressed the importance of geography in interviews or a sociological essay on the relation between geography and risk perception might exist.

The content of the related elements of both perspectives

Secondly, the results of research from the specific perspective will be compared to the results of the analysis in this study from the substantive perspectives.

For example: According to topographic maps, the Dutch flood-prone area is larger and deeper than the Danish areas and the in this study noted perceived risk of the Dutch policy maker is also higher.

Because of the dependence of existing information, not always for all policy makers information will be available.

4. Methodology for describing the cases

In this chapter the method for describing the perceptions and goals of policy makers will be discussed. First, the cases will be defined (paragraph 4.1). Then the elements that should be described for each case are identified (paragraph 4.2) and in the remaining paragraphs of the chapter each of these elements will be elaborated on.

4.1. Definition of the cases: who are the policy makers?

In paragraphs 1.3 and 1.4, the choice was made to consider organisations that constitute the highest level responsible for policy-making. Each of these organisations will thus form the basis of a separate case in the analysis¹⁹.

At what level of government is the policy maker?

In the definitions of paragraph 1.3, policy makers are defined as the organisations at the highest involved level of government.

The European Union has not been taken as policy maker, because – at the moment- the European Union is not directly involved in storm flood risk management, but only through related policy fields such as the environment, coastal zone management, flood disaster compensation etc.

In Denmark and the Netherlands the national level is involved in coastal flood management, and thus the highest level policy maker is located at this level.

¹⁹ The cases are separate, but not independent: they are not only subject to some common regulation (for instance from the EU), but also observe and adopt instruments from each other.

In Belgium, the UK and Germany there is no governmental organisation that holds responsibilities with regard to coastal flooding²⁰. In Flanders coastal flood risk management is a matter of the state level (community/"gewest").²¹

In the UK the national level is formally involved, however, Scotland has autonomy over this issue, which means that there is no overarching level responsible for the entire North Sea coast. One 'national' organisation is responsible for the English North Sea coast and one Scottish organisation for the Scottish coast.

For Germany the situation is somewhat more complicated: Coastal protection is considered to be a "joint task", for which both the federal and the state level have responsibilities. In practice the federal level is only involved in the financing. Therefore the states ("Länder") are taken as policy maker.

Table 1 lists the identified levels²².

Terminology of this document →	National	State	County	Local
Scotland	(devolved)	'Scottish'	District council	
England (& Wales)		National	County	District
Belgium	National	Region / Community	Province	Municipality
Netherlands*		National	Province	Municipality
Lower Saxony*	National	State (Land)	Bezirke	'Kreise'/'Gemeinde'
Bremen*	Federal	City-State		(Gemeinde)
Hamburg	Federal	City-State		
Schleswig-Holstein*	Federal	State (Land)		'Kreise'/'Gemeinde'
Danmark*		National	Region (Amt)	Municipality

*) Waterboards with responsibilities in coastal flood risk management.

Table 1 Terminology for levels of government, in bold the identified levels of highest-level policy makers

²⁰ Or at least do not specifically address coastal flooding in plans or other forms of policy.

²¹ Beneath the central level, in Belgium two separate institutional level exist: that of communities (gemeenschappen) and that of 'gewesten'. The area near the sea is both Flemish Community (Gemeenschap) and Flemish Gewest and in practice the two operate quite integrated. Therefore no distinction will be made.

²² Defacto, all the policy makers at state level are studied (state in the sense of the highest unit with autonomy). However this is not a direct methodological choice.

Which department is the policy maker?

The powers and duties to use the different flood risk instruments reside with different departments. For instance, the responsibility for disaster management is mostly with the home departments, whereas for defences it is with the public works departments.²³

Fortunately, in every state one department has the undisputed lead in coastal flood risk management²⁴ (see table 2). Only for Hamburg the administration of the whole city had to be chosen, as no single leading department exists. The Scottish government is not divided into ministries or departments.

Difference between the scale of the policy maker and the flood-prone areas

Often regions under the authority of one policy maker consist of many separate flood-prone areas. How policy makers deal with the differences within their region has been an explicit point of attention.

Region	Case policy-making organisation
Scotland	Scottish Executive, including its Environmental Protection Agency.
England (& Wales)	Department of the Environment Food and Rural Affairs (DEFRA) and the Environmental Agency.
Flanders	Department of the Environment and Infrastructure
the Netherlands	Department of Transport, Public Works and Water management, including its services (such as Rijkswaterstaat)
Lower Saxony	The ministry of the Environment and its executive agency NLWK.
Bremen	The office of the Senator for Works and the Environment
Hamburg	The Senate of Hamburg
Schleswig-Holstein	The interior ministry, including its coastal division and regional offices.
Denmark	The ministry of Transport and its Coastal Authority

Table 2 organisations selected as policy maker

²³ To take the whole state governmental level as one actor is might be contradictory to the assumption that actors follow one set of goals and one perception.

²⁴ Undisputed by all interviewees to be *defacto* leading. In the Netherlands for instance on interviewee argued that the spatial planning ministry should take the lead in all water management affairs instead of the transport and public works ministry.

4.2. Definition of elements within a case

In paragraph 3.2 the basic three elements for each policy maker have been already been discussed: their problem perceptions (goals and perceived situation) and their choice of instruments (the way they choose their instruments and actual chosen instruments).

For practical reasons however, this is not a very suitable. Goals are always related to a specific part of the perception and the expected effect of instruments is closely related to the choice of instruments. Therefore the following grouping will be used:

- 1 Policy maker: Responsibilities and position
- 2 The problem perception: Risk and related aspects (perception and goals)
- 3 Instruments: The method to choose instruments and the chosen instruments

These elements will be detailed in the next paragraphs.

4.3. Element: The policy maker

Responsibilities (Aims)

Goals can be considered to be hierarchical in nature. At the bottom of this hierarchy are operational objectives that can be translated into actions, at the top strategic aims of the organisation as a whole (see Quade [1996]). However not always is there a clear top-down reasoning from strategic aims to actions. Many policy makers for instance take their legal duties (which can be very operational) as highest aim.

Therefore the concept responsibility has often been used in this analysis: for which reasons does the policy maker feel he has to be involved in coastal flood risk management? And in which way?

Position

The relations a policy maker has with other organisations will also be described.

This is part of the perception of the situation of a policy maker. They give an impression of the possible actions through third parties. Only the most important relations will be described. The general public will be discussed as a single actor.

A change of high-level policy maker

Taking the viewpoint of the policy maker becomes difficult if suddenly one needs to take somebody else's viewpoint.

Only the now involved policy maker will be described in detail, the situation before the involvement of the current policy maker will be described briefly.

4.4. Element: The problem perception**Perceptions and goals with regard to coastal flood risk**

In paragraph 3.1 risk was defined as: The undesirable effects that storm floods may have, when they occur, on individuals, the society as a whole and/or the environment. However these negative consequences of floods vary from minor damage ('a wet carpet') to catastrophic events (thousands of deaths, billions of damage). A first attention point is thus if policy makers focus on a certain type of event.

An indicator for the focus on certain types of event or types of damage is the way the risk goals are expressed, for instance in annual national damages or in probability of inundation.

Damage types

Furthermore there are different categories of undesired effects. Different classifications are possible. In this study the classification of Handmer has been used with regard to material and immaterial losses²⁵: “A material loss, is a loss that is of monetary value²⁶. Death and loss of memorabilia are examples of immaterial losses” [Handmer cited in Rosenthal et al 1999].

Goals and perceptions with regard to related aspects

“If we could only look at flood-risk, we would all live on top of the hill.

However we cannot only look at flood-risk”

comment of interviewee

The problem perceptions have more aspects than just flood risk, because other aspects (such ecology) are effected by flood risk instruments and flood risk instruments compete for resources with other policy fields.

Which specific aspects are affected (or are perceived to be affected) can vary for each policy maker. They have been described accordance the policy makers mentioning of them in interviews, policy documents and earlier studies. With regard to ecology and budget, interviewees have been specifically asked if there is a relevance to coastal flood risk.:

The priority of goals related to the different aspects (for instance if ecology is more or less important than risk reduction), is a particular point of attention.

²⁵ Another dimension in Handmers classification is direct and indirect damage, this dimension is not used in this study.

²⁶ In cost-benefit analyses, sometimes immaterial values are *monetarised*, for instance a number of Euro is assigned to the loss of a life to come to a comparison. This is not meant by material losses.

4.5. Element: Choice of instruments

First it will be described how the policy maker reason from goals and situation perception to instruments. This description follows the reasoning expressed in interviews and policy-documents.

For instance a policy maker may hold the view that he has a legal duty to maintain dykes, thus that this is his instrument, but he may also analyse a range of alternatives and choose the 'best' performing alternative.

The instruments range from building a dike, to the set-up of a grant program and from promoting insurance, to the establishment of zoning laws. To compare these very different instruments, now suitable framework could be found in literature. Therefore a new two-dimension classification will be defined, based on two well known classifications from respectively safety science and policy analysis.

The first dimension is the interventions in the physical system or society the policy makers aims at to reduce the risk (the what), the other dimension is how he steers society to make this change (the how)

The what: intervention points

The previous subparagraph classified instruments on the basis how they attempt to influence the behaviour of others. In this subparagraph a classification of instruments on the basis of changes in the physical or socio-economic system that are intended by policy makers will be made.

In safety science, risk reducing measures are sometimes related to by the so-called 'risk bow' [<<<]. The risk bow is the consequence of events that turn a hazard into consequences. At each step in this sequence intervention might be possible.

This model has been applied to coastal flood risk, starting at the hazard of high water levels and waves and ending at effects such as loss of life, health and material possessions of citizens. To reduce these effects of high water levels, many interventions are possible.

The details of the application of this model can be found in appendix X. The resulting groups of intervention options are the following:

Preventive interventions that reduce the probability or extent of flooding

These group interventions try to stop the water with physical structures, such primary and secondary defences (dyke lines), but also preparation for emergency repairs and strengthening of these lines

Preventive interventions to reduce the consequences

Another group of interventions aims at reduction of the consequences in case an area is flooded. This can be done by avoiding habitation of these areas (spatial avoidance), the flood proofing buildings and preparation for crisis management (such as forecasting, warning and evacuation planning).

Compensation (redistributing the damages)

If the damage has become irreversible, still the distribution of the material costs over society can be influenced. This can be done by compensation out of a disaster fund, but encouraging society to provide or take commercial flood insurance is also a way.

The how: Steering type classification

A traditional classification in administration science of instruments is into regulatory, economic (financial) and communication instruments²⁷ []. In this view the government can steer the behaviour of citizens and organizations in three ways:

- *By regulating the behaviour:* Establish a rule that certain behaviour is required or forbidden²⁸.
- *By providing material incentives:* Desired behaviour can be in some way be rewarded, for instance by subsidies. This is referred to as economic instruments.
- By convincing them of certain behaviour through *communication*.

Considering the (partly) technical nature of the problem a fourth is added:

- *By taking direct action:* for instance (contracting) the construction of a dike²⁹

This classification is usually applied within a view of a unified government that stands hierarchically above the society. In this study other governmental organisations are regarded to be actors that can be influenced. A drawback is that this classification provides less insight into more complex actions in networks of actors.

For instance if a government gives a subsidy to local governments for an awareness campaign, this will only be classified as an economic measure.

²⁷ Another axis in this model is stimulating/liberalizing - limiting / sanctioning. This will not be discussed here

²⁸ The regulation of behaviour of others and not of the state itself is meant with regulation

²⁹ Without such an addition it would be difficult to classify these type of measures. Classifying them as economic incentives to contractors is not possible, as the policy maker is acting as a private party and not as a public party.

Synthesis: Instrument classification table

The discussed classifications can be regarded to be two dimensions (or axes). For instance:

The avoidance of buildings in flood-prone areas (an intervention point) can be achieved by regulation (such as a zoning law forbidding high rise structures) or communication (such as risk maps on the internet).

By setting up table with both these axes, in one overview it can be seen what actions the government tries to reach in which ways. This is done in figure 9, this also depicts a classification of the instruments mentioned in the example above.

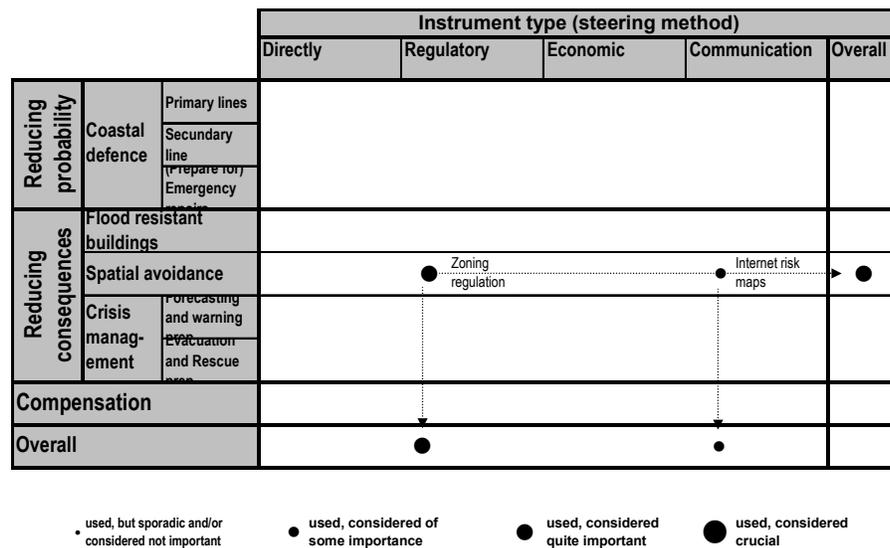


Figure 9 Instrument classification table with examples. The arrows indicate how aggregated classifications are constructed. From each column or row, the largest dot is indicative

Classification of the importance of an instrument

The figure above sets out the ‘cells’ in which instruments can be classified. For each cell it will be considered how relative important it in the total set of instruments it is³⁰ Four levels of the order of magnitude of importance are distinguished, ranking from not important to crucial.

Aggregated classifications of the importance of instruments

In the end conclusions will also be drawn on the two original dimensions of classifications (influencing type and intervention point). For this reason an aggregated classification has been made over the rows (aggregating to intervention points) and the columns (aggregating to the type of steering) of the instrument tables. As the levels of intensity express orders of magnitude, such an aggregation comes down to taking the maximum in a row or column³¹

For example if the policy makers finds the risk maps quite important and the zoning regulation of some importance in his sets of instruments., it will be concluded that he finds spatial avoidance as intervention quite important. For the steering type it will be concluded that he finds communications quite important and regulation of some importance

³⁰ It has also been considered to use a measure of intensity (such as spending) however these figures are extremely difficult to obtain. Moreover, financials are not necessarily a representation of the importance of measures to the policy makers

³¹ The aggregated tables have been put forward to the ComRisk partners within the ComRisk partners (be in a slightly different format of the ComRisk study), therefore there is some check if policy makers agree with the fill-in and aggregation.

5. Design of interviews

In this chapter, the design of the information gathering through interviews ‘original’ will be discussed. First *who* have been the interviewees will be discussed, than *what* the subjects have been and *how* the interview was conducted and processed.

Some of the interviews have been combined with ComRisk, which means that the approach of interviewees and discussed subjects has been a common undertaking. For Germany, Denmark and England the same list of interviewees has been used.

5.1. Selection of interviewees

The number of interviewees that could be selected was limited, as the potential interviewees were scattered over the North Sea Region. Priority was placed on interviewing the high-level policy makers.

In addition to this other involved organisations and experts have been interviewed to complement and verify the information from the policy maker interviews.

The high-level policy maker

The basic assumption was that organisation could be regarded to be entity. However, for a rough check on this assumption, it was chosen to interview two or more people³². Moreover not sufficient knowledge on all subjects was always with one person.

³² The policy makers of Bremen, Hamburg and Schleswig-Holstein were considered simple enough organised to speak to one person.

Other involved organisations

Lower level governments are considered to be external parties in the analysis. Their actions and motives are only indirectly relevant. For this reason they are less essential than the policy-making organisations themselves.

However, they are very valuable to gain more insight into the specific context of a region. Departments and lower governments were selected on the basis of being involved in coastal flood risk management.

Pressure groups have not been interviewed, because of the highly politic load that would be on such an interview and the very specific interest they represent. The only non-governmental organisations interviewed have been one insurance association and one local government association.

Experts

Mostly university staff has been approached as experts. They have been used to fill in specific information gaps, but moreover to discuss specific aspects of the methodology, such as the comparison of the different instruments.

Number of interviews in different states

The interviews were not processed with statistical tools, therefore there was no need to interview the same number of people in each policy makers region. The basic choice has been to interview more people where there are more levels of governments with more responsibilities and where the issues are more complex.

For instance in England multiple departments at 3 different levels of government are in some way involved in the management of the risk, whereas in Flanders only one organisation at one level of government is involved with coastal flooding.

Region	Policy maker	Others involved in policy	Experts	Total
Scotland	2	2	2	6
England	3	4	1	8
Belgium	2	1	2	5
Netherlands	2	7 (1 refusal)	8	17 (1 refusal)
Lower Saxony	2 (1 refusal)	2	-	4 (1 refusal)
Bremen	1	-	2	3
Hamburg	1	-	-	1
Schleswig-Holstein	1	-	1	2
Danmark	1	3	-	4
Total	15 (1 refusal)	19 (1 refusal)	16	50 (2 refusals)

Table 3 Number of selected interviewees for category and region

Table 3 gives an overview of the interviewees. Some concentration of interviews has occurred in the Netherlands. Some more interviews have taken place in this area, simply because there are less barriers to arrange meetings. Also the combination of the interviews with ComRisk contributed some to this concentration. Some reflection on this will take place in chapter 25.

5.2. Questions asked

As the subject itself is relatively complex and not clearly structured, the choice was made to use semi-structured interviews with a subject list and a protocol.

The subjects have been:

- Historic context
- Policy process & organisation
- Participation & relations to non-governmental organizations
- The policy challenges and opportunities in your region/country
- Policy objectives
- Flood risk management measures (discussing the instrument table)
- Evaluation and future

Some of the interviews have been combined with the KPMG ComRisk project. See appendix A.2 for the interview protocol itself with more elaborate list of used checkpoints.

5.3. Processing

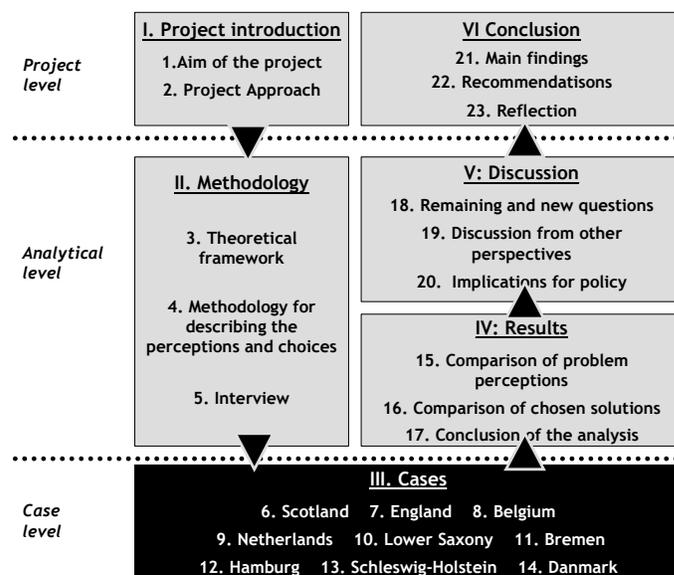
The initial impression was that the interviewees would perhaps be cautious during interviews. The interviews have therefore not been taped.

The interviews taken by one interviewer are have been noted down somewhat less detailed than the interviews by two persons. Most of the interview-reports have afterwards been verified. The reports are included in appendix A and B.

To process these reports, the use of a Qualitative Data Analysis software-tool (sometimes refered to as a 'coder') has been considered. However initial experiences learned that freely available tools (such as ANSWR) did not meet up the requirements and had stability problems in running. Neither the TU Delft nor the host firm has a license to a professional QDA software.

Part III The cases: the problems and choices of the policy makers

This part contains the descriptions at case level: What are problems of the policy makers and which instruments do they choose and why?



6. Scotland

6.1. The Policy maker in Scotland

The Scottish Executive is the high-level policy maker with regard to coastal flood risk in Scotland. Before 1999, Scotland was less autonomous, but seem not to have had a major influence on coastal management [Cox 2001]. The Executive is not divided into ministries.

The implementation of policy is carried out by the Scottish Environmental Protection Agency (SEPA), which was founded in 1995. In this analysis SEPA will be considered to be part of the policy maker.

Responsibilities

The executive considers a modest role for itself in coastal flood risk management. The owners of the land are regarded to be primary responsible for the risk. The law gives only the right to government to act, not the duty (discretionary powers). Agriculture is exempted on beforehand from protection. The powers to undertake action mostly reside with the local authorities.

Only with respect to planning the Executive does play a larger role, as they have a statutory role in planning affairs. Furthermore there are some duties to provide information to local authorities on flood risk (as far as available).

The network of the policy maker in Scotland

Figure 10 depicts the formal relations within and outside the policy maker. There are two formal relations to the local authorities that are relevant to coastal flood risk management: on one hand there is a role in spatial planning, on the other hand SEPA has a role as environmental regulator.

Prior to the approval by a local planning authority (mostly the district) of a development plan, SEPA *must* be consulted upon (as so-called statutory consultee) for both flood risk and environmental regulation. SEPA also regulates the environmental effects of defence works constructed by local authorities. Often this involves an Environmental Impact Assessment.

In principle SEPA does not command, but advises in matter of flood risk. However an ignorance of their advice would lead to intervention by the minister. This is why an objection on the grounds of flood-risk by SEPA is regarded to be decisive.

From regional to local councils

Local councils only exist since 1997. Before that Scotland was divided into regional councils. According to one of interviewees the local councils give more priority to the issue, as flooding affect a relatively large parts of their territory (and constituency).

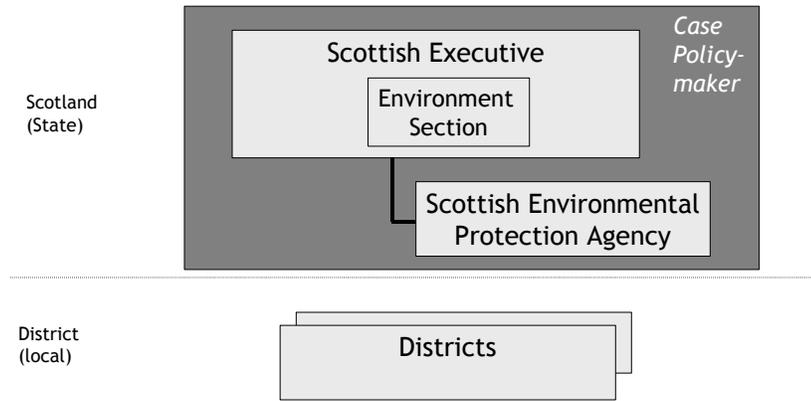


Figure 10 Involved governmental organisations in Scotland

Informal relations

The most remarkable informal relation is with the insurers through their interest organisation (the Association of British Insurers, ABI). The Executive not only considers them important to achieve their goals, but also a legitimate stakeholder, as in Scotland much of the bill for material damages finally ends up with the insurers.

Public attitude

In Scotland coastal flooding is by most of public not conceived to be much of a A recent study showed only about half the people that were in the definition of the policy maker at risk from flooding, also felt so themselves [CRU 2002].

6.2. Problem perception of the Scottish Policy maker

The perception of the flood risk

The last decennia coastal flooding has not been considered to be much of a problem. Flooding near the coast originates mostly from excessive rainwater that is for instance trapped behind sea walls. The main concern in flooding has been with fluvial flooding, of which many occurred in the last five years.

In 2002 however, a study showed that more properties were at risk of flooding from the sea as risk of flooding from the river (90 000 versus 77 000) [Sc. Exec. 2002a]. In general coastal areas below 5 m MSL are considered to be flood-prone.³³

This is in stark contrast with the lack of incidents. A few explanations are considered (such as the role of railway embankments), but until more information is available, the extent of the risk is unknown.

Climate change is regarded to be an uncertain, but potential serious threat. Therefore precautionary approach is taken. Concerns are with developments that may in the future turn out to be unsustainable because of increased flood risk.

The risk is considered to be material. Immaterial damage may be stress and ill-health, but floods are not considered to life-threatening. The risk is expressed in number of exposed properties and for concrete projects in annual damage.

³³ This is related to an approximate 200-year return level.



Two images of the Scottish coastline. Top: A strip of rough, undeveloped highland coast.

Above: Coastal town near Fife

Perceptions and goals besides risk

“Look.... they [projects] have to get three tags: [counts on his hands]: economy, ecology, technology”

interviewee at the policy maker

Economics / budget

The starting point is to only take actions that are beneficial to society (meaning costs do not exceed societal benefits) as a whole, but small societal ‘losses’ are tolerated. The economic effects of actions are calculated in advanced way that is equal to that of the English policy maker. Given this starting point, the available means at the state level are sufficient to fund the local level.

Ecology

The environment is considered to be very important. A number nature area with national and international protection statuses is present.

In principle the ecological load has to be ‘acceptable’. Sometimes there are exceptions possible, in which case a “balance of interests” is struck.

Necessity of land

At the level of the policy maker, the interest of new developments is considered to be subordinate to the flooding aspect. However sometimes alternative grounds may not be available. Moreover existing buildings are considered a given fact.

Technical feasibility

An explicit criterion is the technical feasibility of proposals in order to be funded.

6.3. Chosen solution of the Scottish policy maker

The Scottish Executive focuses on avoiding new buildings in flood-prone areas by regulation. Two reasons can be given for this: firstly it is in line with the precautionary approach to stop future possibly unsustainable development. Secondly as indicated in paragraph 6.1 this is in line with the stronger responsibilities if it comes to spatial planning.:

The Executive works from a framework of four “A’s”:

- Awareness: Awareness is raised in order to prevent people from living in flood-prone areas or at least better prepare themselves.
- Avoidance, through spatial planning instruments.
- Alleviation: Under this interventions such as dikes are ordered.
- Assistance (after floods): Assistance is quite limited. Contingency planning is up to the local authority.

6.4. Instrument table

In figure 11 the instrument table is depicted. The instruments in this table will be discussed, ordered by their point of intervention.

Spatial avoidance is considered the most important instrument. First of all, this is achieved by regulation³⁴. New developments in areas that are situated below + 5 meter relative to the mean sea level are in general considered inappropriate.

Besides regulating developments, SEPA also provides information to local authorities, in addition through the ‘Floodline’ campaign the awareness of the general public is raised.

³⁴ As ignorance of the advice of SEPA can be countered with a binding, overruling decision, it is classified as regulation

Protection works are considered alleviation for developments in flood-prone areas that occurred in the past and are now given facts. They are limited to urban areas and only to be undertaken if economically justifiable. The policy maker encourages districts to provide these defences, by subsidising up to 70% of the investment costs.

Building protection is another option for existing buildings. The Executive aims for an accreditation of flood-protective measure for insurance. An incentive to undertake flood protection by means of lower premiums is pursued with this.

As the risk is considered to be material, evacuation plans are limited and left largely to the police. The Floodline campaign does pay attention to preparation, but is mainly a mean to avoid material damage.

The Executive actively tries to promote insurance among renters³⁵. On the other hand, the Executive has also a strict policy not to compensate damage to citizens, only for local governments some soft credits arrangement exist.

Currently flood damages are insurable for almost all households, this is because ABI has since the 1960's a policy to cover all households, if reasonable possible, against flooding. This means that the insurance is not purely commercial. Indirectly a collective element is present.

Recently non-associated insurers have undercut premiums of associated insurers. This has put this policy under pressure. The Scottish (as well as the English policy maker) put much effort to convince the ABI to keep their cover policy, for instance by increasing their spending.

³⁵ house-owners in general must be covered for flood risk in order to obtain a mortgage

			Instrument type (steering method)				Overall	
			Directly	Regulatory	Economic	Communication		
Reducing probability	Coastal defence	Primary lines		(indirect effect) rail talud regulations (no own action) ●	Subsidize flood walls (grant to local authorities) ●		●	
		Secondary line						
		(Prepare for) Emergency repairs						
Reducing consequences	Flood resistant buildings				Signalling effect through accreditations ●	Promote house protection, certification of contractors ●	●	
	Spatial avoidance			Advice and if necessary block developments ●		Risk information (to local auth by SEPA) ●	●	
	Crisis management	Forecasting and warning prep.	●	Research centers. Measurement network	●		Flood Warning system (to LA and emergency serv.), disseminate Public flood warnings and advice how to handle (to citizens) ●	●
		Evacuation and Rescue prep.	●	Coordination and practice with police.				●
Compensation			Guidelines of reserves (to local authorities) ●	Provide soft credit to local authorities ●		Negotiate with insurers, promote insurance among renters, ●	●	
Overall			●	●	●	●		

● used, but sporadic and/or considered not important
 ● used, considered of some importance
 ● used, considered quite important
 ● used, considered crucial

Figure 11 Instrument table for Scotland

6.5. Recap for the case of Scotland

In Scotland the policy maker sees a limited role for himself. The primary responsible party is the land-owner and if public action is required, it is up to the discretion of the local government to undertake these actions.

The Scottish policy maker considers the risk unclear due to contradicting information on the present risk and uncertainties in climate change. However within these uncertainties, it is judged to be a relative small, material risk.

The Scottish policy maker takes a precautionary approach, his first concern is to prevent further possible unsustainable development. This is done by blocking most developments in low-lying coastal areas by regulation of the concerned planning authorities.

In addition to this instruments are used to reduce the risk where buildings are already present by providing seawalls, operating forecast and warning schemes and encouraging building protection and flood awareness.

6.6. Points of attention for reflection in Scottish interviews

The staff members work on both coastal flooding and river flooding policies.. At both local and state level it has been mentioned coastal flooding “got tagged along with river flooding”

SEPA does implement the policy of the Executive, but is in other respects is more independent from the Executive.

6.7. Sources used for the Scottish case

Written sources

- BBC News 18-11-02, " 'petty' politics blocking flood plans", news.bbc.co.uk/1/hi/scotland/2486571.stm
- D. Crichton, 2003, Flood risk & insurance in England & Wales: Are there lessons to be learned from Scotland?, London: Benfield Greig Hazard Research Centre
- Fife Council, 1999, Fife Shoreline Management Plan, Fife:Fife Council
- Kieran R. Hickey, The Storm of 31 January to 1 February 1952 and its Impact On Scotland in *Scottish Geographical Journal*, 117
- Martyn Cox (Scottish Coastal Forum), Devolution in Scotland: the effect on coastal policy, conference paper presented at Coastal Management for Sustainability - Review and Future Trends, London.
- Derek J. McGlashan, 2002, Coastal Management and Economic Development in Developed Nations: The Forth Estuary, in *Coastal Management*, 30
- Derek J. McGlashan, 2003, Funding in integrated coastal zone management partnerships, in *Marine Pollution Bulletin* 46
- NORCOAST - Review of national and regional planning processes and instruments in the North Sea Region - Full Study, 1999
- Scottish Coastal Forum, 2001, Coastal Plans Inventory.
- Scottish Executive, NPPG7 - Planning and Flooding
- Scottish Executive, Central Research Unit, 1999, Climate Change: Scottish Implications Scoping Study
- Scottish Executive, CRU, 2001, Climate Change: Review of levels of protection - Main research findings
- Scottish Environmental Protection Agency, 1998, Flood Risk Assessment Strategy, Stirling: SEPA Head Office / Director of Environmental Strategy
- Scottish Environment Protection Agency, 1998, Policy No 22: Flood Risk Assessment Strategy
- Scottish Environment Protection Agency, 2000, Policy No 41: Development at Risk of Flooding: Advice and Consultation - A SEPA - Planning Authority Protocol
- Scottish Environment Protection Agency, 2000, Policy No 34: Flood warning strategy
- Scottish Environmental Protection Agency "Floodline" (leaflet)
- Water Environment and Water Services Scotland Act 2003 (WEWS 2003)

Interviews with persons at:

- The Scottish Executive
- SEPA
- Fife district council
- Dundee University

7. England

7.1. The policy maker in England

In England the high-level policy maker is the Department of the Environment, Food and Rural Affairs (DEFRA)³⁶. This department has emerged out of a number of reorganisations of departments in recent years. Implementation is being carried out by the Environment Agency according to service delivery agreements with DEFRA.

Responsibilities

The English policy maker has assumed only limited responsibilities in flood risk management. Flooding is - formally and informally - largely a responsibility of the owner of the land:

The role of the government in flood risk is the same as with the risk of burglary: the house-owner should first of all properly protect his house and if his belongings are stolen he cannot hold the police responsible for the damage.

Interviewee at related department (paraphrased)

The policy maker only has the duty to provide information (if available) to local planning authorities on their request, but for the remainder the law only contains powers (rights to act).

The policy maker (especially the Environment Agency) does have extensive legal duties in being the ‘guardian’ of the environment. This includes regulation of the environmental impact of coastal defence works.

³⁶ This department is responsible for coastal flood risk management in England and Wales. As Wales does not border the North Sea, it will be referred to as the English policy maker

Network of the policy maker

In England two layers of management can be distinguished: a formal layer of statutory responsibilities and an added layer of coordination on a voluntary basis.

Legally, stretches of coast are either 'operated' by the Environment Agency or by local authorities. These local authorities are mostly district councils.

In general, the Environmental Agency manages the more flood prone stretches and the local authorities manage the more erosion-prone stretches, but this is not by definition.

The formal division of responsibilities results in a quite scattered coastal management. However, on top of this statutory layer, non-statutory coastal groups have been formed in order to practice integrated coastal management. These groups draw up shoreline management plans for this purpose.

The funding-structure of coastal defence is complex, but basically, the flood defence committees of the EA and local authorities decide how much will be spend on which projects. However, often it is crucial if DEFRA subsidises the projects. Currently the funding structure is under review, a likely outcome of this review is that committees receive a fixed budget which they may spend as they see fit.

Spatial planning processes also take flood risk into consideration. Currently, the most important planning level is the district, where zoning maps and upon specific developments is decided. There are specific local committees which advice the planning authority how to deal with the flood risk, these are the flood options appraisal groups.

At the national level the Office of the Deputy Prime Minister produces planning guidance, specifically on how planning authorities should deal with flood risk. These guidelines are

considered important, but they are not formally binding. Currently the spatial planning decision making is under review, likely leading to the increase of the importance of the regional level. For both flood risk management and spatial planning thus the role of the region may increase in the future.

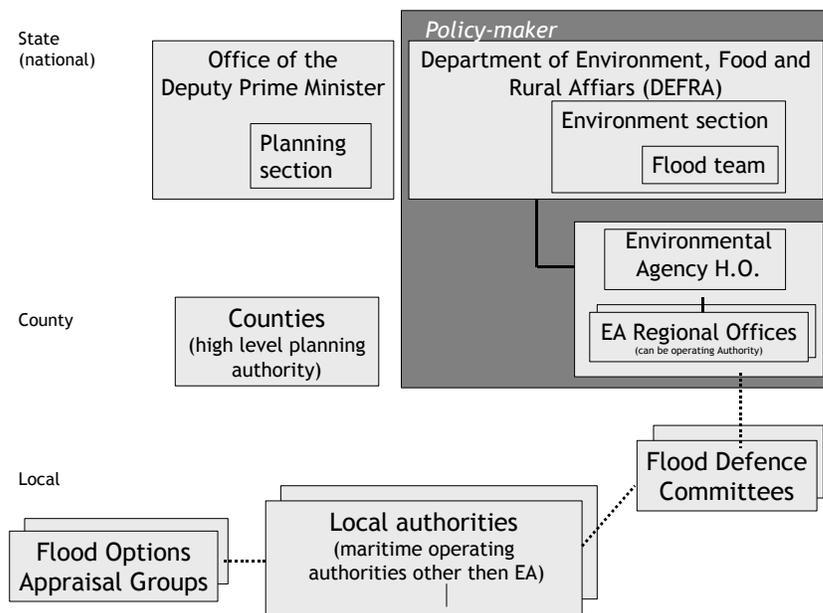


Figure 12 Involved government in England

The relation with the insurers is important. In recent years conflicts have occurred between the insurers and government about amount of spending on protection. The Association of British Insurers has set an ultimatum to increase the spending to the government. The government has chosen to agree to the demands of the insurers and to increase the budget for flood defence.

Public attitude

In the Northeast of England awareness of coastal flooding risk is high, for the remainder it is much less or focused on fluvial / rain flooding.

In contrast to the continental countries, the public is more often dissatisfied with the decision not to build or strengthen defences, than with the disturbance of ecology and people in the implementation of works. Another difference is that any Demand for defences by flood-prone communities is not necessarily shared by the rest of society.

Necessity of land

In England land scarcity is an issue. Especially for locating housing in region around London , land is scarce. Not only because much land has been developed already, but also because large areas are have protected statuses because of the present nature .

7.2. The problem perception of the English policy maker

The perception of the flood risk

The interviewees in England stress the long, diverse coastline of England and the diversity of landscapes behind it. At some places cliffs raise out of the sea, at other places deep polders are present.

Mostly coastal flooding threatens coastal towns and cities, however for instance London's inner city can also be flooded from storm surges.

In England an explicit ambition is to “taken into account all floods” [IV-?]. This varies from many small floods causing limited damage to rare catastrophic floods such as that of 1953.

However implicitly a focus is present. This focus is on the material damage which are expressed as annual averages. More specifically the main concern is with damage to buildings. Also in general 1:1000 or 1:2000 events are the most rare events considered (compare this to the 1:10 000 defence standards in the Netherlands).

Intangibles such as stress and death are only started to be incorporated systematically in the policy. For instance, recently the cost:benefit analysis includes the costs of ill-health due to stress. At the moment a goal of no deaths due to floods has been formulated.

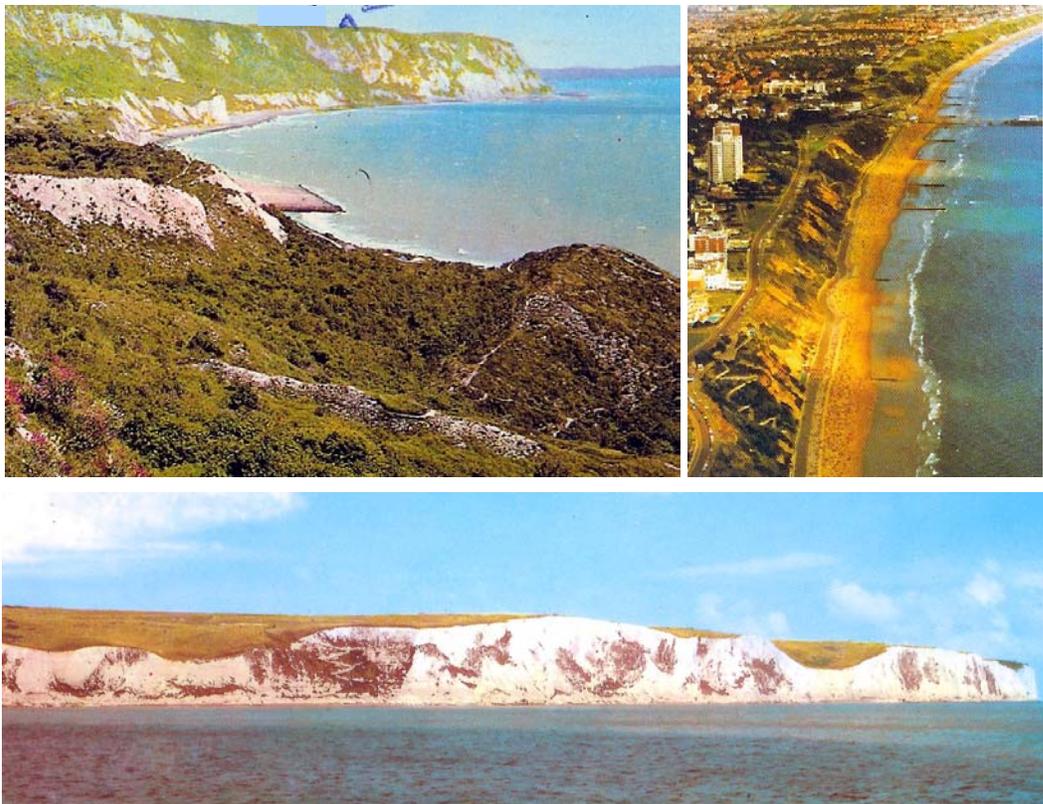
In contrast to all other policy makers, the English policy maker pays attention to the protection of ecosystems from floods (salt water might for instance damage fresh water ecosystems).

Non-flood risk aspects

Economics / budget

England has a similar attitude to public spending on defences as Scotland: the societal benefits must exceed the costs. The means are relatively more limited in England: not all projects that meet this initial criterion can be carried out. This lead to a “value for money” approach: the available money is spend in such a way that the largest societal benefit is created.

The cost:benefit calculation, estimates the effect at the national (state) scale. For instance, if a firm goes bankrupt due to flooding, but other firms quickly take over the production and employment, the estimated net negative effect on the economy will be small. This in contrast to the continental policy makers, who consider economic positive benefits of risk instruments are – in general – equal to the avoided (direct or indirect) damage.



The diverse coast of England. Above: Dover chalk coast, top left: desolated strip in Anglia, top right: populated area near Scarborough

Ecology

Many protected areas near and at the shore are present in England. These have various protected statuses, both national and international. Most policy makers consider flood risk instruments as a threat to ecology. As said, in England the protection of eco-systems from being flooded as a result of coastal defence are taken explicitly taken into consideration.

Technical feasibility

Like in Scotland, the English policy maker pays specific attention to the technical feasibility of undertaking. It has done so by making it an explicit criterion to be eligible for grant.

7.3. Choice of solution

“We want to be prepared for all floods, dikes will never be able to stop all floods”

English Interviewee

The English policy maker takes a wide approach to flood risk in several aspects. First of all there is the already mentioned ambition to take into account all possible floods.

Secondly the English policy maker has considerations over the long-term sustainability of instruments. To give an example: dikes are regarded potentially unsustainable, as it is not certain that in the distant future means are available to maintain them.

Thirdly the policy maker considers, and has chosen, a wide range of instruments. Although the policy maker has (through the EA) the responsibility of coastal management it does not take this as a starting point.

The chosen strategy has three pillars: firstly good warning systems, secondly coastal defences (where economically, ecologically and technically sound) and lastly the avoidance of inappropriate developments. This latter is beyond the direct control of DEFRA and is carried out by the Office of the Deputy prime minister.

Formally, both warning systems and coastal defence have to meet cost:benefit criteria. However it is generally believed warning systems will in almost all cases make this criteria. Effectively for almost all flood-prone areas a warning system can be provided as a basis. Only in the more urban areas these are supplemented with coastal defence.

7.4. Instrument-table

Figure 13 depicts the instrument table for the English policy maker. Some specifics for these instruments can be noted.

Coastal defences

Not only the shoreline and the specific hydrology varies greatly, but (as a result of economic optimisation) also the return period standards vary greatly (from a few years for rural areas to 200 years)³⁷. This means that at some places coastal defences involve not more than a small wall of a few feet, but at some places includes high dikes, dams and barriers have been build.

The operating authority takes care of the coastal defence. This can be the EA or local government. The complex system of funding and granting does arrange that – by large – in both cases the central *and* local tax-payers pay.

³⁷ London is protected against a 1:1 000 years storm. This is even laid down statutory. However it should be noted this a law of the city of London, putting a duty on the citizens (!) living near the river to do so.

Moreover in the grant system of the central government, all proposals (no matter if they come from the EA or the local government) are treated equal with a priority scoring system to select the “best value for money”.

Building protection

England is one of the few policy makers that consider building protection as an effective instrument to reduce coastal flood risk. This is encouraged by promotion campaigns. Including ‘flood fairs’, technical advice and awareness posters (“Do you know where your ventilation holes are? Floods certainly do!”) [EA Floodline 2003]

Spatial avoidance

Spatial avoidance is one of the three pillars of the English strategy. However the policy maker cannot regulate spatial developments directly. It has sought the corporation with the Office of the Deputy Prime Minister, which has given extensive (non-binding) guidance to planning authorities how to deal with floods.

Most interesting, a gradual approach is used. Areas are not simply safe or unsafe, but classified by their probability of flooding. This classification also applies to areas behind existing defences. For instance in medium-risk areas, parking lots and parks are allowed and in low-risk areas only buildings such as hospitals are not allowed.

For concrete developments, planning authorities are expected (but not obliged) to ask advice of the EA. only 80% of the negative advice given is followed [EA 2003]. The policy maker is now reconsidering this policy.

Crisis management

The warning of the public is considered important part of the flood strategy. However this is first of all aimed to better preparation to avoid material damage. This is done in two ways. Besides the mentioned awareness campaign an extensive forecast and warning system exist. This includes warning trough signs on television and impressive automatic dial-up systems.

Redistribution

The English government has, like the Scottish, a strict policy not to compensate damage. However they do actively try to keep flooding commercially insurable. As discussed in 7.3, negotiations with the Association of British Insurers have taken place to this end, and resulted in increased spending of the English government.

			Instrument type (steering method)				
			Directly	Regulatory	Economic	Communication	Overall
Reducing probability	Coastal defence	Primary lines		(indirect effect) rail talud regulations (no own action) ●	Subsidize flood walls (grant to local authorities) ●		●
		Secondary line					
		(Prepare for) Emergency repairs					
Reducing consequences	Flood resistant buildings				Signalling effect through accreditations ●	Promote house protection (to citzns), certification of contractors (to. insurers) ●	●
	Spatial avoidance			Advice and if necessary block developments ●		Risk information (to local auth by SEPA) ●	●
	Crisis management	Forecasting and warning prep.	●	Research centers. Measurement network	●	Flood Warning system (to LA and emergency serv.), disseminate warning Public flood warnings and advice how to handle (to citizens) ●	●
		Evacuation and Rescue prep.	●	Coordination and practice with police.			●
Compensation				Guidelines of reserves (to local authorities) ●	Provide soft credit to local authorities ●	Negotiate with insurers, promote insurance among renters, establish group insurance ●	●
Overall			●	●	●	●	

● used, but sporadic and/or considered not important ● used, considered of some importance ● used, considered quite important ● used, considered crucial

Figure 13 Instrument table for England



**1.15am. Kitchen full of water.
A great time to realise you
don't know where to turn the
power off.**

**There are ways to make your life easier in a
flood emergency, before it happens.**

**Know where the mains switch is. Have a torch
to hand. Keep your important documents in
a safe place. (How good are you at finding things
underwater?)**

**Act now. Be prepared for flooding.
For more information and a free
guide to protecting your home, call the
Environment Agency's 24 hour Floodline.**

www.environment-agency.gov.uk/floodline

Floodline
0845 988 1188
ENVIRONMENT AGENCY

A poster used in a campaign to raise awareness amongst citizens and activate them to prepare themselves

Taken from: www.environment-agency.gov.uk

The screenshot shows the Environment Agency's web interface for the Indicative Floodplains map. At the top left is the Environment Agency logo. To its right are two images: a landscape with large stone structures and a waterfall. Below the logo is a navigation menu with links for HOME, NEWS, ABOUT US, CONTACT US, and HELP. A dropdown menu labeled 'Choose a section' is next to it. On the far right of the menu are 'SEARCH SITE' and 'CYMRAEG'.

The main content area is divided into several sections:

- Show layer:** A dropdown menu with options: Bathing Waters, Discharges to Sea, Groundwater, and Floodplains (selected). A 'Go' button is to the right.
- Query layer:** A dropdown menu with a 'On' checkbox.
- Search by:** Input fields for Postcode, Placename, Grid Reference (with 'E' and 'N' sub-fields), and a 'Go' button.
- Key:** A legend titled 'Indicative Floodplains' with two entries: 'Sea' (represented by a blue square) and 'River' (represented by a light blue square).
- Map:** A large map showing a street-level view of London, with a green overlay indicating floodplains. An inset map of the United Kingdom shows the location of the main map area.
- Footer:** A link to 'Problems with this page? Please contact the webmaster' and a row of five small icons: four green trees and one grid icon.

Another public communication: An indicative floodplain map on the Internet, which can scale down to street level. Here the streets around the London Tower are shown

Taken from: www.environment-agency.gov.uk

7.5. Recap for England

The English policy maker has assumed only limited responsibilities, the citizens are held primary responsible for their protection and damage. The English policy maker sees himself confronted with a wide range of risks, from frequent minor material damage to disasters. In his approach, a focus can be noticed for material damages to buildings.

The English policy maker considers public spending only appropriate if economically justifiable. However as budget does not even allow this level of spending, a “best value for money” approach is taken.

The English policy maker has the ambition to find a set of instruments that is able to address the whole range of risks in a sustainable way on is has resulted in the most wide rang of intervention points used of all the policy makers.

The policy maker himself manages defences along long stretches of coast and the policy maker operates warning services. To this direct action, voluntary instruments of grants, advice, public campaigns are added.

7.6. Points of attention for reflection

The only potential minor disturbance in England is the sensitivity the issue of flooding. Since the mid 90's several major river floods have occurred and this has lead to much discussion and media attention. Some interviewees did not wish to comment on some of the questions asked.

Also the ‘quango’ status of the Environment Agency is somewhat complicating: though they implement the ministries policy, in some respects it is a separate entity of the ministry.

7.7. Sources used for the English case

Written sources:

- DEFRA / Environment Agency, Risk, Performance and Uncertainty in Flood and Coastal Defence, A Review, R&D Technical Report FD2302/TR1
- DEFRA, 2001, Flood and Coastal Defence, The Autumn 2000 floods, www.defra.gov.uk/environ/fcd/floodingsincidents/foodinf.htm
- DEFRA, 2001, Flood and Coastal Defence - High-level targets, www.defra.gov.uk/environ/fcd/hltarget/hltarget.htm
- DEFRA, 2001, Shoreline Management Plans, A guide for coastal defence authorities, London
- DEFRA, 2002, The flood and coastal defence funding review - Outcome of consultation
- DEFRA, 2002, Flood Management - Aims and objectives, www.defra.gov.uk/environ/fcd/policy/aim.htm
- DEFRA, 2003, Strategy for Flood Management and Coastal Protection, www.defra.gov.uk/environ/fcd/policy/strategy.htm as on 6-10-03
- DEFRA, Flood Management - Aims and Objectives, www.defra.gov.uk/environ/fcd/policy/aim.htm as of 5-9-03
- DEFRA, Flood Management - Insurance, www.defra.gov.uk/environ/fcd/policy/insurance.htm as of 5-9-03
- DEFRA, 2003, Flood Management - Funding, www.defra.gov.uk/environ/fcd/policy/funding.htm
- DEFRA, Elaboration of the Environment Agency's Flood Defence Supervisory Duty, www.defra.gov.uk/environ/fcd/hltarget/envagenc.htm
- DEFRA, Grant Aid for Flood and Coastal Defence Capital Projects,
- DEFRA, 2003, Risk Assessment for Flood & Coastal Defence for Strategic Planning - High-level Methodology, R&D technical report W5B-030/TR1
- DEFRA, 2002, UK Climate Impacts Programme 2002 - Climate change Scenarios: Implementation for Flood and Coastal Defence: Guidance for users, R&D technical report WB5-29/TR
- Environment Agency, "East Coast Floods 1953", www.environment-agency.gov.uk as of 5-2003
- Environment Agency, 2002, High-level target 1 - Policy Statements
- Environment Agency, 2002, High-level target 12 - Development and Flood Risk
- Environment Agency, 2002, High-level target 3- Emergency Exercises and Emergency Plans
- Environment Agency, Strategy for Flood Risk Management 2003-2007
- Environment Agency, Themes: Reducing Flood Risk, www.environment-agency.gov.uk/themes/reducingfloodrisk as on 6-10-03
- Environment Agency, 2003, Delivery Plan for Flood Defence Service Delivery Agreements 26 and 27

- Environment Agency, 2003, Delivery Plan for Implementing the Conclusions of the flood and coastal defence funding review
- Department of the Environment, Welsh Office, 1992 Planning and Policy Guidance 20: Coastal Planning
- Foresight, 2003, Foresight Flood and Coastal Defence Project - DRAFT report
- Halcrow Group Ltd, HR Wallingford and John Chatterton Associates (for DEFRA), National Appraisal of Assets at Risk from flooding and Coastal Erosion, including the potential impact of climate change
- Jim W. Hall, Ian C. Meadowcroft, Paul B. Sayers and Mervyn E. Bramley, 2003, Integrated Flood Risk Management in England and Wales
- John Handmer, 2001, Improving Flood Warnings in Europe: a research and policy agenda, in Environmental Hazards, 3, pp 19-28
- Local Government Association, On the edge: the coastal strategy
- Local Government Association and DEFRA, 2003, Delivering the flood and coastal defence capital programme (letter to local authorities)
- Timothy L. McDaniels, Robin S. Gregory, and Daryl Fields, 1999, Democratizing Risk Management: Successful Public Involvement in Local Water Management Decisions in Risk Analysis 19-3
- NORCOAST - Review of national and regional planning processes and instruments in the North Sea Region - Full Study, 1999
- NorVision, 1999, A spatial perspective for the North Sea Region
- Office of the Deputy Prime Minister, Planning Policy Guidance 25: Development and Flood Risk
- P.B. Sayers, J.W. Hall and I.C. Meadowcroft, Towards Risk-based flood hazard management in the UK, in proceeding of ICE - Civil Engineering, 150 (pp 36-42)
- Wash Estuary Local Authority Members Group, 1996, Was Estuary - Management Plan

Interviews with persons at:

- DERFA
- Environment Agency
- Flood Hazard Research Centre (Middlesex University)
- Local Government Association
- North Norfolk district council
- Office of the Deputy Prime Minister
- Scarborough city council

8. Flanders

8.1. The Policy maker in Flanders

Flanders is the only region where only one governmental organisation has responsibilities in coastal flood risk management. This organisation is the department of the Environment Infrastructure and Nature of the Flemish community

The entire level of government of the policy maker itself was created, when Belgium was transformed into a federal state. This does not seem to have lead to major changes in perception and instruments.

Within the department, the section Waterways and Sea, is responsible. This section is split into several divisions, of which one deals with the coast directly at the North Sea (division Coast) and another with the Antwerp region (division Sea-Scheldt). Some of the policy of these divisions common, but some policy-making also takes places independent from each other.

The division on the coast is at the moment planning a radical shift of its approach to coastal flood risk. It wishes to move from a strategy strongly focussed on maintaining standard of defences , towards a more broad range of instruments, based on sophisticated risk analysis. As explained in paragraph 3.4, the present policy will be shown in the overview tables.

Responsibilities

The law contains very few arrangements for flood risk management. It is limited to a few sentences on coastal defence. No legal duties are put on the government, nevertheless the

interviewee indicated that the citizens are not expected to take own responsibility, but the government is held responsible for the risk management

The network of the policy maker in Flanders

There are some differences in the network between the Antwerp division and the coast division. The latter has at the moment a quite limited network, as actions are mostly undertaken directly (in consultation with others in the department), however a major shift in approach to flood risk management is planned. This would involve a stronger role for risk analysis and instruments such as evacuation planning.

In the Antwerp region already a strong relation has been made to spatial planning. The Antwerp region is an estuary-river system and thus controlled flood areas can reduce the water levels in the Scheldt. In addition the international character of the Scheldt brings along relations to the Dutch government.

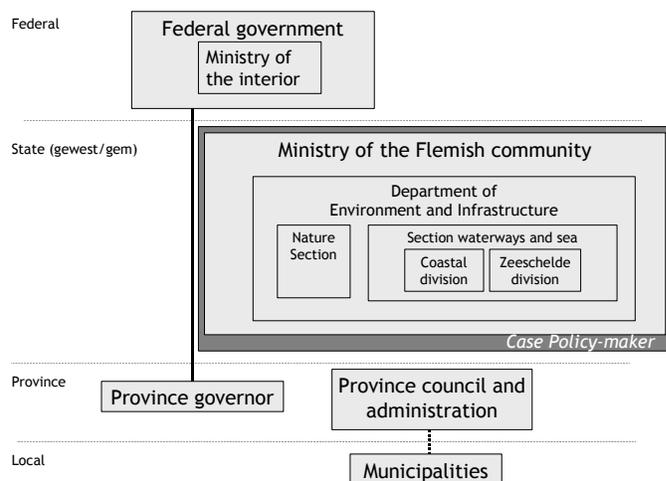


Figure 14 Position of the Flemish policy maker

Public attitude

The public is mainly concerned is with disturbances during implementations, aesthetics of works and (around Antwerp) with loosing land to controlled flood areas. The awareness of the risk is noted to be very low, this is linked to the absence of major disasters from coastal flooding in Flanders.

8.2. Problem perception of the Flemish Policy maker**The perception of the flood risk**

Three separate risks can be distinguished: the risk of storm damage in the dunes on the coast (among which eroding of dunes), the risk of a breakthrough of this dune strip, leading to a flooding of the polders in the hinterland and in the Antwerp region the risk of a flooding of the harbour, city and upstream towns.

The latter two are considered to be potentially disastrous. The main expression of the risk is in probability of breakthrough. The Flemish policy maker has a 'zero tolerance' policy for deaths due to floods.

Perceptions and goals besides risk*Budget / available staff*

The Flemish policymaker has for his standard, compared the stand of protection to the consequences of flooding in the Netherlands and England. As these countries use a (partly) economic approach, indirectly economy has played an role in deciding safety levels. On the other hand the importance of a societal decision on what is safe enough is stressed. At the moment the protection levels within each region are still equal, but on the coast a differentiation to the value they protect is considered. The Flemish policy maker has a limited capacity to produce policy, as it has relative small policy staff.



Some samples of the Flemish coast. Top left: dune area at the West coast.
Top right: coastal town at beach at West coast. Above: Scheldt near
Antwerp

Ecology / esthetics

The dunes on the coast are considered an important nature area and the shoreline a recreational areas. Defences should not block or alter the view of people too much, because this might lead to problems in the implementation of works.

The Scheldt estuary is considered to be too dynamic (too turbid) for a healthy ecosystem. The deepening for navigation poses an additional problem to ecology.

Navigation

For the port of Antwerp, a deep waterway in the Scheldt is essential, but such a deep waterway increases the propagation of tide and surges. As a surge is already funneled by the natural shape of the estuary and river, tides and surges are land inward stronger than near the coast.

Development

In Flanders, the development of low-lying areas is in general considered to be acceptable, but it is regarded less crucial and as less an achievement as it is in Germany and the Netherlands.

8.3. Chosen solution of the Flemish policy maker

The policy maker has a strong focus on coastal defence. In addition in Antwerp areas have cleared some areas of buildings, to serve as controlled flood areas to reduce the load on the defences that protect populated areas in time of extreme water levels.

For the coast directly at the North Sea, a once in thousand year standard has been set for flooding of the hinterland and a policy to protect houses in the dunes if reasonable possible. In practice this means that groups of houses are protected, but some isolated houses not.

For the Antwerp region a protection level that withstands a 1:4000 to 1:10 000 storm is envisioned. With regard to loss-of-life, a 'zero tolerance' policy has been set³⁸.

The legal powers of the Flemish policy maker are limited. This leads to a focus on direct measures. For instance, the main way to achieve spatial avoidance is to buy property of house- and land-owners.

Instrument table

In figure 15 depicts the instrument table for the Flemish policy maker. Defences are built and maintained by the policy maker are by far the most important element in the strategy. Communication to the Dutch government, municipalities, and the population takes place about the design of these structures.

An potential new feature in the coastal defence of Antwerp could become the connection between the East Scheldt and (West) Scheldt in the Netherlands. As the East Scheldt can be closed of by a storm surge barrier, water levels during a surge water levels will not raise in the East Scheldt, creating a buffer in which the West Scheldts water can flow.

For the Antwerp area, controlled flood areas are being implemented. The main function of these areas is to store water during a flood, bu to this end, population of this are is avoided. Therefore they are classified as a both a secondary defence and a measures of spatial avoidance

The federal government runs a disaster compensation programme. However the policy makers themselves stand somewhat ambiguous to this instrument: it does provide relief, but it also removes an incentive to avoid very flood prone areas.

³⁸ How this relates to recognition of a possibility of breakthrough (once every 1000 years) and little or no other interventions is not clear.

			Instrument type (steering method)				
			Directly	Regulatory	Economic	Communication	Overall
Reducing probability	Coastal defence	Primary lines	Nourish dunes, build and maintain walls and dykes	Shoreline activity permits		Communication with population on implementation issues, communication with Netherlands	
		Secondary line	Controlled flood areas. Roads, polder dykes				
		(Prepare for) Emergency repairs	Inspect and strengthen dykes during storm				
Reducing consequences	Flood resistant buildings						
	Spatial avoidance		Buy flood-prone land				
	Crisis management	Forecasting and warning prep.	Operate 24/7 forecast center	Subsidize research	Dessiminate to other services		
		Evacuation and Rescue prep.			Advise emergency services of situation		
Compensation				Disaster funds (by other part of government)			
Overall							

• used, but sporadic and/or considered not important	● used, considered of some importance	● used, considered quite important	● used, considered crucial important
--	---------------------------------------	------------------------------------	--------------------------------------

Figure 15 Instrument table for Flanders

8.4. Recap for the case of Flanders

The Flemish policymaking for the coast and the Antwerp region is partly independent. On the coast two risks are distinguished: damage in the dunes and floods beyond the dunes. For the first risk a 'protection where reasonable' approach is used and for the second risk a 1:1000 years standard has been set. This is achieved by directly implementing and maintaining coastal defences.

In the Antwerp region a risk for the flooding of the port, large parts of the city and upstream towns. Budget, navigation and safety conflict. For the moment the policy maker has chosen to clear areas of population by buying them out to reduce the load on populated areas.

8.5. Points of attention for reflection in Flanders

The application of the substantive decision-making model has encountered some potential disturbances on a number of points.

Firstly there is not one clear-cut policy maker. There is only on some points an overarching policy for the coast and Antwerp region and Antwerps choices are related to those of Dutch policy makers.

Secondly gathering information has proven difficult. For the Westcoast region there are no public policy documents. Thirdly protection and navigation works of Antwerp have been political sensitive issue within Flanders and between Flanders and the Netherlands for decades.

Furthermore, the instrument of controlled flood areas, has aspects of spatial avoidance and secondary defence.

8.6. Sources used for the Flanders case

Written sources

- Departement Leefmilieu en Infrastructuur, 2001, Samenleven met de zee, in Waterspiegel (magazine departement), April 2001
- Ministerie van de Vlaamse Gemeenschap, AWZ, Bestuur Havens, Kust 2002 - Deel 1 De Zeewerende functie van de kust - Stand van Zaken - Voorbereidend Rapport
- Ministerie van de Vlaamse Gemeenschap, AWZ, April 2001, Waterspiegel No 4: Samenleven met de zee
- Ministerie van de Vlaamse Gemeenschap, AWZ, 2002, Onderrichtingen bij optreden van stormtij of gevaarlijk stormtij in het kustgebied en in het gebied van de Zeeschelde en haar bijrivieren - Stormseizoen 2002/2003
- Ministerie van de Vlaamse Gemeenschap, AWZ, Afdeling Water Wegen Kust, April 2003, Samen leven met de zee - Zeewering met een nieuw gezicht
- Actualisatie Sigmaphan
- Gemeente Oostende, Gemeentelijke Rampenplan
- Provincie Antwerpen - Dienst Waterbeleid, Maart 2002, Ruimte voor water
- VIWC, 2002, Ontwerp Waterbeleidsplan Vlaanderen 2002-2006

Interviews with persons at

- AWZ Zeeschelde
- AWZ Kust
- University of Antwerp
- Province of West-Flanders

9. The Netherlands

9.1. The Policy maker in the Netherlands

The policy maker in the Netherlands is the ministry of transport, public works and water management and its services and regional offices.

The ministry has become involved since the 1953 flooding of large parts of the Zeeland county and the Rotterdam region. Before 1953 coastal flood risk management was left to the counties and waterboards.

Responsibilities

Since 1996 the government has legal duties to provide specified levels of protection (expressed as specific return periods for the design hydrological conditions), these legal duties are a codification of policy already set out in the 1960s as a result of the 1953 flood.

Two return periods have been distinguished for the main land. One for the rural south and north (1:4000 years), and one for Holland (1:10 000 years). Only small areas such as river meadows and dunes are excluded from these protection zones (the so called dike-rings). The law also foresees a future change towards inundation chances of rings of dikes.

Formerly the state only has direct responsibility for a number of main barriers and dams, for the remainder it has the duty to supervise lower governments on their protection works and provide funding to them.

Although the responsibilities of the government are formally clearly limited to certain tasks, informally it is felt the government will be held responsible for any flooding that occurs. As one interviewees noted:

...however, if a flood occurs, people call upon the central government... “actually...we always end up paying the bill”. Despite that the law is perfectly clear that people outside the protection zone have no right whatsoever on compensation...

interviewee at the policy maker (paraphrased)

Moreover the feeling is that *within* the government the national level is always in the end expected to provide additional finances to the lower government. The interviewees relate this to the strong feeling of national solidarity and national history in the Netherlands. if it comes to flooding

The network of the policy maker

The construction, maintenance and management of most of the coastal works is left to the waterboards, with the exception of nourishments and the main barriers. The county (province) supervises the waterboards, whilst the national government acts as higher supervisor of the coastal flood defence.

Spatial planning is focussed at the municipality level. At the provincial and the national level specific spatial plans are also made on a strategic level. In recent years the links between spatial planning, water management and links have been considerably strengthened. Into spatial decision procedures, flood risk is addressed. However the link to the disaster management authorities at the municipal level, relations are quite limited.³⁹

Many non governmental organisations are involved in the policy process and consultation of them takes place in both legal prescribed approval procedures and informal communications. Recently a common agenda was set with the ‘policy agenda for the coast’ project.

³⁹ If disasters exceed the boundaries of a municipality, various stages of up-scaling can take place, but many crucial power (such as the decision to evacuate) remain with the municipality. Some policy is made at the home department, but only incidental relations between this section at the home department and the flood risk policy maker exist.

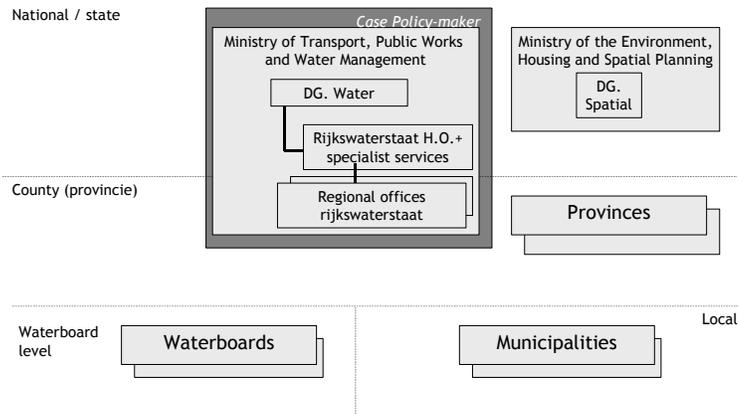


Figure 16 The position of the Dutch policy maker

Public attitude

The Dutch policy maker notes that the average Dutch citizen knows about the history of flooding, but assumes that the improvements in coastal defences over the last fifty years, have eliminated all the risk. Dutch are noted to be very intolerant to any flooding.

Furthermore the Dutch policy maker notices a lack of support for measures among those citizens that are directly affected by them, for instance if houses have to be demolished in a strengthening project.

9.2. Problem perception of the Dutch Policy maker

Flood Risk

The floods are regarded to be potentially catastrophic, causing immense material and immaterial damage. More than half of the country – in which 2/3 of the population lives – is situated lower than the high water mark. The 1953 flood took 1800 lives and this was in the

rural, less deep, county of Zeeland. A flood into the polders of Holland⁴⁰ is possibly even more severe⁴¹.

The policy maker is first of all concerned to reduce the risk of such type of events, however, out of the farreaching responsibility imposed on the Dutch government, smaller events also receive attention. For example, the risk of damage to small towns and individual houses in the dunes has received considerable attention. Or as one civil servant noted:

“Wet carpets are also part of Dutch politics”

Civil servant at the policy maker

The risk is discussed in terms of probability of a dike breakthrough⁴². Currently a new approach is planned that will express the risk in terms of flooding probability and flooding consequences.

The precise effects of climate change are regarded as unknown, but considered as a challenge to keep achieving the legal standards. Moreover in the dunes, the potential set-back lines during severe storm are increasing.

Other aspects

Flood protection receives priority over all other interests. Some of the interviewees were even amazed that the question if they were willing compromise on safety for other interests was asked.

Budget / economy

According to the interviewees, the trade-off between safety and spending can only be understood if one know the history of safety standards in the Netherlands

⁴⁰ Holland is a region within the Netherlands, do sometimes also used to refer to the whole Netherlands.

⁴¹ How severe does depend on the size of the breach(es) and if inland dikes would stop such a flood; on this opinions differ somewhat

⁴² To be more precisely: the probability of the occurrence of more extreme hydrological conditions than the design conditions

The standard for the largest flood-prone area in Holland (1:10 000) has been based on an economic optimisation in the 1950s⁴³. The remainder of the standards has been set without calculation. Probably a compromise between an economic arguments and arguments of equity (“everybody deserves equal protection”) has been used⁴⁴. Or as one civil servant put it:

“Standards are set by bargaining That is fine, as long compromises are well communicated.”

civil servant at the policy maker (paraphrased)

These standards stand now for almost 50 years (and codified more recently in law). It should be noted that these standards are often regarded as an aim on itself than a mean to a higher goal. Budget is in general available to maintain and enforce defences to meet these legal standards.

However on the background reconsideration if the standards are still appropriate is ongoing, as the original calculation is very outdated. A project (Floris, [Dep. Wat. Man. 2003]) is executed to gather the information for the reconsideration of standards.

However this will not be an easy process. As one civil servant noted:

the investments in the area have increased with a factor 10-100, but suggesting to increase the protection with such a similar factor is not popular. The required investments to an economic optimum again are nearly infeasible.

interviewee at the policy maker (paraphr.)

Ecology

Although the interest of ecology would not be allowed to influence the safety level, the impact on ecology is as much as possible limited. Over the decades pressure groups have had a

⁴³ The calculation actually resulted in a much higher safety standard (approx 1:125 000), it was later assumed that the defences would withstand conditions 10 times rarer than the design conditions.

⁴⁴ I base this conclusion mainly on the fact that only 2 standards exist (1:4000 and 1:10 000), with an economic optimisation one would expect a wider range of standards, as some dike-rings are one or more orders of magnitude smaller, rural and less deep.

considerable influence in this. More recently, the habitat-directive and its codification in Dutch law has increased the attention to ecology.

Originally, the Habitat-law put major limitations on activities on and near some of the dikes. The fact that waterboards decided to ignore these laws if they felt it was potentially endangering the condition of the dike, is exemplary for the priority of safety over other interests.

Navigation

In specific projects, such as the storm surge barrier near Rotterdam, navigation has been a key issue, but in the policy documents, navigation is not specifically addressed

Necessity of land

Stopping the development of half the country, including the economic and cultural center, does not come even into consideration. Even small reclamation projects are undertaken (such as the enlargement of the Rotterdam port), although the large projects for agriculture have stopped.

The necessity of living in the dunes has been discussed in recent years. The coastal towns are looking for growth, but the policy makers fears that he will be held responsible in case of flooding, although he has no legal duties in the dunes.



Three types of Dutch coast: Top: the Northern Coast of Groningen, Middle: The Holland Coast, with the Hague on the background. Below: The Oosterschelde-barrier, which closes of one the estuaries of Zeeland during storm surges.

9.3. Chosen solutions by the Dutch policy maker

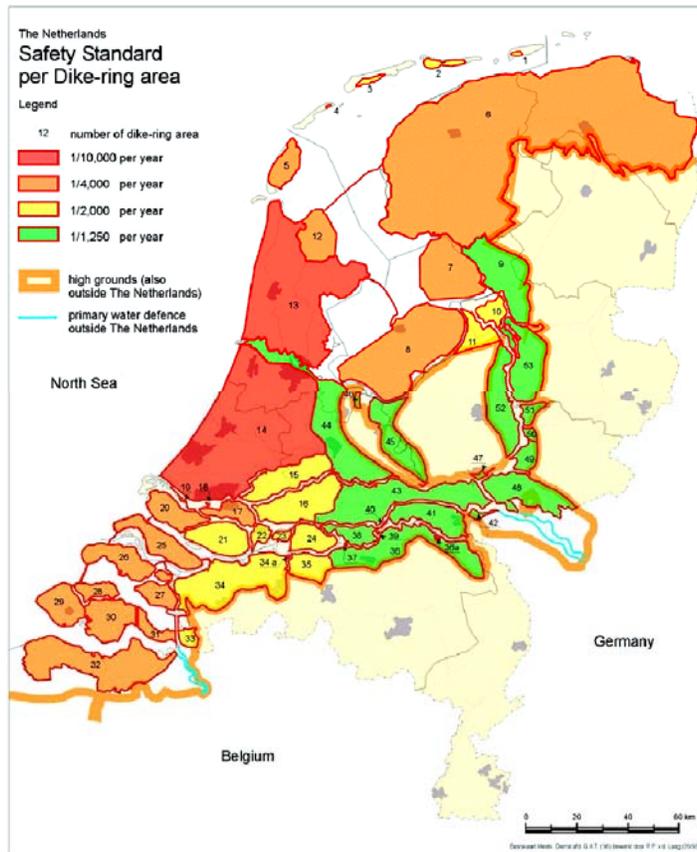
The Dutch policy maker has a strong focus on coastal defences in his dealing with the risk of the flooding of the large, low-lying hinterland.

The management of these defences are largely left to the waterboards and counties, but the policy maker has a firm, accepted control over this process by detailed guidance and supervision. It also funds new investments.

For manages the smaller risk of damage in the dunes, sand replenishments of the beach and dunes are used to maintain the current level of safety. In addition the avoidance of further build up areas.

The Dutch policy maker is undertaking some projects to consider other intervention points, such as evacuation into their strategy. However, there are fears that a broad approach will lead to scattered responsibilities and less attention to the defences.

In recent years the policy maker did increase the attention to communication about flood defences. For the general public a large communication campaign has been launched to increase support for projects to strengthen the defences in the light of climate change and new scientific insights.



Map of the protection zones in the Netherlands. Note that the unprotected dune- and meadow-zones are mostly too narrow to show on this scale

Taken from TAW [1998b1]

9.4. Instrument table

Figure 17 depicts the instrument table for the Netherlands, in which the focus on the intervention point of coastal defence is clearly visible.

Coastal defence

The main instrument of Dutch policy maker is coastal defence. Since 1960 an advanced system of barriers and dams has shortened the coastline considerably. The main barriers and dams are being operated by the state. The state is also directly responsible for sand supplements along the entire coastline.

The state is furthermore the higher supervisor for the dikes and dunes. Through guidance and consultancy from the specialist services it supports the provinces and waterboards

The involvement in secondary lines is somewhat less. Besides the secondary dikes behind the main barriers (Delta and Ijssellake dikes), the waterboards and provinces choose themselves if to maintain secondary lines. They, to avoid a quick flooding of a small area, remove some of these historical secondary dikes.

They are also the ones responsible for the dike-guard system to inspect and reinforce dikes during calamities.

Recently the policy maker started a public campaign to increase support for measures such as heightening (and thus widening) of the defences and at some point widening the rivers.

Spatial avoidance

Spatial avoidance as instrument to reduce the risk in unprotected areas, has in recent years received considerable attention,. The objective is to prevent further building in those parts of the dunes, where erosion can occur.

In the past a pure regulatory approach was used. The waterboard noted in its public register where the boundary of the protected area within a dike-ring is. For building in the dunes permits were required, but seldom applied for or enforced.

In the last years a connection to the spatial policy has been strengthened. These zones are being drawn into spatial plans or 'red contours' were drawn. This contour-policy is largely abandoned, however the current Habitat regulation obsoletes the discussion. Urban expansion is anyway no longer allowed.

Crisis management

The policy maker has a special service to predict storm surges and disseminate these to concerned authorities. Waterboards have emergency plans dealing with reinforcing dikes that are about to fail., however plans for after breakthrough of defences are limited to non-existing. The policy maker does in general not actively pursuit the achievement of these plans either, but some steps are taken in Zeeland in this respect.

A number of reasons for this can be mentioned. Disaster management is an municipal affair, which is much below the scale of a large flooding in the Netherlands. Another reason might be the high standard of defences. The home department guidance on dimensioning disaster services, advices to not to dimension emergency services for flood events that are more than 1:4000 years⁴⁵.

Lastly, a complete evacuation of the Holland area is considered to be infeasible. The policy maker might be somewhat uncomfortable to devise a plan that reduces, but not eliminates the loss of life.

Redistribution of costs

Since the 1953 flood, the association of insurers has a policy not cover flood damages. Since a few years flooding due to local extreme rain can be insured again. The Dutch policy maker considers commercial insurance against coastal floods infeasible.

Till 1995 the Dutch government compensated disasters on an ad-hoc basis. However this turned out to be costly as many events were classified to be a disaster and the paid compensations were quite generous [Rosenthal].

Since 1996 a disaster funds is in place, however salt water (eg coastal) flooding is excluded and can only be included by a government decision. Also the size is quite modest (approx. 1 billion Euro) compared to the potential flood damage.

⁴⁵ See Van Dyke 2002, note that in this guidance for disaster response planning the probability of exceedance of the design return period of dykes is equalled to the probability of an area to be flooded.

			Instrument type (steering method)				
			Directly	Regulatory	Economic	Communication	Overall
Reducing probability	Coastal defence	Primary lines	● Nourish dunes and beach. Build and operate main dams&barriers	● Supervise lower governments on defense, guidances on defenses	● Fund investments of lower governments in defenses	● Gain support for measures through campaign. Dialogue with other departments	●
		Secondary line				● Contribute to segmentation research.	●
		(Prepare for) Emergency repairs				● Left to waterboards. Guidance???	●
Reducing consequences	Flood resistant buildings						
	Spatial avoidance			● Support zoning regulation for areas round or outside dykes			●
	Crisis management	Forecasting and warning prep.	● Forecast center			● Pass on towards authorities	●
		Evacuation and Rescue prep.				● Departmental crisis support centre.	●
Compen-sation	Recovery	Redistribution of costs			● Disaster funds, which CAN be opened for salt water flooding	●	
Overall			●	●	●	●	●

● used, but sporadic and/or considered not important	● used, considered of some importance	● used, considered quite important	● used, considered crucial
--	---------------------------------------	------------------------------------	----------------------------

Figure 17 Instrument table for the Dutch policy maker

9.5. Recap for the case of the Netherlands

The Dutch policy maker is primarily and formally oriented towards preventing catastrophic storm floods of the low-lying half of the country. This prevention has priority above other interests.

Legal set standards are based on combination of economic and equity considerations. The standards are regarded as economically outdated, but huge involved investments block an update of the 50 year old calculations.

However the societal feeling of national importance and cohesion with regard to floods results in the imposition of a farreaching responsibility on the policy maker. Out of this informal responsibility, the policy makers attempts to prevent an increase in the risk for damages in the dunes.

The basis of the Dutch policy makers' strategy are coastal defences, achieved by funding, regulating and advising lower governments. In recent years the use of communication to gain support for works on the defences has increased. For the dunes areas, communication is used to make existing spatial regulation more effective.

9.6. Points of attention for reflection in Dutch interviews

The home department (dealing with disaster management), did not respond to numerous requests for an interview though the ComRisk project.

9.7. Sources used for the Dutch case

Written sources

- Earryt Boetes, Nies Brouwer, Sjan Martens, Ben Miedema en Ron van Vremde, 2003, Evacuatie bij Hoogwater
- Eric van den Bosch, Arnoud Buiting, Hans Spobeck, Arjan Stam, 2003, Preparatie op overstromingen
- Harry van Boven, Henk Ensing, Cynthia de Jong, Hans van Wijk, 2003, Zee InZicht: Polderen aan de kust over klimaatverandering en veiligheid
- Commissie Waterbeheer in de 21ste eeuw, Advies van de Commissie Waterbeheer 21ste eeuw
- Delta InZicht project- en stuurgroep, 2003, De Delta in Zicht - Een integrale visie op de Deltawateren
- Commissie voor de Deltawerken, 1960, Eindrapportage van de commissie
- Dutch Dialogue on Climate and Water and Risk Management - Summary of the report on the Dutch Dialogue on Water and Climate
- Richard Jorissen, 1998, Flood Protection, Safety Standards and Societal Risk in R.E. Jorissen and P.J.M. Stallen (eds), 1998, Quantified Societal Risk and Policy Making, Dordrecht: Kluwer Academic
- Korbee & Hovelinck / Resource Analysis voor RIKZ, 2002, Beleidslijn kust: Reactionota, De Bilt / Delft: RIKZ
- M. Kok, H.F. Dooper, I.B.M. Lammers, Verzekering van regenschade, in: Het Waterschap nr 17, pp 803-807
- Marchand, M., K.V. Heynert, H. van der Most en W.E. Penning, Dealing with flood risk, Delft Hydraulics Select Series 1/2003
- Dutch Department of Transport, Public Works and Water Management, the Hague
 - Undated, notitie "Aanleiding voor de Campagne Nederland Leeft met Water"
 - 1995 Kustbalans 1995, de tweede kustnota
 - 1998 Vierde Nota waterhuishouding. Regeringsbeslissing, 1998
 - 1998 Flood Defences Act & Policy Creating Space for the River.
 - 2000 3e Kustnota. Traditie, Trends en Toekomst,
 - 2001 Bouwen in de kustzone? - Lange termijnverkenning van de ruimte voor stedelijke functies in de kustzone
 - 2001, An inventory of risks, safety levels and probabilistic techniques in five countries at the North Sea coast, 2
 - 2001 Koersen op tijdgeest
 - 2002 Towards an Integrated Coastal Zone Policy - Policy Agenda for the Coast,
 - 2002 3e Kustnota. Traditie, Trends en Toekomst: Het vervolg, 2002

- 2002 Kust in kader? Opvattingen over integraal kustzonebeleid, The Hague: RIKZ
- 2002 Tradities, Trends en Toekomst: het vervolg - Eerste voortgangsrapportage actiepunten derde kustnota
- 2002 Huidige instrumenten voor implementatie van integraal kustzonebeleid, The Hague
- 2003 EuroSION Pilot Series Report - The Holland Coast, The Netherlands, The Hague: RIKZ
- 2003 Project Floris: Flooding in the Netherlands - Probabilities and consequences
- Ministerie van VROM, Ruimtelijk Planbureau, 2003, Atelier Naar Zee!, Naar Zee!
- NORCOAST, 1999, Review of national and regional planning processes and instruments in the North Sea Region Study,
- NorVision, 1999, A spatial perspective for the North Sea Region
- NRC Handelsblad
 - 12-10-03, Thema: Waterschappen, 12-10-03
 - 14-3-03, "Deel dijken voldoet niet aan norm", www.nrc.nl/binnenland/artike/10452033325641.html, en "Het succes van de zachte aanpak", www.nrc.nl/dossiers/profielen/de_kust en "Een rampscenario voor de volle Randstad"
- North Sea Coastal Management Group, A review of Netherlands Coastal Policy, final report, March 1998
- OECD, 1997, Integrated Coastal Zone Management: Review of Progress in Selected OECD Countries
- Provincies Noord- en Zuid-Holland, 2001, Strategische Visie Hollandse Kust
- A.J. Saul (ed), 1992, Floods and Flood Management, Dordrecht: Kluwer
- SAVE & Adviesbureau van Dijke, 2000, Leidraad Maatrap - versie 1.3
- Technical Advisory Committee for Flood Defence s (TAW), Secretariat Dep of Public Works, Transport and Water Management, The Hague
 - 1998, Fundamentals on Water Defences,
 - 2000, From probability of exceedance to probability of flooding, Towards a new safety approach,
- Anne van Urk, Dick de Bruin, Wout de Vries, 2003, The Dutch Case, in World Water Forum 3 Conference papers
- Unie van Waterschappen, 2001, Naar een eenvoudiger bestuurlijke en financiële structuur van het waterschap, The Hague
- Willem van der Ham, 1999, Heersen en beheersen, proefschrift TU Delft.
- Peter van Rooy en Lyda Sterrenberg, Het blauwe goud verzilveren, Den Haag: Rathenau Instituut
- Zeeuwse Courant (www.zeeuwsecourant.nl), Engelsen beter voorbereid op overstroming, Internationale studie naar stormvloed en Zeeuwen wensen sterkere dijken

Interviews with persons at

- Accanto (Mr. Van Rooy)
- Delft University of Technology
- Directorate General Water, Ministry of Transport, Public Works and Water Management
- Erasmus University Rotterdam
- Marsh Risk Consulting
- NIBRA (National Dutch firefighting and disaster preparation institute)
- Province Zeeland
- Province Zuid-Holland
- RIKZ, Rijkswaterstaat, Ministry of Transport, Public Works and Water Management
- Water board Delfland
- Water board Zeeuwse Eilanden



Satellite photo of the German North Sea and Wadden Sea

Source NASA Landsat photography (www.nasa.gov)

10. Lower Saxony

10.1. The Policy maker in Lower Saxony

The policy maker in Lower Saxony is the department for the Environment of the state government and its executive agency (NLWK) (Niedersächsischen Landesbetriebes für Wasserwirtschaft und Küstenschutz). The policy maker has become involved after the floods of Wadden Islands in 1962, before flood risk management was left to water boards

Responsibilities

The Lower Saxony government has a direct responsibility for the dikes, set by a specific dike act. This act puts a duty to the government to maintain the dikes

Furthermore the act distinguishes between sustaining the dike within the design parameters (such as the crest-level) and activities due to a change in this parameters. The first is a task of the lower level governments, in the latter the ministry has a responsibility to provide fundings. Informally, the ministry also sees a role for itself in research, design and advice through its NLWK agency.

The network of the policy maker in Lower Saxony

Figure 18 depicts the formally involved organisation in Lower Saxony. According to the German constitution, coastal flood and erosion protection is a ‘joint task’ of the federal government and states. This means that the federal *can* become involved as it chooses. The federal government limits itself currently to funding the work of the states and is not concerned with the substance of their decision.

This has been arranged in such a way that the federal government is only involved in funding of 70% of investments. The federal ministry of consumer protection, agriculture and the environment is responsible for this task. This ministry has set definition what is eligible for funding. It is up to the states to decide which measures they prefer. However a maximum of investments is each year set by the federal government. In practice, only in Hamburg this is reached, for the others states, state level funding is the limiting factor.

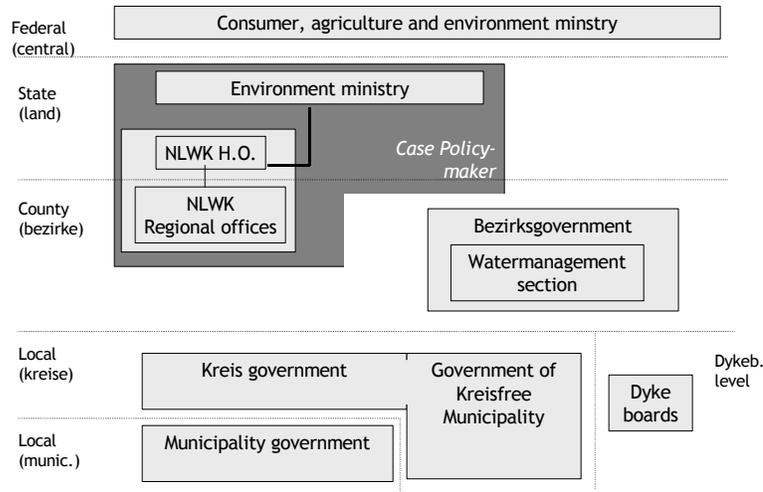


Figure 18 The network of the policy maker in Lower Saxony

The Bezirke (at county level) are the higher authorities with regard to water management. They supervise the water boards and the authority for activities in or at the dike (permits varying from power cables to banks). They also set the inward boundary of the flood-prone area, which determines the area that is taxed for maintenance of the dikes.

Furthermore they set the design parameter of dikes (based on the guidance from the ministry) and are the leading governmental organisation for planning new dikes and barriers. At the moment this government level is under review. The removal of this entire government level is considered.

The Kreise are the 'lower authority' and their task is to regulate activities near the dike by permits. They are also responsible for disaster preparation, among which the preparation of flood evacuation plans. The ministry of the interior supervises the preparation of these plans.

The elected dike-boards are the managers of the dikes. Within the design parameters they are fully responsible, including raising funds through taxes. If the design parameters change the state becomes involved in funding (and with this in the decision-making).

The Lower Saxony relation to environmental NGOs is characterised by conflict. A long standing, minor conflict is the extent to which works at the dikes are necessary (such dyke revetments, or mowing the dykes). In recent years, a more major conflict has evolved around the plan for a barrier in the Ems. This conflict ended up in a series of court cases on the construction of the barrier. The policy maker has won these cases, but new appeals have been made to the court regarding the operation of the barrier.

The policy maker tries by early involvement of these NGOs to reduce the amount of conflict, but has achieved little success till now.

Public attitude

The policy maker notices a very low awareness of the risk of flooding by its citizens. The last flood on the main land was in beginning of the 19th century, so many people are not familiar with this flood. If people are aware of historic floods, they assume the present defences are safe. In the opinion of the policy maker this leads to difficulties in implementing works, mainly in the conflict of interest with the environmental NGOs mentioned.

10.2. Problem perception of the policy maker in Lower Saxony**Flood risk**

The focus of the policy maker is on catastrophic events. The low-lying area extends far land-inward and at many places natural segmenting elements do not exist.

Lower Saxony has a deterministic approach to floods. The highest recorded water levels plus an expert estimated margin are used for design of dikes.

Probabilistic methods are judged to be infeasible.

This means that, on the contrary to all other studied policy makers, neither 'once in so many years' expressions, nor annual damages are used in discussions. Risk becomes binary. The protection is either at a safe or at an unsafe level⁴⁶. The policy maker does acknowledge that 'safe' does not mean that floods are impossible.

This leads to a different reasoning from the other policy makers. The issue becomes largely a technical matter, of determining the safe level. In this way questions such the appropriateness to vary protection levels, become irrelevant.

⁴⁶ Some research has been done what would be probability of overflow of dikes. These results shows that this 1:300-1:8000 years, depending on the location.

Perceptions and goals besides risk

*Protection has to be guaranteed, this also not discussed by the NGO's. We need safety. The discussion is about **how** this can be achieved.*

Interviewee at dikeboard

The above citation is from a person from a dikeboard, but is also representative for the view held by the policy maker.

Economy / budget

As there is only one 'safe' level, this is the level to which dikes should be designed, an (explicit) trade-off between budget and protection is thus not made.

However this does not mean the state always funds these investments, at least not immediately. Projects are spread out in time to match the available funding. Currently decision of '63 and '76 are still not fully implemented. It is remarkable that given the no-compromise attitude towards other interests, the policy maker does not mind that the budget limits the actual protection level.

Necessity of land

Not protecting parts of the main land is not regarded to be an alternative, or as one professor involved in research on this matter characterised the attitude as follows: "no single piece of land should be left undefended."

Ecology

Almost the entire coast of Lower Saxony is situated in the international nature reserve of the Wadden Sea. This brings along several limitations. However essential works can still be carried out, be it with lengthy procedures.

Navigation

Navigation as issue was not mentioned by the policy maker itself. However it has been a major issue in the decision on the Ems storm surge barrier.



Top: The cover of a book about the dikeboard Norden, the title roughly translates as “stronghold Norden”. Above: Inspection party, inspecting the defences of the Island Langeroog

10.3. Chosen solution by the policy maker

The Lower Saxony policy maker is firmly focussed on coastal defence, achieved by regulating, advising and funding the water boards. At some other points intervention does take place, but the policy maker has only little involvement in this.

10.4. Instrument table

Figure 19 depicts the instrument table, in which the strong focus on coastal defence by regulation and funding is clearly visible

Defences

Protection works are the main instrument used. The waterboards (and Bezirke) are by state law required to build these to the 'safe' level and maintain to more than 30 cm below this level. The policy maker emphasizes a system approach. He wishes to consider the Island, marshes, primary and second dike as a system.

Building protection

The only buildings regulation is that objects and constructions that afloat might damage the dike should be well anchored.

			Instrument type (steering method)				
			Directly	Regulatory	Economic	Communication	Overall
Reducing probability	Coastal defence	Primary lines	Some state dykes •	Supervise and regulate 'enthaltung' dykes and barriers by lower ●	Co-finance investments in dykes and barriers ●	Some communication with NGOs ●	●
		Secondary line			Co-finance secondary dykes?? ●	Limited communication • for public support	•
		(Prepare for) Emergency repairs				Dialogue with waterboards •	•
Reducing consequences	Flood resistant buildings						
	Spatial avoidance		Regulation aimed at dyke • protection				•
	Crisis management	Forecasting and warning prep.	Forecast centre •				•
		Evacuation and Rescue prep.	Evacuation plans at Kreise • level; by other department				•
Compensation	Recovery	Redistribution of costs			Ad-hoc compensation of citizens •	•	
Overall			•	●	●	•	

• used, but sporadic and/or considered not important ● used, considered of some importance ● used, considered quite important ● used, considered crucial

Figure 19 Instrument table for Lower Saxony

Crisis management

Flood forecasts are disseminated to disaster authorities through a specific plan (Alarmplan). Kreise are the primary disaster authority in this respect. They should have evacuation plans for flooding. The ministry of the interior at state level supervises this. The policy maker has however little direct involvement in this, besides from supplying some flood risk information.

Compensation

After disasters at the political level often an ad-hoc compensation is decided upon. Insurance is considered infeasible.

10.5. Recap for the case of Lower Saxony

The policy maker in Lower Saxony considers coastal flooding a catastrophic risk. This is prevented by coastal defence, through the funding and regulating of lower authorities. The deterministic procedures allow only for a binary distinction between 'safe' and 'unsafe'. In theory, other interests may determine the question how the safe level is reached, not if. In practice budget does limit the actual achievement of the safety level.

10.6. Points of attention for reflection in interviews in Lower Saxony

Only the NLWK has been interviewed. The ministry refused an interview (as part of ComRisk). Secondly one scientist noted that -though his research was not finished yet – he felt a more strategic motivation was behind the deterministic approach. In framing the issue into a pure technical context, complicated discussions are avoided.

10.7. Sources used for the Lower Saxony Case

Written sources

- Bezirksregierung Lüneburg, Küstenschutz, www.bezirksregierung-lueneburg.de
- Bezirksregierung Weser-Ems, 1996, Generalplan Küstenschutz für den Regierungsbezirk Weser-Ems
- Grundgesetz für die Bundesrepublik Deutschland
- Gesetz über die Gemeinschaftsaufgabe "Verbesserung der Agrarstruktur und des Küstenschutzes"
- Niedersächsisches Deichgesetz (NDG)
- NLWK, Das Emssperrwerk - Mehrzweck-Wasserbauwerk an der Unterems für einen besseren Sturmflutschutz und für das Aufstauen der Ems zur überführung tiefgehender Schiffe zwischen Papenburg und Emden
- NORCOAST - Review of national and regional planning processes and instruments in the North Sea Region - Full Study, 1999
- NorCoast, Recommendations on improved Integrated Coastal Zone Management in the North Sea Region, Aalborg: Norcoast project secretariat
- Johannes Weigel and Stephan Mai, GIS-gestützte Schadenpotenzial- und Risikoanalyse an der niedersächsischen Küste
- Matthias Kiese, Britta Leineweber, 2001, Risiko einer Küstenregion bei Klimaänderung Ökonomische Bewertung und räumliche Modellierung des Schadenspotentials in der Unterweserregion, Hannover Working Papers in Economic Geography, Hannover: University of Hannover

Interviews with persons at:

- Dikeboard Norden
- NLWK
- Bezirksregierung Weser-Ems

Written sources for Germany as a whole

- Thomas Dworak, Wenke Hansen, R. Andreas Kraemer, Precautionary Flood Protection in Europe - Workshop report, Berlin: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
- Verbraucherministerium, 2002, Findings principles for the common task of coastal defence
- Länderarbeitsgemeinschaft Wasser (LAWA), 2000, Wirksamkeit von Hochwasservorsorge und Hochwasserschutzmaßnahmen
- The "Länderarbeitsgemeinschaft Wasser", Working Group of the Federal States on water problems, 2003, www.lawa.de as of 9-5-2003
- NorVision, 1999, A spatial perspective for the North Sea Region
- Organisation for Economic Co-operation and Development, 1997, Integrated Coastal Zone Management: Review of Progress in Selected OECD Countries
- Matthias Kannen, 2000, Analyse ausgewählter Ansätze und Instrumente zu Integriertem Küstenzonenmanagement und deren Bewertung, Dissertation, Kiel:Albrechts University

Interviews for Germany as a whole:

- Consumer, agriculture and environment ministry

11. Bremen

Bremen is a city-state within the German federation. It administrates two separate territories: The city of Bremen at the river Weser and Bremerhavn (Bremens main port on the coast).

11.1. The policy maker in Bremen

Bremen is a city-state, The identified policy maker in Bremen is the senator for Public Works and the Environment (“Bau und Umwelt”) and its office (behörde für Bau und Umwelt”).

Responsibilities

The policy maker has a duty to provide coastal defences out a series of senate decisions. He mainly sees his role limited to providing defences.

Network of the policy maker

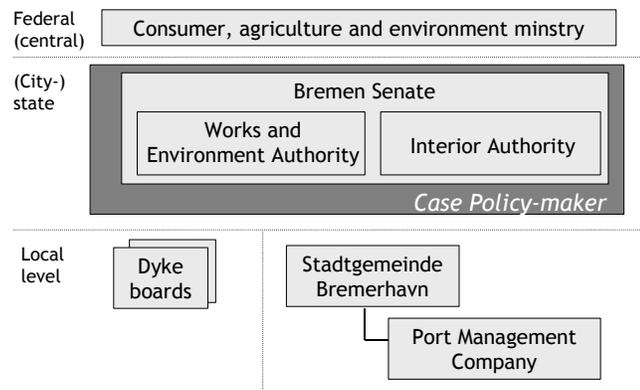


Figure 20 Involved organisations in Bremen

The Federal government funds 70% of investments costs in defences up to a certain maximum (see paragraph 11.1).

Lower Saxony is somewhat dependent on the actions of Bremen. Bremen has constructed barriers upstream in the Weser and in its tributaries to, which also protect Lower Saxony. Decisions in this respect are taken together by the two states, and Bremen receives funding for this.

In the city of Bremen, two dikeboards build, maintain and operate defences. For the – mainly industrial – Bremerhavn recently the operational responsibility has been transferred to the port management company, which whom the city of Bremerhavn has a contract.

Public Attitude

A low awareness is noted, as floods have not happened for a long time.

11.2. Problem perception of the Bremen policy maker

Flood risk

Floods can affect the majority of the territory of low-lying Bremen. For the city of Bremen floods can be caused by storm surges and by high river discharges. The potential consequences are considered disastrous and life threatening, although no flood has occurred for a century.

Bremen's main approach to floods is deterministic, much alike Lower Saxony. However within the policy document [Sen. Bau und Umwelt 2003], probabilistic approaches are presented as background information.

Other aspects

Budget / economics

Budget is not always available, but not a major problem. As the main expression of the risk is deterministic, cost-benefit trade-offs are not made explicitly⁴⁷.

Navigation

In the 19th century a new main port for Bremen was started at what now has become Bremerhavn. Nevertheless some port activities still remain in Bremen and further upstream, thus accessibility still has some importance.

Necessity of land

Bremen is a small, low-lying urban state. A general avoidance is not considered an option, but some rural farmland that is also present is not regarded to be as necessary for development.

11.3. The chosen solution

The policy maker focuses strongly on defences, for which it sets out regulation and provide funding. The policy maker leaves operational arrangements to the city of Bremerhavn, the dike boards and the port management company and is involved in funding, supervising and coordinating these. It has made arrangements with Lower Saxony to jointly fund the barriers that provide both states protection.

⁴⁷ A general cost:benefit study has been conducted in corporation with the federal government as pilot project.

11.4. The instrument-table

Coastal Defences

The main tributaries of the Weser have been closed of by barriers. Upstream from the city of Bremen (but still in the territory of Bremen) a barrier is present.

Especially to deal with fluvial flooding, recently a number of controlled flood areas have been set. One of these has been specifically necessary because of the added resistance of the Weser barrier during high discharges.

Behind the barriers secondary defences (mainly meant for fluvial protection) are present. These are no longer reinforced, but maintained in at their present state.

Emergency strengthening is organized by the operational managers, who developed plans for this.

Crisis management

In times of (near) flooding a liaison officer is added to the crisis staff of the senator of the interior, who bears the responsibility for disaster management.

Limited plans for flood management exist. At the moment these are being extended and software tools to simulate floods is being developed to improve the predictions.

			Instrument type (steering method)				
			Directly	Regulatory	Economic	Communication	Overall
Reducing probability	Coastal defence	Primary lines		Supervise activities of dyke board ●	Receive funding from LS. Fund activities of dyke boards. Contract to port management ●	Dialogue with lower saxony ●	●
		Secondary line		Supervise activities of dyke board ●	Fund activities of dyke boards. Contract to port management ●		●
		(Prepare for) Emergency repairs					●
Reducing consequences	Flood resistant buildings					Send out message that in front of dykes people are self responsible ●	●
	Spatial avoidance						
	Crisis management	Forecasting and warning prep.	Forecast ●			Flood warning system ●	●
		Evacuation and Rescue prep.				Liaison with disaster management staff during crisis ●	●
Compensation	Recovery	Redistribution of costs			Some ad-hoc measures in severe cases ●	●	
Overall			●	●	●	●	

● used, but sporadic and/or considered not important
 ● used, considered of some importance
 ● used, considered quite important
 ● used, considered crucial

Figure 21 Instrument table for Bremen

11.5. Recap for Bremen

Bremen has for long not experienced floods, but still considers the risk present and potential disastrous. The Weser and its tributaries flow through Bremen into Lower Saxony, creating opportunities for joint action.

The policy maker has chosen to focus on defences. The construction and operation of these defences is left to the waterboards and port management company. The policy maker has arranged joint funding with Lower Saxony of the barriers.

11.6. Point of attention for reflection

An interview with the a person at the policy maker has not been possible. Instead a list of written questions has been used.

11.7. Sources used for the Bremen Case

Written sources

- Die Senator für Bau und Umwelt Bremen, 2003, Allgemeine Informationen über die Wasser- und Bodenverbände in der Stadtgemeinde Bremen, www.umwelt.bremen.de (as of 6-5-2003)
- Die Senator für Bau und Umwelt Bremen, 2002, Hochwasserschutz in Bremen

Interviews with persons at:

- The office of the senator for Public Works and the Environment (by email)
- The university of Bremen

12. Hamburg

12.1. The Policy maker in Hamburg

Hamburg is a city-state within the German federation, governed by a senate. Within the senate, the senator for infrastructure and transport and its office is the policy maker for flood risk in Hamburg with respect to the public interest (all areas except the port). The senator for port economy is the policy maker for the protection of the port industry. The senator for security is responsible for dealing with flood disasters, such as preparing for evacuation.

As neither of these three senators and their offices has the overarching lead to all aspects of flood policy, the entire city administration of Hamburg as is taken as policy maker.

This administration became actively involved in 1962, after a major flood that killed over 300 citizens. Before 1962 coastal defences were left to the water boards.

Responsibilities

The Senate has committed itself by a series of decrees to maintain defences ‘of public interest’ to certain specifications. At some places in front of these defences houses have been built, these are for the own risk of people.

The port area is mainly occupied by relative large firms. In principle, they are self-responsible for organising their defences. Due to the crucial importance to the economy of Hamburg the city administration does see a support role.

The network of the policy maker in Hamburg

Figure 22 depicts the network of the policy maker in Hamburg. The central government is limited to the funding of 70% of the investments in works up to a certain maximum (see chapter 11).

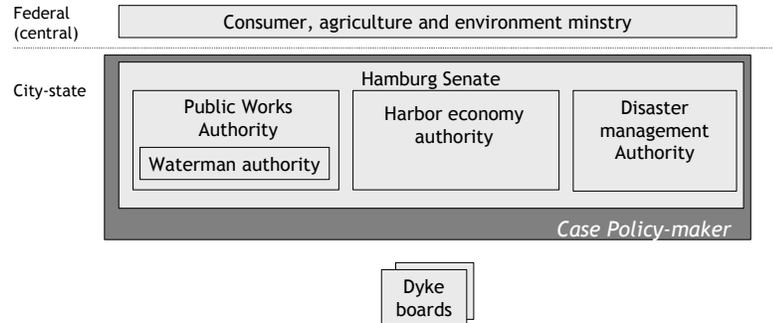


Figure 22 Formally involved organisations in Hamburg

Before the flood of 1962, the water boards played an important role in dike construction and maintenance. Nowadays the water boards only have a task in the strengthening of dykes during storms, if necessary.

Hamburg is somewhat dependent on Lower Saxony and Schleswig-Holstein on the other. As long as the dikes of the other states are considerably lower than those of Hamburg, a storm surge will be absorbed by floodings in these more rural states. On the other hand, a storm surge barrier downstream the Elbe would also benefit Hamburg.

Public Attitude

According to the Hamburg policy maker, the general public in Hamburg is aware of flood risk. This is mainly attributed to the 1962 flood.

12.2. Problem perception of the policy maker in Hamburg

The Flood Risk

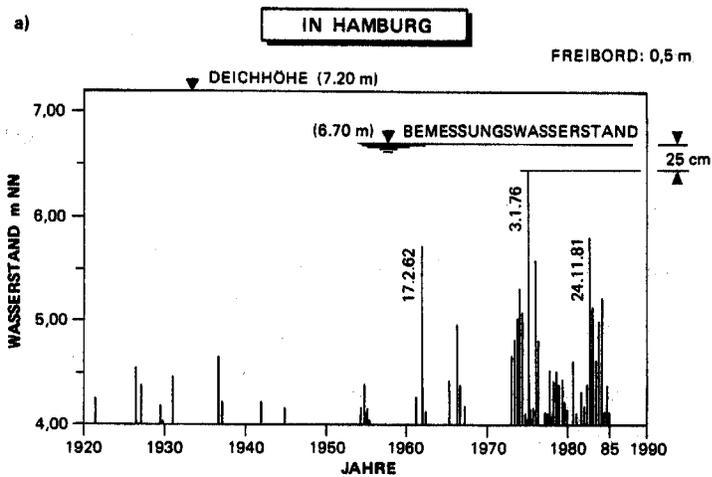
Hamburg is situated at the Elbe at a point where both high river discharges and storm surges can be threatening (comparable with Antwerp and London).

The Elbe has been deepened for navigation and this had a large impact on the propagation of storm surges into Hamburg. As there are no long records of levels in this new situation, statistical probabilities cannot be calculated. A single value method is used instead.

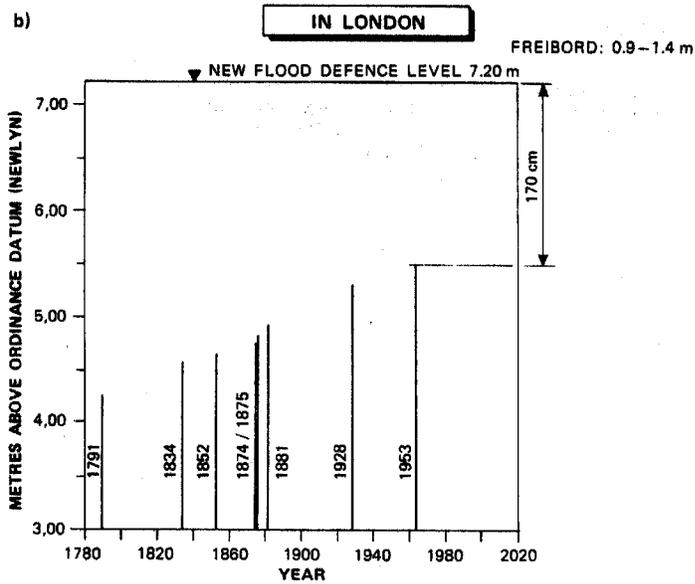
This means that, like in Lower Saxony, probabilities or annual damages cannot be estimated. The difference with Lower Saxony is that the design margin in the defences (on top of the single value) is open to political and societal debate.

The policy makers consider the amount of land that can be flooded high, especially relative to the small size of the state. The focus is on major disasters with loss of life. Material damages receive less attention. Between 1962 and 1976 damages in front of the state (main) dikes were considered to be even entirely a matter of the landowners. After 1976 some attention is given to these areas.

FIG. 1 ENTWICKLUNG HOHER STURMFLUTEN



(NACH REF. 5.07, UNTERLAGEN DER STURMFLÜTKOMMISSION)



(NACH REF. 5.12, R. HORNER)

Graph taken from a study undertaken by Masuch and Olbirsch [1986], This graphs shows that the difference between highest recorded (or calculated) and design level expresses the safety. (whereas in Lower Saxony this difference is a expert judgment). This particular study also uses probabilistic approaches.



The river Elb and the port of Hamburg at dawn

photo by Chris Reyners

...

Perceptions and goals besides risk

Economy / budget

Hamburg considers it appropriate for its city to have higher dikes than the more rural bank of the Elbe in Lower Saxony and Schleswig-Holstein. This is called the “Metropol zuschlag” (Metropolitan allowance). This is now the case after a recent heightening. However Hamburg does not consider it inappropriate to differentiate the levels of protection within its state (for instance between its rural and urban areas).

The normal funding division between state and federal government is 30%/70%, But Hamburg pays more than 30%, as it finds much more investments are needed than the federal assigned budget. Some additional funding from the European Union has been acquired.

Ecology

Although most of Hamburg consists of urban area, some protected nature are presented. According to the EU Habitat directive, loss of this nature need to be compensated. However, there is very little room for compensation within the boundaries of the Hamburg state. Negotiations with other states on compensation in their territory have proven to be difficult.

One of the reasons not to construct a storm surge barriers has been that it would be difficult to accommodate ships that cannot enter the port during closure of the barriers.

Necessity of low-lying land

It has not been a consideration to not defend certain areas. Space is scarce in Hamburg.

Navigation

The port of Hamburg is regarded to be of vital importance to the Hamburg economy.

The deepening of the Elbe took place before the consequences to storm surge propagation were known. This was learned the hard way in 1962.

Navigation issues have been important in the decision not build a storm surge barrier. The barrier is a threat for navigation, but large ships would be also be a threat for the closure of the barrier.

12.3. Chosen solution by the policy maker in Hamburg

The Hamburg strategy has since the floods of 1962 two focus points. First of all strong coastal defences, and should these fail, an thoroughly prepared warning of the population.

This is mostly achieved by direct action, however for evacuation it is regarded to be as essential that there is a general awareness of flood risk and information on the evacuation is disseminated in advance.

The Hamburg city takes a more distanced position to the port area, and encourages the building of defences by the industry in the area.

12.4. Instrument table for Hamburg

Figure 23 depicts the instrument table for Hamburg

Coastal defences

The senate itself builds and maintain dikes. After the flooding of 1962 these were heightened. Twice since then the design height has been increased. The main reason for this have been increases in estimates of extreme water levels.

After 1962 no major measures were taken for the port area, as the damage was only economical. However in 1976 again a large flood swept again through the port area. At that time the port industry felt measures had to be taken and they started to build private dikes. For this they do receive advice and up of 75% (25% state, 50% central government) through the port economy authority of Hamburg.

Secondary dikes

Often these private dikes form a protection line in front of the public dikes. This is regarded to be as a positive side effect, not a deliberate aim of these dikes. Some secondary dikes are present behind dams alongside tributaries to the Elbe, these are also dikes against fluvial flooding.

In the experience of the policy maker these are more easily somewhat neglected, because their protective function is less clear. This has been another consideration not to build a barrier in the Elbe (see frame)

Emergency repairs

There is an elaborate plan to carry out emergency repairs if necessary. This includes stocks of material at several locations. Water boards play a role in guarding and reinforcing these dikes during emergencies.

STURMFLUT

HINWEISE FÜR DIE BEVÖLKERUNG IN DER ELBNIEDERUNG

- Information in English is available
- Sizin için yetkili semt idaresi alabilirsiniz.
- Informacje w języku polskim
- Informacije na srpskohrvatski
- Информации на руском местном ведомстве.

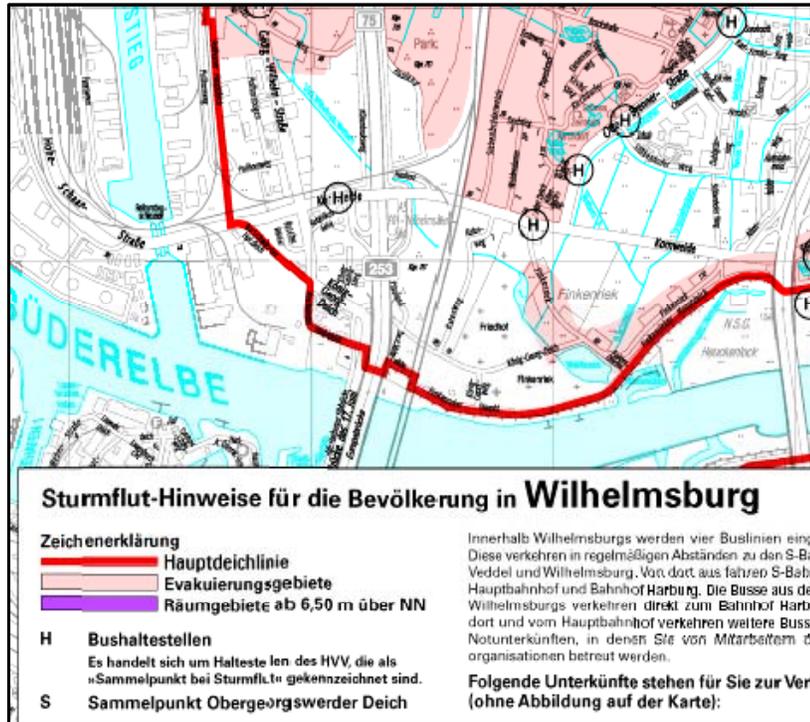
Faltblatt für Wilhelm:



Liebe Hamburgerinnen, liebe

Der Hochwasserschutz in Hamburg ist so weit vorangebracht, dass die Schutzanlagen bis zu einer Höhe von 6,50 m über NN ausreichen. Dadurch hat sich die Gefahr einer Sturmflut verringert.

Erfahrungen aus aller Welt zeigen, dass es bei Sturmfluten zu erheblichen Schäden kommen kann. Dies gilt auch für die Elbniederung, deren Wasserstand bei Sturmfluten bis zu 6,50 m über NN ansteigen kann.



Parts of an evacuation information map/leaflet, annually spread door-to-door by the city of Hamburg

Building protection

One area has slowly converted itself from an abandoned port zone into a commercial and residential area. People are expected, and do, take their own precaution measures here. Another form of individual building protection, is too simply raise the ground, this is done in the port area by firms.

Spatial avoidance

Permanent living outside dike areas is not allowed. There is no policy on avoiding built-up in low-lying areas behind defences. However the public evacuation plans might have an impact upon the willingness of people to buy houses in low areas.

Crisis management.

Hamburg pays much attention to emergency management. Investments have been made in an advanced forecast model. Detailed evacuation plans are made, which identify (on the basis of topology) regions at medium and high risk during floods.

In this plan evacuation routes and pick-up points for public points are identified. For the eventuality of a short warning time there is even a secondary contingency plan: high, strong buildings or high grounds within deep areas are identified on the map. All this information is disseminated yearly to the general public. These plans can even be found in the yellow pages.

Compensation

Insurance is considered to be impossible: no insurer is expected to take such a large cumulative risk. Limited compensation has been paid out in 1962 on an ad-hoc basis and this might happen again after a flood, but there is no specific arrangement for this.

			Instrument type (steering method)				
			Directly	Regulatory	Economic	Communication	Overall
Reducing probability	Coastal defence	Primary lines		Supervise activities of dyke board ●	Receive funding from L.S. Fund activities of dyke boards. Contract to port management ●	Dialogue with lower saxony ●	●
		Secondary line		Supervise activities of dyke board ●	Fund activities of dyke boards. Contract to port management ●		●
		(Prepare for) Emergency repairs					●
Reducing consequences	Flood resistant buildings					Send out message that in front of dykes people are self responsible ●	●
	Spatial avoidance						
	Crisis management	Forecasting and warning prep.	Forecast ●			Flood warning system ●	●
		Evacuation and Rescue prep.				Llilason with disaster management staff during crisis ●	●
Compensation					Some ad-hoc measures in severe cases ●	●	
Overall			●	●	●	●	●

● used, but sporadic and/or considered not important
 ● used, considered of some importance
 ● used, considered quite important
 ● used, considered crucial

Figure 23 Instrument table for Hamburg

12.5. Recap for the case of Hamburg

The Hamburg state has taken the responsibility for the flood risk management in 1962, after a disastrous flood. These type of disasters are still the main concerned risk, with a focus on loss of human life.

The policy maker takes a deterministic approach, however the difference between the design crest level and highest expected level is seen as a political and societal discussion. It can be regarded as a sort of expression of the protection level.

The chosen strategy to reduce the risk of disasters is twofold. It consists of flood defences with a considerable margin above the highest calculated value and a warning and evacuation plan disseminated to the general public.

12.6. Point of attention for reflection in Hamburg

No lead department has been identified with regard to coastal flood risk. Because of this whole administration of Hamburg has been taken as policy maker.

12.7. Sources used for Hamburg

Written sources

- Heinz Aschenberg and Gerhard Kroker, Sturmfluten und Hochwasserschutz in Hambrug - Ein Abriss der Geschichte des Deichbaus und der Binnenentwässerung im Sturmplutungsgebiet der Elbe, Hamburg: Baubehörde und Architekten- und Ingenieur-Verein
- Marina Eismann / Michael Mierach, Wenn die Flut kommt... - Erinnerungen an die Katastrophe von 1962 und Heutiger Hochwasserschutz, Hamburg: Dölling und Galitz Verlag
- Marina Eismann and Michael Mierach, 2002, Wenn die Flut kommt... erinerungen an die katastrophe von 1962 und heutiger hochwasserschutz, Hamurg: Behörde für Baue und Verkehr
- Freie und Hansenstadt Hamburg / Masuch + Olbrisch Berantende Ingenieure, 1986, Risiko-analyse der Hochwassergefährdung Hamburgs
- Freie und Hansenstadt Hamburg, Baubehörde, Amt für Wasserwirtschaft, 1993, Küstenschutz in Hamburg - Deichbau und Ökologie
- Freie und Hansenstadt Hamburg, 1995, Hamburger Senat entscheidet sich für langfristigen Hochwasserschutz durch Deicherhöhungen
- Freie und Hansestadt Hamburg, 2003, STURMFLUT - Hinweise für die bevölkerung in der Elbniederung
- Freie und Hansenstadt Hamburg, Behörde für Bau und Verkehr, Amt für Bau und Betrieb, 2003, Hochwasserschutz in Hamburg
- Peter Haake, 2003, Hochwasserschutz in Hamburg
- Freie und Hansestadt Hamburg, Behörde für Bau und Verkehr, Amt für Bau und Betireb, 2003, Hochwasserschutz in Hamburg
- Freie und Hansestadt Hamburg, Behörde für Bau und Verkehr, Amt für Bau und Betrieb - Peter Haake, 2003, Hochwasserschutz in Hamburg

Interviews at

- The authority for Public Works and Transport

13. Schleswig-Holstein

13.1. The Policy maker in Schleswig-Holstein

The policy maker in Schleswig-Holstein is the ministry for the interior. In the past the waterboards were fully responsible for coastal defences, but became unable to finance investments. After this the ministry took over the responsibility in 1971.

Responsibilities

Formally the responsibility of the policy maker is limited to the managing of the state-dikes (basically the primary mainland dikes) and supervising and funding the secondary dikes (by the waterboards). The Schleswig-Holstein dike-law specifies the safety level of these state-dikes (see further paragraph 18.3):

“the state dikes should be designed to withstand all stormfloods”

Schleswig-Holstein Water Act

These responsibilities are specific for the east coast, for the west coast (bordering the baltic sea) , more responsibility is laid with the land-owners. This differentiation has been made, because the Baltic sea is less hazardous with respect to flooding.

The network of the policy maker

The network of the policy maker is depicted in figure 26. The federal government provides 70% of investments costs, up to a certain maximum (see chapter 11). The state of Schleswig-Holstein is not divided into counties, but regional offices of the state government do exist. These implement the flood instruments. The elected waterboards are responsible for the maintenance of the secondary dikes⁴⁸.

⁴⁸ In Schleswig-Holstein (on the contrary to Lower saxony), the state also funds investments within the design parameters

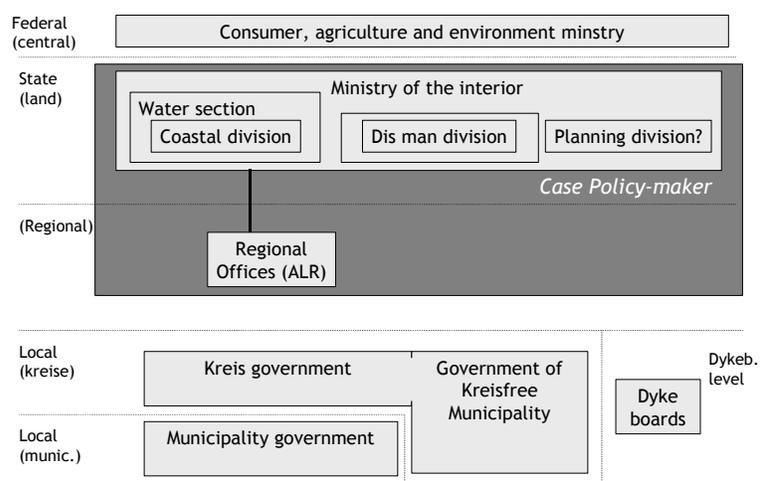


Figure 24 Involved organisations in Schleswig-Holstein

Public attitude

The general public is noted to be aware of historic flooding. The sea is also referred to as “Blanken Hans” (Pale Hans), who takes away lives. However people trust that the present dikes are strong enough to protect them against this danger.

13.2. Problem perception of the policy maker

Protected from life-threatening storm floods and the damaging influence of the Sea, people life, work and recreate – now and in the future – in the coastal zone of Schleswig-Holstein.

Ideal (Leitbild), Masterplan Coastal Protection, Schleswig-Holstein (translated)

Flood Risk

Along the entire west coast, reclaimed and other low-lying areas are located. These make up a considerable part of the territory of Schleswig-Holstein. In addition some areas are threatened from the Baltic Sea

The interviewees and other sources note the extensive flooding in the past. Much of the land lost in 14th century has never been won back. The focus is thus on the life-threatening floods, especially disastrous floods. Dikes are first of all a life protecting objects. But in a recent study by the policy maker a very wide range of damage categories has been taken into account.

Perceptions and goals besides risk

“All agree that coastal protection has priority over other interests, of its life protecting function, including the interest of nature”

Masterplan Coastal Protection, Schleswig-Holstein (translated)

Budget / economy

The budget is limited. These limitations lead to a delay in carrying out works.

The policy maker does want to incorporate economics (cost-benefit analysis) into the policy, though differentiation of protection levels is not possible:

“.... behind all our dikes are people living. A risk-based approach asks for valuation. Such approaches cannot take the loss of life into account, therefore we have said ‘all people shall have the same safety standard’ “

Interviewee at the policy maker

Ecology

Although safety has priority over ecology, ecology is considered important. Ten principles for sustainability have been formulated, in which ecological damage is tried as much as possible to be avoided and otherwise compensated.

Necessity of land

Schleswig-Holstein has set a policy of standstill. No land is reclaimed anymore, however also a policy to not abandon land is set.

13.3. Chosen solution by the policy maker in Schleswig-Holstein

The policy maker has a strong focus on its legal duty for coastal defences. The primary line is under the policy makers direct control and he supervises the management by the water boards of the secondary line. In addition the policy maker is involved in the preparation of flood management plans. On the other intervention points the involvement of the policy maker is limited.

One of the apparent main challenges for the policy maker is its legal duty to build dikes that are designed to withstand all storm floods, as no water level can be defined that for sure will never be exceeded.

However since long an operationalisation of this duty has been accepted, which takes the maximum of the following three calculations:

- The water level with a statistic return period of 100-year
- The highest ever recorded water level
- The sum of highest recorded/thought components of extreme water levels

At the Baltic Sea the second value is at the moment determinative, at the North Sea coast the first. Although the transformation from “all floods” to “once in 100 years” seems problematic, this is long-standing and considered political accepted. Or as one interviewee at the policy maker answered to the question why ‘100’ and another number:

“I don’t know exactly. 100 years has been accepted in the past. Why change it then?”

Interviewee at the policy maker

A challenge for the policy maker has been to incorporate economics despite the demand for equal safety standards. It is considered to be societal unacceptable to differentiate the design protection levels. However, the prioritisation of works on the basis of investments they protect, has been accepted. As projects stretch out over decades, this leads to significant *de facto* differentiation of safety levels.

13.4. Instrument table

Figure 28 depicts the instrument-table for Schleswig-Holstein

Coastal defence

The entire North Sea coast is protected by dikes, dams and locks. Although there is no legal duty to defend secondary dikes and their management is left to the water boards, they are regarded to be quite important to limit the effects of a flooding.

The policy maker has no indication that these secondary dikes pose a risk, by increasing the flood speed in the area between the secondary and primary dike. For

emergency strengthening and repair, a dedicated service road has been built behind the dike.

Like in all German states the yearly inspection of the dikes is an important communication tool. The local government can discuss its problems with the state and the event receives media attention.

Spatial avoidance

Living in front of the state dykes is forbidden. However it should be noted that there is very few land in front of these dykes

Crisis management

There is a forecasting service that details the forecasts at federal level. Evacuation is a task of the Kreise, however the policy maker is actively involved in advising the Kreise in this matter.

Redistribution of costs

Though formally people are not entitled on compensations, after significant events usually a political decision is made to compensate.

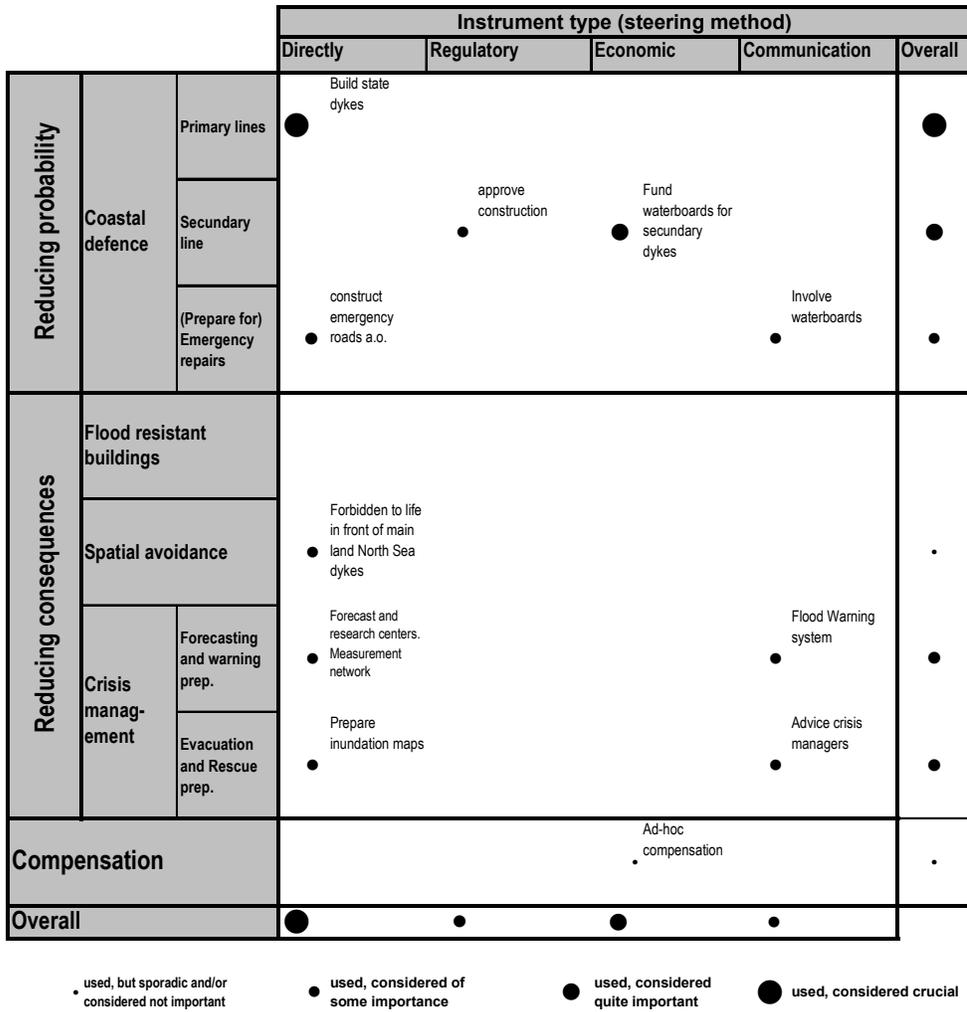


Figure 25 Instrument table for Schleswig-Holstein

13.5. Recap for the case of Schleswig-Holstein

The policy maker in Schleswig-Holstein sees floods as potentially life threatening and disastrous. This brings along a demand for equity in the protection of human life. The protection is given priority of other interests. The law even demands defences designed against all storm floods.

The policy maker focuses on this legal duty to provide coastal defence, it has operationalised 'all floods' into '1:100 years' for the primary dike and uses secondary dikes to limit the extent of flooding. These latter are managed by the water boards, but supervised and funded by the policy maker.

13.6. Points for reflection in Schleswig-Holstein

In Schleswig-Holstein several ministries have fused into the ministry for the interior. The disaster management section is within a different part of the large ministry

Sources for Schleswig-Holstein

Written sources:

- Jacobus Hofstede and Bernd Probst, 2002, Integriertes Küstenschutzmanagement in Schleswig-Holstein, Kiel: Ministerium für ländliche Räume, Landesplanung
- "Ministerin für ländliche Räume, Landesplanung, Landwirtschaft und Tourismus des Landes Schleswig-Holstein, GeneralplanKüstenschutz."
- Landeswassergesetz (Wassergesetz des Landes Schleswig-Holstein), In der Fassung vom 13. Juni 2000, GVOBl. Schl.-H. 2000 S. 490, ber. S. 550.
- Innenministerium des Landes Schleswig-Holstein, 2003, Integrated Coastal Zone Management in Schleswig-Holstein

Interviews with persons at:

- Ministry of the Interior
- University of Kiel

14. Denmark

14.1. The Policy maker in Denmark

The policy maker in Denmark is the Ministry of Transport and the Danish Coastal Authority. Their involvement started in 1976, before that the situation was left entirely up to local water boards in the Wadden Sea region. In the Northern region flood protection is less of an issue.

The Danish Coastal Authority has five years contracts with the ministry. In these non-public documents to quite some detail objectives and instruments are laid down in quite some detail. Funding-decisions of dike-projects in the Wadden Sea region remain a responsibility of the ministry.

Responsibilities

In Denmark, the first responsibility for coastal defence is with the land-owner. However, in practice this is only expected from land-owners on the Baltic coast, at the North Sea Coast land-owners only have to pay for the defences provided.

The policy maker stresses the autonomy and strength of the regions (at county-level, Amter in Danish). The policy maker sees himself as having a facilitating role when it comes to flood protection. This facilitatory role is in practice extensive (see paragraph 19.3).

In the North (directly on the North Sea), flooding is a minor issue and water boards do exist. Here, joint-management agreements with regional authorities are made.

The network of the policy maker in Denmark

According to one author, the Coastal Authority is the pivot in coastal policy [Borup 1999]. The exact organisation differs between the Wadden Sea region and the remainder of the North Sea Coast.

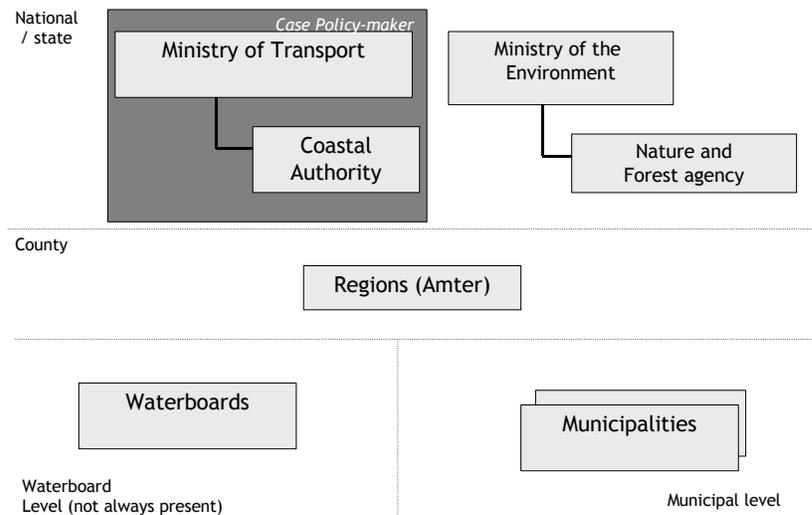


Figure 26 Involved governmental organisations in Denmark

After serious flooding in 1976, the role of elected dike boards in the Wadden Sea Region was reduced, significantly. The water boards form a link between the local population and the government. Collecting the tax from those that benefit from the protection is one aspect of this link.

The main responsibility nowadays is with the regions (Amter). They initiate projects and bear the primary responsibility for their completion and maintenance.

The North Sea area (which also faces a lower degree of threat from the sea), does not have a tradition of dike boards. The policy maker has management agreements with local authorities (such as nature agencies, regions and municipalities) regarding coastal management.

The ministry of Environment and its agency, which approves spatial zoning plans and enforces ecological regulation, plays an important role in the coastal management of both areas.

The policy maker has a seat in the board that decides on disbursements from the flood fund (see paragraph 15.4).

Public attitude

Floods are not a major issue in the Danish society, as only limited areas are involved. The people in those areas are quite aware of the possibility of flooding, as standards of the coastal defence are quite low.

These low failure standards are accepted, also because of the existence of compensation funds. Only directly after flood is there high demand for protection. This fades as the memory of the floods fades.

In the 1970's and 1980's, no protection was provided at some stretches of coast. However when floods actually occurred, a strong societal pressure for some protection manifested itself.

14.2. Problem perception of the Danish Policy maker

“Our problems are not of Dutch dimensions”.

Interviewee at the policy maker

Flood risk

The flood-prone area in Denmark is regarded to be limited, with no land below sea level and only small areas, unpopulated areas are low-lying. There is no single definition of flood-prone, but usually everything below 5 meter is considered to be flood-prone.

Climate change, especially on the longer run, is regarded to be something to take seriously. On the very long term it is thought to be a force that can force a policy-change towards retreating at some points away from the coast.

The only loss-of-life in recent history has happened when workers were washed away at a dike reinforcement project. However without measures there is a real danger perceived for the inhabitants of two towns (about 10 000 inhabitants) at the Wadden Sea. The town of Tyboron further North, is exceptional vulnerable to flooding, as it is virtually surrounded by the sea and a lake. A flood is considered to be catastrophic for the town.

Perceptions and goals besides risk

Budget / economy

Following the 1976 flood, a societal cost: benefit analysis was used as the subsequent basis for the policy, resulting in the choice to leave some areas

unprotected. When these did occasionally flood, societal pressure ensured that a minimum standard of protection was introduced (see further 19.3).

Up till now, funds have been to meet the optimal societal cost: benefit and the added minimum safety standard. However, the new government is planning budget-cuts for many departments.

Ecology

Ecological considerations are making the implementation of some measures more difficult, but not impossible. The policy maker regards it to be a delaying factor and a source of added requirements in the design of dikes.

Landscape

“We don’t want our coasts to end up looking like the Spanish coasts”

Interviewee at the policy maker

Landscape conservation is considered the most important interest along the Danish coast. For this reason 300-meter and 3000-meter restriction zones have been established. Within 300-meter of the coast limited new activities are permitted. For the 3000-meter zone the restrictions are less strict, although permits are required for development.

Necessity of land

Development with regard to flood risk is not an issue. The landscape and ecological regulations already prohibit building in flood-prone areas. More in general, the Danish have never undertaken major reclamation works.



The Danish coast. Cliffs at the North Sea coast near Bljølberg (above).

The Waddensea coast near Ribe (below)

14.3. Chosen solution by the policy maker

The policy maker stresses the initiatives at the county level, but chooses to remain heavily involved. For example, coastal defence projects are usually carried out in the following way:

The DCA monitors the coast for possible weak points, notifies the region and dike board, when these are found. At their request the DCA drafts an improvement plan. This plan used as basis for the county to apply for funding to the ministry, after which the DCA takes care of the implementation and monitors the new situation.

After the 1976 floods, the Danish policy maker devised a general strategy for flood risk management. A cost-benefit analysis was adopted as basis for decision making.

Three main elements can be distinguished in the chosen strategy:

- Protection by defences if average costs are lower than the average avoided damage. This led to a 1:200 years standard for two towns.
- Compensation of damages in the case of severe floods
- A warning and evacuation plan and system to deal with the threat to humans.

This solution led to occasional, uncompensated flooding. This turned out to be societally unacceptable. Accordingly, a minimum protection standard of 1:50 years was set. Damage owing to events that are more rare than 1:50 years is usually eligible for compensation. For the town of Tyboron a unique standard of 1:1000 years has been set, as a flooding here is considered to be life threatening.

At the moment the cost-benefit analyses are being updated. The new method will also take the immaterial damages (such as loss-of-life) into account.

14.4. Instrument table

Coastal defences

A continuous line of dikes is present along the Wadden Sea coast from the German border. Further north there is a mixture of natural and nourished dunes, and some 'hard' defences. In the far North the primary concern is with erosion not with flood protection.

A second line of dikes is present near the German border, but this is considered exceptional. Emergency repairs are not carried out during storm situations, the risk to personell is considered not to outweigh the possible prevention of a breakthrough.

Building protection

Buildings at risk of flooding have to adhere to governmental regulations. The flood heigth has to be above the expected flood heigth. The policy maker has been involved in this by advising the ministry that has issued this regulation.

Spatial avoidance

There are no specific spatial regulations with regard to flood risk. However due to the landscape and ecological regulations, this is not required. The coastal authority has has the power to permit or prohibit activities directly at the coastline

Crisis management

Forecasting flooding and subsequently evacuating threatened areas is a crucial part of the Danish strategy. Evacuation plans for both the urban and rural areas are made and practices are carried out. Due to the low protection standards of the dikes, flooding or near-flooding occur and experience is gained with evacuations.

The DCA is involved as advisor in both in the preparatory as well as operational crisis management. In the drafting of plans they play a major role.

Compensation

The Danish compensation system is formally called an insurance system. However it comes down to a disaster fund arrangement. There is an obligation to buy a flood insurance, if one takes fire insurance. The premium goes into a fund that is controlled by an independent board.

The main criterion for compensation is whether a storm surge is classified as 'severe'. In general, a storm is severe for a specific location, if it is more rare than the one in fifty year event. This is equal to the minimum defence standard. In this way, defences and the compensation fund complement each other.

			Instrument type (steering method)				Overall
			Directly	Regulatory	Economic	Communication	
Reducing probability	Coastal defence	Primary lines	Nourish dunes (North Sea Coast) ●	Fund dykes (built by region/land-owners). ● One secondary dyke funded .	Aid in analysis, design etc. ● (don't risk lives policy)	●	
		Secondary line					
		(Prepare for) Emergency repairs					
Reducing consequences	Flood resistant buildings		Aid few houses during storm . event	Floor height >= flood height ● regulation		●	
	Spatial avoidance			Permitting near the coast .		.	
	Crisis management	Forecasting and warning prep.	Forecast and research centers. Measurement network Evacuate, prepare evac plan, coordinate with police and others ●		Flood Warning system ●	●	
		Evacuation and Rescue prep.			Emergency communication: Informing and instructing people what to ●		
Compensation	Recovery	Redistribution of costs		Public insurance ●		●	
Overall			●	.	●	●	●

• not used ● used, but sporadic and/or considered not important ● used, considered of some importance ● used, considered quite important

Figure 27 Instrument table for Denmark

14.5. Recap for the case of Denmark

The Danish policy considers the risk of coastal flooding to be quite limited, but to include some threat to human life. Although the responsibility is considered to lie with landowners and regional government, the policy maker is very involved in managing the risk. Theoretically, compensation, defences and evacuation instruments complement each other in such a way, that virtual all risk is eliminated

Prevention is only used, if the the costs do not exceed the average costs of compensation, but a minimum standard has been set. Forecasting and evacuation planning is used to reduce the threat to human life at most places.

14.6. Points of attention for reflection in Danish interviews

In Denmark the publicly available information on flooding risks is limited. The agreement between the coastal agency and department, outlining the concrete goals, is confidential. The ministry has not been interviewed.

14.7. Sources for Denmark

Written sources

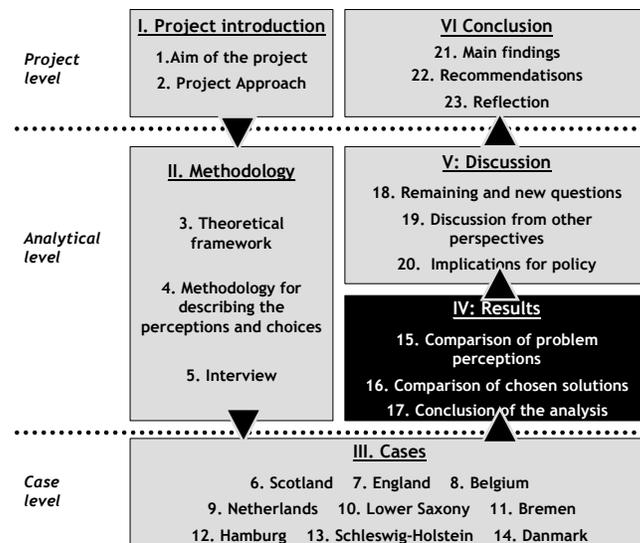
- Heile T. Ankenr, Vibeke Nelleman and Sten Sverdrup-Jensen, Integrated Coastal Zone Management in Denmark, Ways and means for further integration, discussion paper for the transnational seminar on the European Spatial Development Perspective, Göteborg October 1998
- Borup, 1999, Integraal Kustzonebeheer in Denemarken, Den Haag: Rijksinstituut voor Kust en Zee
- Christian Lastrup, 2001, Coastal Protection Strategies, Danish Coastal Authority
- NORCOAST - Review of national and regional planning processes and instruments in the North Sea Region - Full Study, 1999
- NorVision, 1999, A spatial perspective for the North Sea Region

Interviews with persons at:

- Amt (region) Ribe
- The Danish Coastal Authority
- The Danish Nature and Forestry Agency (by telephone)
- Dikeboard Ribe

Part IV Results: comparisons from the substantive perspective

In this part the descriptions of the previous part are summarised and compared. First with regard to problem perceptions and then with regard to the solutions. Lastly the key findings will be summarised.



15. Comparison of problem perceptions

The policy makers and their responsibilities

In almost all the studied countries, a high-level policy maker concerned with coastal flood risk could be identified. These policy makers are ministries, which are located at the state level in federal systems and located at the national level in non-federal systems. In Hamburg several involved departments have the lead together

The task fields present in the policy makers departments differ, but coastal defence is usually handled by the same department. However other fields relevant for coastal flood risk management (such as land-use planning and disaster management) are mostly handled by a different department.

The policy makers however, have relationships with those departments that are involved in land-use decisions. In England, Denmark and most of Germany relations also have been laid with disaster management authorities.

Citizens or government as primary responsible party

In the UK and Denmark the main responsibility for flood risk is with the citizens. The government does provide a certain reduction of the risk, but citizens are held self-responsible for accepting or reducing the residual risk.

An important difference between the UK and Denmark, is that in Denmark the citizen is expected to accept some flooding, but not to bear the costs of the damages incurred.

In the Netherlands and Flanders, the policy makers feel that society imposes a more far-reaching responsibility upon them than the law does. These policy makers feel they will be held responsible for all flooding events.

The German policy makers also face a societal pressure to prevent any flooding, but are more resistant of this pressure and restrict themselves largely to their legal tasks. The Schleswig-Holstein and Lower Saxony have limited their responsibility to a specific operationalisation of their legal tasks.

The legal requirement is to design main dikes to withstand all floods, but they have operationalised this to specific water levels and/or return periods, which they acknowledge are surely not for sure the highest possible.

Division of responsibilities within the government

Another point of is the policy makers attitude towards the division responsibility between the levels of government.

In the United Kingdom the policy maker restricts himself to the national interest. Investments in defences are only subsidized if they have a positive effects on the national scale. In England, the division of responsibility between the local and national level also differs greatly per stretch of coast. Since the early 1990s, the management of individual stretches of coast by different authorities is increasingly coordinated through non-statutory bodies such as shoreline management groups.

In Scotland, the Scottish government is since the 1990s the high-level policy maker, due to the increase of autonomy of Scotland from the national government.

In Belgium the only level of government with a direct responsibility in coastal flood risk management is the level of the state (gewest), this has been the case since the transformation of Belgium into a federal state in the 1980s.

The Dutch policy maker feels that since the 1953 flood the final responsibility always 'ends up' at his, because of the feeling of 'national solidarity' with regard to flood protection since the 1953 flood disaster. For example, most of the investments are – unavoidable - paid by the state.

In Denmark and Germany a similar development can be noticed. The involvement of higher level governments has also increased greatly after floods, but lower levels of government seem to have retained more responsibility. They can for instance not expect that all their investments are funded on short-term.

In Schleswig-Holstein the increase in the involvement of the policy maker is not directly related to flooding. The water boards that were previously the sole responsible government were no longer able to finance their task.

Findings on risk perception

The risk may be common, but the level and type of risk countries feel they have to deal with is very different. In Scotland the risk is perceived as uncertain, but low and not life threatening. Denmark considers extreme events to be life threatening, but a limited number of people and buildings are affected.

Flanders, Germany and the Netherlands consider flooding to be potentially catastrophic and focus on reducing the risk of such catastrophes. However Flanders and the Netherlands also take minor floods of the dune-strip into account, due to their far-reaching responsibilities imposed by society (note that Germany does not have dunes).

In England, the explicit ambition is to take the whole range of possible events into account. However in the current approach a focus on relatively frequent, material damages can be noticed.

All policy makers consider climate change as an important, though uncertain development. All policy makers have added precautionary margins in their design of new defences. However, only the policy makers in The Netherlands, England and Scotland have reconsidered if their selection of instruments need to be revised to cope with future climate changes. This has led to more attention for spatial instruments.

Findings on other aspects

The policy makers view on which aspects are related to coastal flood risk management are largely similar. The most important are land-use, ecology and economy (spending), However the policy makers differ in the priority they give to these aspects.

Necessity of using potential flood-prone land

The policy makers have a different view on the necessity of living and working in low-lying land. The Dutch policy maker regards it as crucial, given that half of his country is near or below sea-level. Germany and Flanders do not consider a general avoidance of these areas either as they cover a considerable area.

Scotland, England and Denmark, on the contrary, do – in general - consider their low-lying land non-essential for development, although exceptions occur. Past developments are however regarded to – in general – irreversible.

Public spending, Economic optimisation vs. equity

The Scottish policy maker wishes only to invest if the societal benefits are equal or larger than the costs. Projects that fall slightly short of this are usually also accepted.

In England the same basic approach is used. However the current budget is not sufficient. Therefore, the policy maker tries to get the most value (from a societal view-point) with the available means.

This approach is accepted by the majority of society. This is most probably connected to the fact that floods are considered non-life threatening (if evacuation takes place) and individuals can take commercial flood insurance.

In Germany, the life threatening potential of flooding leads to a societal demand for equity ('my life should be as well protected as yours'). Bremen and Lower Saxony's technical approach does not even allow differentiation in protection level.

The Dutch and the Danish policy makers have struck a balance between equity arguments and economic arguments in their approach. However they have achieved this in very different ways.

The Dutch policy maker has differentiated its protection standards by economic optimisation in the 150s. Rural areas, received a lower standard, but possibly not as much lower as economical optimal. The calculation of the 1950s is generally considered to be outdated. but there there is no funding available, for the enormous investment costs new standards would require.

The Danish policy maker has solved the inherent contradiction between equity and economy differently. Originally they started out with a purely cost:benefit approach such as in Scotland. However a minimum-protection goal was later introduced (still allowing a higher level where economically beneficial).

In Belgium the protection goals are somewhat based on economic arguments, though this cannot be traced back to explicit policy statements

Ecology

Although ecological consideration is largely dictated by EU regulation, differences can be noted. In Scotland and England the starting point is that the environment should not be damaged severely. From this starting point, compromises are possible in exceptional cases.

In contrast in Flanders and the Netherlands ecological interest are important, but only allowed to have an influence on *how* the protection levels are reached, not *if* they are reached.

Although this difference in priorities provides insight the difference in priority given to safety, it should be noted that the number of cases where areas that are left unprotected to spare the environment in the UK is quite limited.

16. Comparison of the chosen solutions

In this chapter the chosen instruments will be compared and their relation to the findings on the problem perceptions discussed.

16.1. The method of choosing instruments and general sets of instruments

Two types of reasoning from problem perception to instruments can be distinguished. The Scottish, English and Danish set out high-level, strategic aims and consider a wide range of alternative interventions to achieve these. The resulting choice is also a combination of instruments. For instance, Denmark has chosen a combination of defences, disaster management and compensation to achieve their goals.

Although the way they reason is quite similar, the goals the Danish and UK policy makers pursue are quite different. The UK aims at maximizing the effect on a national scale, the Danish policy maker pays much more attention to the protection of the individual.

In Flanders, Germany and the Netherlands the distinction between means and ends is more vague. Defences are chosen as intervention, because of legal duties, or because they are under the direct control of the policy maker. In this way, the policy makers are somewhat predisposed towards coastal defence.

The Flemish policy maker has planned a large paradigm shift in the approach to coastal flood risk management. It plans to consider a wide range of interventions in its next strategy. If this would indeed occur, his approach would become more similar to the approaches of the Danish and UK policymakers.

16.2. Comparison of intervention points

The UK and Danish policy makers intervene at a number of points, whereas Flanders, the Netherlands and Germany have a focus on coastal defence.

This focus can also be noticed in figure 28, which depicts the classification of instruments, aggregated to their intervention point. However in this figure is also visible, that the policy makers that focus on coastal defence, do sometimes have secondary foci, see for instance Hamburg's attention to evacuation. The specific intervention points will now be discussed further.

Prevention: Primary Defences

For Flanders, the Netherlands and the German policy makers coastal defence are crucial in the protection against disasters. Other interventions are of secondary importance.

As a result the continental coast has become a stronghold against the sea. A virtually uninterrupted defence line of dykes, (artificial nourished) dunes, dams and barriers runs along the entire coast.

Figure 28 Classification of aggregated instruments, according to the selected intervention point

	Reducing probability			Flood resistant buildings	Spatial avoidance	Reducing consequences		Compensation
	Primary lines	Coastal defence line	Secondary line (Prepare for) Emergency repairs			Crisis management	Forecasting and warning prep.	
Scotland	●			●	●	●	●	●
England	●			●	●	●	●	●
Flanders	●	●	●		●	●	●	●
Netherl.	●	●	●		●	●	●	●
Lower Sax	●	●	●		●	●	●	●
Bremen	●	●	●		●	●	●	●
Hamburg	●	●	●	●		●	●	●
Schl. Holst.	●	●	●		●	●	●	●
Denmark	●	●	●	●	●	●	●	●

● used, considered crucial
 ● used, considered quite important
 ● used, considered of some importance
 ● used, but sporadic and/or considered not important

To the UK policy makers, defences are much more a mean to an end. This can already be seen in the terminology used. Maintaining and inspecting dikes is in England referred to as “asset management” and in Scotland defences are regarded to be an “alleviation”. In England at least a third of the coastline is unprotected against flooding and/or erosion [Eurosion 2003].

The Danish policy maker started out with an approach similar to the UK. It no longer sustained protection of those stretches, where the societal costs exceeded the benefits. However under great pressure from society a minimum standard of defence was set. Nowadays virtually the entire Wadden Sea coast is protected by defences..

Secondary defences and emergency strengthening.

In Flanders and Germany (especially Schleswig-Holstein) secondary defences are regarded as a risk-reducing instrument. In the Netherlands, they are also regarded to as a risk on itself, as they create small flood pockets, which flood extremely rapidly. For Scotland, most of England and Denmark secondary defences are not very useful as the flood-prone areas are small.

The English, Flemish, Dutch and German policy makers prepare themselves lower to strengthen the dykes during high water levels or expect their lower governments to do so. The Danish and Scottish policy makers have not made such preparations. The Danish policy maker even discourages lower government from reinforcing their defences during such events, because of the high risk to the workers involved.

Prevention: Spatial avoidance

Scotland and England try to avoid built-up zones in areas potentially prone to flooding. The Dutch and German policy makers try to avoid building in *unprotected* flood-prone areas. The Danish policy makers consider this largely the responsibility of the people themselves. The Flemish policy maker perceives a lack of instruments to intervene at this point.

Prevention: Building protection

Only the UK policy makers consider structural measures to buildings as a significant part of their strategy. In Denmark some regulation exist and in Hamburg private parties choose themselves to raise grounds, but neither the Danish nor the Hamburg policy maker has been the initiator of these regulations.

Prevention: Disaster management

All policy maker consider early warning an important instrument and are involved in someway in forecasting and passing alters on towards disaster management authorities. Most of them are also involved in the preparation for flood management plans, for handling a breakthrough. However the Dutch and Flemish have at present only arranged a liaison between themselves and the disaster management staff.

Compensation

In the United Kingdom private insurance is possible, but for the remainder of the regions this is considered to be not an option. According to the policy makers the main reason is that insurers would simply refuse to cover flood damages, because of their cumulative character.

Belgium and Denmark work with a disaster funds for compensation. Germany compensates ad-hoc. In the Netherlands there is a disaster fund, but this is far too limited to cover extensive coastal flooding. Some policy makers have an ambivalent attitude to disaster funds: it does provide relief to those affected, but it can also remove the incentive to avoid the risk.

16.3. Comparisons of the steering type

The classification of instruments, aggregated to their steering type is depicted in figure 29. If one compares this figure to the foci in intervention points in figure 28, the differences in chosen steering type are clearly less strong than those in intervention points. However differences in emphasis are present.

	Directly	Regulatory	Economic	Communication
Scotland	●	●	●	●
England	●	●	●	●
Flanders	●	·	·	●
Netherlands	●	●	●	●
Lower Saxony	●	●	●	·
Hamburg	●	·	●	●
Schleswig-Holstein	●	·	●	·
Denmark	●	·	●	●

· used, but sporadic and/or considered not important ● used, considered quite important
 ● used, considered of some importance ● used, considered crucial

Figure 29 Classification of aggregated instruments of the policy makers according to the selected steering type (see also figure 9 for details on this aggregation)

The management of defences

In general there are two ways policy makers achieve coastal defence. The first way is to manage these defences themselves (or through contractors). This is done in England, Flanders, Hamburg and Schleswig-Holstein.

The other way is to fund lower governments to do so. This is done in Scotland, the Netherlands, Lower Saxony, Bremen, Denmark and partly in England.

Strings are always attached to this funding. In the United Kingdom funding criteria have been set. In the Netherlands, Bremen and Lower Saxony regulatory instruments are coupled. Lower government *have* to take care of coastal defences.

These differences in the management coastal defences explain most of the differences of figure 29. Some additional comments can be made regard the used steering types for the achievement of other interventions

Direct instruments

All policy makers operate their own forecasting and warning service. In Flanders land is bought from land-owners as spatial avoidance measure.

Regulatory instruments

Regulatory instruments are mostly used in regulating lower governments, to control spatial developments. In Scotland spatial regulation is the most important instrument in coastal flood risk management.

Economic instruments

The use of economic instruments, besides the funding of lower governments, is very limited. In Scotland accreditation schemes for building flood protection aim at creating a financial incentive for this protection, because of lower insurance premiums. Disaster funds have been classified under economic instruments, but as said, the policymakers have an ambivalent attitude to these⁴⁹

Communication

All policy makers use increasingly communication instruments to achieve their aims. Within the government, they use these instruments to gain support for their proposals, improve them or otherwise create synergy between governmental organisations.

The way in which communication instruments are used towards citizens differs. The Scottish and English policy makers try to motivate their citizens to act themselves. For instance to protect their house, prepare their own flood plan etc. The other policy makers only spread information on the risk itself of living in, or in front of, the coastal defences.

⁴⁹ Note that government compensation could also be classified as a direct instrument. The policy maker aims to intervene by affecting the distribution of the costs for the damage and does so by giving (tax) money to affected citizens. In this way it is not a economic instrument, as these paid compensations do not try to encourage certain risk reducing behaviour.

16.4. Changes in the approach of policy makers

In Flanders (especially on the coast), a major change of scope in the problem and instruments to address it is planned. In Scotland coastal flooding has only recently been put on the policy-agenda.

All other policy makers are planning, or have implemented minor changes such as increased coordination between parties in England or the increased attention to public communication in the Netherlands.

Looking back over the last decades, few major shifts can be found, namely: the introduction of cost:benefit analysis in the 1950's in the Netherlands, which was later also adopted in England and Denmark. And the introduction of a minimum protection in Denmark. Thus the sets of instruments that policy makers use are quite stable in general.

17. Conclusion on the relation between problem perception and instruments

Perception and chosen instruments

It can be concluded that the policy makers differ in their perceptions of the situation and their goals (the problem perception). This leads to significant differences in the chosen instruments.

Roughly, three groups of policy makers can be distinguished with regard to their perceptions and chosen instruments. On the one hand the UK policy makers focus on material risks and use a combination of instruments to reduce the risk to a collective 'optimal' level.

On the other hand the Flemish, German and Dutch policy makers focus on catastrophic events and emphasize coastal defences to reduce this risk in such a way that individuals are protected in a societally acceptable way and are disposed towards using defences to achieve this.

The Danish policy maker stand in between those two groups of policy makers. He resembles the UK policy makers in the limited amount of assumed responsibility, the perceived risk and the use of a combination of instruments. However relatively more attention is paid to the risk to human life and the protection of individuals, to the extent that all risk is virtually eliminated.

Figure 30 provides an overview of the most important elements, in this figure those three groups are depicted. These three groups, will now be described more fully.

The UK policy makers (focus on material risks and limited responsibilities)

The UK policy makers focus on more frequent events with relatively limited consequences. Another important common perception is the presence of nearby higher land, which means that alternative ground for desired developments in flood-prone areas can usually be found. Nearby higher land also reduces the danger to human life in case of flooding, as people can more easily leave the danger area.

The UK considers the citizens to be first of all self-responsible for the risk and encourages them to take action themselves. The policy makers and government in general has a discretionary power to act. Their chosen interventions are a combination of reducing the probability of flooding, reducing the consequences in cases of flooding and redistribution of costs after flooding (by insurance).

The UK policy makers do have a goal of zero loss-of-life, but thereafter the main goal is to come to an optimal ratio between societal costs and benefits. For instance, defences are only provided if they provide a net positive effect for the country as a whole.

The Danish policy maker (focus on limited risk to human life and limited responsibilities)

The Danish and UK policy makers are much alike, but do have significant differences. They both acknowledge a risk to human life and both have set goals to eliminate this. However, in the UK the focus is on material risk, in Denmark the risk to human plays a more important role. For instance, flood management in the UK is about sandbags and moving valuables to higher floors, in Denmark it is about evacuation of people

Another important difference is that the UK policy makers do not wish to eliminate all risk, but to come to 'optimal' levels of risk reduction. In Denmark the

ambition is eliminate virtual all risk. Defences stop most surges. In the case of extreme surges people are evacuated and their material damages compensated.

Another important difference is that in Denmark the citizens are named as the primary responsible party, but in practice they are expected to do no more than paying their flood protection tax and cooperate in evacuations.

The choices of the policy makers that focus on catastrophes

The Flemish, Dutch and German policy makers focus on more rare, catastrophic events. They consider their potential coastal floodplains to be so extensive and populated that abandoning them or stopping further development is not possible.

Considering the potential disastrous consequences and the impossibility of avoiding the danger, the emphasis in their approach is on coastal defences to protect human life. As the focus is on the protection of human life, equity in protection is at least as important as economic efficiency.

The Dutch and German policy makers have extensive legal duties with regard to the design standards and/or supervision of these defences.

Different methods of reasoning⁵⁰

The policy makers do not only have different perceptions and goals on the one hand and chosen instruments on the other hands, they also differ in the methods they use to reason from perceptions and goals towards instruments.

United Kingdom: 'Economic' approach

The UK policy maker calls its approach to flood risk 'risk analytic'. This approach strongly resembles economic analysis. 'Economic' does not meant that only

⁵⁰ In the discussion the question will be dealt with if it is a coincidence that the grouping here is the same as with regard to perception and choices.

monetary values are taken into account, but that potential material and immaterial costs and benefits are quantified and aggregated to the level of the state. The effects on individuals or groups play a subordinate role.

Denmark: Combination of interventions by direct action

In Denmark the protection of the individual is much more important and the role of the government is more extensive. Combinations of instruments are sought that best provide this protection to individuals and a minimum standard of defences is maintained, even if it would be cheaper to compensate damages.

Flanders, Netherlands and Germany: coastal defences as starting point

The Dutch and German policy makers take their legal duties to provide coastal defence as the starting point. The Flemish policy maker does so without legal duty. Any other intervention is considered an additional, secondary instrument.

The Flemish policy maker is planning a shift towards a type of reasoning similar to the UK or Danish policy makers.

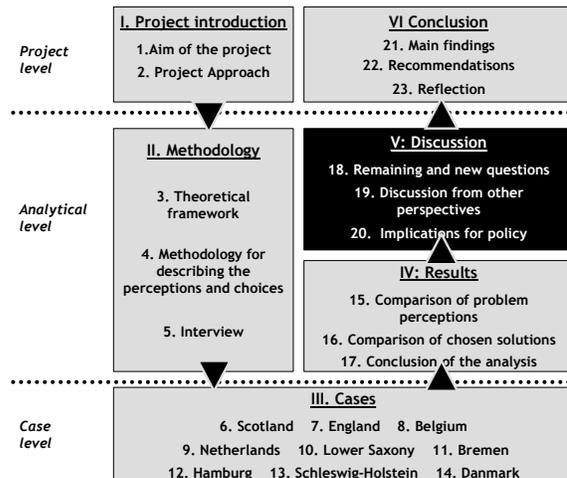
Conclusion on the relation between problem perception and chosen instruments.

The conclusion of the analytic phase of this report is that policy makers do indeed differ in their instruments. This can be explained by the fact that they also differ in their goals (the protection of individuals vs optimising the collective net benefit) and perception of the situation (the risk, the necessity of development of low-lying land and the societal attitude). In addition their methods for choosing instruments differ.

In the next part it will be discussed what might be explanations for these observed differences in problem perceptions and approaches and what the implications of the analysis with regard to the adoption of instruments between the policy makers are.

Part V Discussion

In this part the results of the analysis will be discussed. Explanations will be offered for choices of policy makers that cannot be explained from the substantive perspective and for new questions that arise. Further, the implications of the findings for the adoption of instruments between policy makers is discussed.



18. Questions for discussion

At the end of the previous part it was concluded that policy makers differ in their instruments, because they differ in their aims, methods and perception of the situation. However at some points, differences in perception and aims cannot explain differences in chosen instruments, thus questions do remain (paragraph 18.1). In addition the results give rise to new questions, around the central question: why do policy makers have different perceptions and aims (paragraph 18.2)?

18.1. Remaining questions

On a number of points the analysis has difficulties in explaining the chosen instruments purely on the basis of the problem perception.

1. Why do some policy makers have different problem perceptions of different areas in their region, but still use only one approach?

In the previous chapter it has been concluded that policy-makers strongly base their instruments on the perceived risk. However in some cases where a policy maker is in his region faced with different types of risk, he does not differentiate his instruments.

For instance, the Dutch and the Flemish policy makers perceive a catastrophic potential for an extensive flooding of their interior. However the risk for their dune zones is similar to that of coastal stretches in Denmark or the UK (limited number of properties affected, higher ground nearby). One would expect

that perhaps the Dutch and Flemish policy makers would for these areas use an approach similar to the UK and Denmark (multiple interventions).

However, the Dutch and Flemish policy makers manage these limited, localised risk much in the same way as they manage the extensive risk of coastal floods into the low-lying interior of the country. For both they focus on defences. For instance in neither of these countries (till now) a public preparedness or evacuation plan has been prepared.

The English policy maker explicitly chooses to have a strategy, which can address a range of different risks, and has recently start to pay more attention to intangibles, such as the risk to life. However, he is doing this by incorporating these intangible risks in a project appraisal structure that previously mainly dealt with material risk. To this structure a score element for avoidance of risk to people has been added. This leads to the remarkable situation that project proposals can score 0-12 points for their economic cost:benefit ratios and 0-2 points for their avoidance of risk to people.

2. Why is the English policy maker relatively more concerned with material risk?

The English and Flemish policy maker both face material and immaterial risks. However the English policy makers focuses on the material risk, whereas to the Flemish policy maker the risk to life is at equally important. Both face a situation in , both faced with a material and immaterial risk, seem to be focussing on a different risk.

To put it differently: Why does the Flemish policy maker not focus on small damages to the buildings near the beach and the English on preventing a rehap of 1953?

The 1953 flood took 20 lives in Flanders and 300 in England and both have been hit by fluvial flooding in the last decade, thus the actual occurrence does not seem to be a consistent explanation. Also compared to other policy makers, the English policy seems to be relatively more focussed on the material risk and collective effect.

3. Why have the Netherlands and Flanders in an absolute sense made the least preparations for managing an actual flood

The Flemish and Dutch policy makers have the least preparations for a large flood event than any other policy maker, even though they do both explicitly note that their defences cannot be guaranteed to prevent all possible floods.

One would expect that they as their Hamburg and Schleswig-Holstein colleagues—considered defences most important, but made provisions to manage floods as well as possible, if the defences should fail.

Flanders is planning to address flood management in its new plans for the coastal defences. The Netherlands some limited plans are considered for the province of Zeeland and the Northern Netherlands, but for the major urban areas no plans are in preparation.

4. Why do some governments implement defences directly, whilst others leave this to lower levels of governments?

Some explanation of steering types has been given from the responsibility the policy maker has assumed (voluntary vs hierarchical approaches). But the use of steering instruments depends largely on the relation between levels of government. These are described within the substantive perspective, but not explained.

For example, why does the Environmental Agency directly manages stretches of coast, whereas the Dutch government funds provinces and water boards?

5. Why does the Lower Saxony government refrains probabilistics?

The Lower Saxony government perceives probalistic estimates as non-feasible, thus areas are either safe or unprotected.

The Hamburg and Bremen governments hold a similar view, but they do consider the protection level to be gradual. The Hamburg government takes the design margin as a societal decision, the Bremen government considers indicative estimates of return periods of water levels.

18.2. New questions

The new information brought to light by the analysis also gives rise to new questions. The most interesting are highlighted.

5. Why do the countries use different methods to choose their instruments?

The observed differences in methods of reasoning from problem perceptions to instruments cannot be explained from the substantive perspective. However the fact that those countries that perceive a relative low risk, use more economic like, analytical methods and countries that face a high risk are predisposed towards defence is most interesting and deserves further an explanatory.

6. Why does English society accept an economic-like approach and Danish society not? Why does the Danish policy maker focus more on the risk to life and the English on the material risk?

As explained, England and Denmark have a similar risk focus and method of reasoning and they started out with similar goals. However in Denmark under perceived societal pressure more attention was given to the individual, by the introduction of a minimum protection standard. In England - apparently - the (perceived) societal pressure has been less.

7. Are the differences in perceived risk due to physical differences in the countries?

From the substantive decision-making perspective, the perception of the risk is analysed. From this viewpoint, the factual risk does not form the basis of the analysis. It matters only how the policy maker perceives it.

However this question is very relevant in analyzing the differences in the instrument selection of different policy makers: if differences in perception are (mainly) determined by the geographical situation, it is unlikely they can change. If the perceptions depend more on cultural factors or co-incidence, changes *might* be possible.

Discussion of these questions

I will leave question 5 (the binary approach of Lower Saxony) and 6 (differences in societal attitude) open because information for analysis is not available at present and research on these aspects is ongoing.⁵¹

I will also leave question 4 (relations between governmental organisations and responsibilities) open, because so many different factors, often unrelated to flood risk, play a role that this question cannot be tackled adequately in this discussion.

The remaining questions will be discussed by re-examining the findings in the light of geographical situation and water management cultures in the next chapter.

⁵¹ In Lower Saxony within the KRIM project an extensive research into explanations for the deterministic approach is ongoing [KRIM 2003]. As part of ComRisk, an survey among citizens of the countries is ongoing to their perception and attitude towards coastal flooding [see www.comrisk.org].

19. Discussion using other perspectives of questions by use of other perspectives

In relation to question 7 (the factual risk), some geographic information will be discussed first in paragraph 19.1. This will also clarify whether regions indeed treat different risks the same (question 1) and that whether similar risks are treated differently (question 2). The cultural factors underlying the reasoning and choices of policy makers will be examined in paragraph 19.2.

19.1. Discussion of geographical factors

In this chapter the relation between the substantive perspective and a geography perspective will be discussed. The central question is whether the risk perception (focus) and risk goals (such as standards) can be explained by differences in the physical system.

Virtually all interviewees refer to the topology and the urban or rural characteristics when discussing the perceived risk. In most countries land below a specific height exists for a first indication of flood-prone. This is in approximately 5 m above mean sea level (MSL)⁵².

The fact that policy makers for a first, rough indication compare the topology to the mean sea level, indicates that differences in the surges and tidal

⁵² In England such a general height is not used.

effects are less important than topology⁵³. The estimated sea levels for a specific return period, are mostly in the same order of magnitude (except for Scotland, where surges are lower). See appendix G.1 for more details.

Another dominant factor in discussing the risk is the land-use. Floods in urban areas have a considerable higher impact than floods in more rural areas.

Thus the most important elements indicated by policy makers to be examined are: land-use (rural or urban) and topology. For these an overview will be provided.

Overview of the geography⁵⁴

Figure 32 is enclosed in the inside of the backcover of the thesis. It depicts the study area as a three dimensional image. Altitudes have been exaggerated 10 000 times (relative to the distances in the horizontal plane). Ground above the 70 meter contour line has been cut-off and are depicted as grey plains⁵⁵. In this way the subtle differences in the coastal plains are more evident.. The sea has been drawn in at mean sea level⁵⁶.

⁵³ The exception to this are 'squeezes' by estuaries, here difference in extreme play an important role

⁵⁴ Many aspects of the physical systems bear relations to the risk. To mention a few: hydrology (such as probabilities of extreme levels and flood propagation), soil type, land-use, topology, infrastructure (as damage and as evacuation path) etc. etc. Countries have tailormade risk models for to meet their specific demands. This chapter takes a simplified approach to this: it will give an overview of topology and the presence of urban and non-urban areas. Moreover rough, indicative data is used to compose this overview. Therefore the present overview is *not* a risk analysis.

⁵⁵ If this would not have been done, mountains such as the Ben Nevis in Great Britain, would be 40 cm high

⁵⁶ In fact, the MSL has been taken by definition as level plane, to which the relative heights of land have been drawn in.

To provide the reader with some support in the interpretation of the graph, a colour range has been applied. Grounds above the 5 meter contour are coloured green (land above 10 meter light green). Ground that is between the mean sea level and the 5 meter contour is colored red to yellow. Areas below sea level are colored in purple. See the legend for further details. Further technical details can be found in appendix G.2.

Some limitations apply to this overview. This picture does not show small urban areas. In general only urban areas that measures more than half a square km (roughly 500 inhabitants) are visible in the picture. For Great Brittain the treshhold is higher, only urban areas of several square km's are depicted (about 2000 inhabitants).

Moreover the topology is subject to some inaccuracies. In general it is correct to the meter, but for some small areas larger inaccuracies occur. The matching of the different layers (sea, urban areas, topology) is in general accurate to 1-2 kilometer, but at a limited number of locations inaccuracies of up to 5 km might occur.

It should also be noted that the colours only represent alttitude. As they do not take flood propagation into account, some far land-inward areas that are orange (see for instance the Netherlands) are extremely unlikely to flood from the sea. On the other against steep parts of the English coast, water may come higher. Note that the land that borders the Wash area, is near the coast higher than further land inward.

Notwithstanding these differences, the figure provides an useful overview of the geographical conditions on a general level. Comparisons can be made, that to the best of my knowledge, have not been possible before.

Geography compared to the (risk) perception

A few observations can be made from figure 32. The central Netherlands (Holland) stands out, both in depth of the area and the presence of major urban areas. Note that this later has increased over the last decades. Most of the old centres of major cities, are on higher ground and many new developments have expanded into the deep areas.

At the opposite of the Dutch perception is the Scottish perception. This latter also seems to be in line with this figure. It should be noted that most of Scotlands problems, such as lines of houses directly at the sea, are literally too small to be visible in this figure.

Similar regions can also be identified. The mainland behind the Wadden Islands (the Northern Netherlands, Lower Saxony, Schleswig-Holstein) and the hinterland of the Flemish coast looks on this scale quite similar. This is also in line with the noted perceptions.

On some points, differences in perception cannot be explained from this overview. Compare for instance Hamburg with London. Both major urban areas, with their (old) port areas and city centers low-lying. Still the risk to human life is less dominant in policy documents for London

The Wash⁵⁷ and Humber area in England do have extensive low-lying areas and look similar to Flanders or the Wadden Sea region. The English policy maker also acknowledges this, but it remains difficult to understand why he does not seem to focus on the risk to human lives in these areas.

Urban areas in the dunes that are the concern of Flanders and the Netherlands are often too small to be visible on this map. It can also be seen that considerably higher grounds are very close for these areas. Geography, at least at this scale, seem to suggest evacuations are feasible for this region and investments are limited.

Geography compared to the (risk) goals

The risk goals are in general in line with this overview of the geographical situation. Note for instance the high standards for central Netherlands (1:10 000 years), London (1:1000 years and defacto 1:10 000 years upstream of the Thames barrier) and Antwerp (1:4000 to 1:10 000 years). The 1 in 50 years standard for the rural parts of Denmark is also in line with this figure, the urban areas in this region are so small that they are barely visible in this figure.

Of course equity considerations plays a role in the setting of standards. This can explain why the Wadden Island of Texel in the Netherlands has a protection standard two times that of London.

However upon closer examination some differences cannot be completely explained from equity arguments. Two differences will be discussed.

⁵⁷ However note that the deep areas in central Anglia (even below sealeven) are surrounded by higher land, thus it should not be concluded these can be flooded from the sea

Small Scottish coastal towns enjoy the same safety standard as large reclaimed areas in Schleswig-Holstein (between the first and second line of defence). This is remarkable as the the Schleswig-Holsteins policy maker considers safety to be too important to be set by economic analysis (see chapter 14), while in Scotland the policy maker only funds projects that have a positive collective, economic yield (see chapter 7).

It appears that the economic optimisation of Scotland and the Schleswig-Holsteins government of their legal duty to design dikes ‘that withstand all storms’ can have an equal result.

Conclusion on geography

In general the problem perceptions of the policy makers are in line with the geography of their regions. The geographic perspective explains why the Dutch and German policy makers perceive a high risk and Denmark and Scotland perceive a smaller risk and it also explains the high standards of defence of London and the central Netherlands.

However as it confirms the perception of the policy makers, it also confirms the minor inconsistencies between the policy makers that followed out of the comparison of their perceptions and instruments. For instance, neither the risk perception nor the geography can explain why for the large polders of Schleswig-Holstein an evacuation plan exists, whereas it does not seem to exist for the coastal towns of the Netherlands

The protection standards are in general in line with geographic factors such as the size, the depth and amount of built-up area in a floodprone area. However it has also been found that the aims of the policy makers are also an important factor. Considerations of equity lead to relative high standards for areas with a relative low risk. Remarkably, protection standards based on the societal feeling of safety are not necessarily higher than economically founded standards.

19.2. Discussion of cultural factors

In this chapter the influence of cultural factors on the reasoning and choices of policy makers will be considered. Explanations will be sought for why the Flemish, Dutch and German policy makers have a strong preference for coastal defence, often accompanied by high standards of defence.

Specific information on cultural factors in flood risk management in the North Sea Region is scarce. This chapter is mostly based on Dicke [2001].

Dicke has conducted a narrative analysis, which mean narratives or ‘policy stories’ are identified. In these narratives a relation is made between the extent in which policy makers perceive water and related systems as controllable and the strategies they choose.

Dicke has only compared England (& Wales) and the Netherlands. However as the Netherlands and England have been placed in each of the two best distinguishable groups on the basis of their perceptions and approaches, her findings are very relevant and interesting:

Dicke, concludes for England:

'Sustainable Water Management' and 'Eco-pragmatist Water Management' [identified narratives in England] (...) have in common that they argue resilience and risk analysis is a better approach to water management than control for the reason that natural developments, as well as human behavior cannot be predicted. 'Predict and provide' [another narrative] was the older outlook contradicted by these two narratives (...) but its previous dominance has not been sustained.

Dicke [2001 pg 154]

For the Netherlands, Dicke also finds that the narrative with a strong belief in control ('Grand Public Works') is nowadays is somewhat subordinate. However Dicke also notes that during crises (such as the years following near-floodings) it is 'taken from the shelf' (revitalised).

The dominant narrative according to Dick is 'Room for the rivers' which takes resilience as starting point, but this narrative is characterised as "control through resilience [Dicke 2001, page 199], whereas the English narrative is characterised by "resilience instead of control".

These differences are consistent with the outcome of this analysis, where the Netherlands has been found to have a strong, not directly explainable, focus on coastal defences and an absence for instruments to manage actual floods.

The "resilience instead of control" which Dicke assigns to England, is consistent with the "flooding you cannot prevent it, you can prepare for it" PR slogan. Of course the consistency does not prove casual relation, but it is certainly a strong of causality.

The cultural differences between the characterising the Netherlands and England, apply to the two different groups of policy makers the Netherlands and England are part of. However it is an interesting hypothesis that cultural factors are the decisive, underlying factor to the in this study observed differences in methods and aims.

19.3. Conclusion on the influence of geographic and cultural factors

Geographic factors are able to explain the differences in perception of the situation held by the policy makers and much of their chosen solutions. However on some specific points the geography cannot explain the choices of the policy makers. The goals policy makers formulate with regard to these risks and the way they choose instruments to achieve these goals have been found to be also influenced by cultural differences, at least in the Netherlands and England.

The differences in water management culture offer a solid, plausible explanation for the different ways of reasoning of the Dutch and English policy makers and well as the much stronger Dutch emphasis on coastal defences than would be expected from a purely geographical perspective.

It should be noted that some of these cultural factors interact with geographical factors (see also chapter 3) Dicke for instance notices that the irreversible artificial nature of many of the Dutch water systems contribute to the emphasis on control in the Netherlands. On the other hand the geographical situation can over the medium-term and long-term be influenced by the policy maker. Especially in the Netherlands, better protection and drainage has led to more built-up low-lying areas, increasing the potential consequences of flooding.

20. Discussion of implications for policy

In the previous chapter, the discussion of the results was concluded. In this chapter the implications of the findings for storm flood risk will be discussed. This will form the basis for the basis of the recommendations in chapter 24.

This study's aim is to describe, compare and explain the perceptions and practices of policy makers. It is first of all up to the policy makers to use this as a basis to consider (for instance through the ComRisk project their choice of policy).

However I will present my own thoughts on possible learning points for policy makers. First by discussing the advantages and disadvantages of the Dutch and English practices, which in many respects are opposites. After this more general consideration will be given to the feasibility of harmonisation or adoption of instruments.

20.1. Reflections on the Dutch and on the English approach

The Dutch approach considered

The Dutch approach is characterised by a strong focus on coastal defence. On one hand this certainly has advantages. In the Dutch situation with large urban flood-prone areas, defences are essential. The potential damages are so tremendously high that they are not insurable and beyond the coping capacity of the country. Here defences are probably an economically sound instrument.

One might argue that no guarantee can be given that the country will be able to maintain these defences indefinitely. However, the West of the Netherlands needs to be kept dry actively anyway. If the pumps that drain the polders are switched off, much of the land will return to water in matter of weeks. The West of the Netherlands is thus an artificial system anyway.

Lastly, the concentration of responsibility in one task and one department can be considered as advantage. The argument by some interviewees that shared responsibilities are dangerous, because nobody will in the end feel responsible, should not be dismissed easily. In the publications of the Dutch national auditor (Algemene Rekenkamer), plenty of examples can be found, where shared responsibilities led to neglect of responsibilities⁵⁸.

On the other hand, the Dutch policy maker does bet all his money on a single horse. The stochastic uncertainty is stressed (“1:10 000 years might happen tomorrow”) by the policy maker, but the uncertainty in the stochastic parameters themselves not (“1:10 000 might also be 1:1000 years”). This is remarkable as the basis for much of these estimates are 100-year records of water levels. An extrapolation of a factor 100 is uncommon in statistics. In this respect the Dutch policy maker might have fallen in the pitfall of forgetting uncertainties in a problem analysis, once other uncertainties are quantified.⁵⁹

⁵⁸ See for instance their report on Energy and Environment [Algemene Rekenkamer 2002]

⁵⁹ Quade [1996] in his handbook of system analysis refers to this as one the biggest pitfalls in policy-making supported by analytic methods. Note that the Dutch policy makers does spend considerable amounts of money to include more uncertainties in the stochastic methods.

A good analogy can be made with investing in stocks. Only dare devils put all their money on a single stock that has the highest expected growth and dividend. A wiser investor will spread his investment, even if he knows that this on average yields less money.

The Dutch options for “alternative stocks” are of course somewhat limited. It is understandable that putting a stop to all developments in the western half of the country is not feasible. However a flood disaster management plan for the central Netherlands does seem a logical additional intervention to increase the robustness of the selected set of instruments. The policy maker often reasons that a full evacuation is not possible, but this is no argument no to prepare to save as many people as possible. To state this simply and personally:

**Why haven't I ever been told that in case of a flood I stand no chance to outrun it, but I am quite safe on a higher flood of a concrete house?
And worse: why is it not organised that when a flood occurs somebody will tell me to go there?**

Another argument, often mentioned informally, is that the policy maker does not want to cause panic by publishing evacuation plans. There is certainly some validity in this argument. The Dutch general public is at the moment not burdened by a feeling of being in danger of being flooded. However there is strong tension between this argument and the current on-going campaign to raise the sense of urgency of citizens. Can citizens feel perfectly safe and appreciate the urgency of measures at the same time?

Lastly a serious drawback of the Dutch approach is that all areas have received high standards. That the Wadden Islands enjoy a statutory standard twice that of London (1:2000 years vs 1:1000 years)⁶⁰, while investments are very limited and one can walk in a few minutes to safe, higher ground is remarkable.

Moreover this approach is costly. Dutch interviewees often stress that the 1950's economic calculation is outdated and thus much more money is needed to regain an economic level of spending. However, these interviewees rarely mention the original calculation only applied to the central economic hart of the Netherlands. The other regions most likely received – economically speaking – too much protection in the 1950's. It *might* be that some regions could receive actually a lower standard if their protection were to be optimised economically⁶¹. In this case alternative interventions become more interesting.

In reflecting on the Dutch approach, it should be mentioned that the Dutch policy maker operates in a difficult environment. On one hand potential consequences are enormous, almost beyond imagination. On the other hand expectations and demands of the public are very high. In the Dutch society the coastal defence is object of national pride. An international survey in the 1990s found that of all historic events the Dutch are most proud of their large water management projects [see Dicke 2001].

⁶⁰ Some differences in methodology behind these figures exist.

⁶¹ In the tidal river area, lower standards for the rural areas might even increase the level of protection of urban areas. Thus, in some sense, protection of rural areas increase the average damage in urban areas. It is of cours without calculation not possible to proof if the present levels of protection in rural areas might by economically justified because investments have increased without calculation.

The English approach considered

The English policy maker's approach has as strong advantage that it is more robust. If one of the interventions does not reduce the risk as expected, not all is lost. Another advantage of the English approach is the use of gradual definitions. An area is not safe or unsafe. A good example of this is the fact that it is advised that hospitals are not built inside areas that can flood, even if these areas are protected by coastal defences.

Furthermore in the English approach citizens are made aware that the government will not be able to stop all floods everywhere. The English policy maker also has a stronger control over spending on coastal defences.

The major disadvantage of the English policy maker lies in the lack of emphasis placed on the potentially *fatal* effects of floods. At presently this fatal risk is incorporated in the existing approach to tangible losses, by adding a score element to project appraisals. Two potential difficulties with this approach can be mentioned

First, the adding of scores for the avoidance of loss-of-life in the appraisal system, will lead to an explicit comparison and trade-off of human life to monetary benefits. A price tag will be placed on human life. This is not uncommon in economic analysis, but it is quite uncommon to directly couple this to decisions. To give an example:

Lets say that two projects compete for funding, one is the increase of protection for a polder where if a flood occurs, it is estimated 10 people will be killed⁶². The other project is the protection of a large, high value

⁶² These do exist in England

commercial area that is frequently flooded to a few inches by excessive rainfall, but where no danger to humans is posed. Will the English policy maker be able to sustain that he will fund the latter project?

The other reason is that the expected (probability of) loss-of-life is only one of many factors that determine if a risk is acceptable. An example of an important additional factor is voluntary choice. If one choose to drive a motor one accepts a much higher risk than if a chemical plant is built nearby your residence⁶³.

For coastal flood risk differences in voluntary choice can exist. Compare a centuries-old town that owing to climate change suddenly is in the indicative floodplain, with a new neighbourhood built on a known floodplain (where people should have known better).

20.2. Hurdles and opportunities for common strategies and adoption of instruments.

Authorities of the regions studied have expressed the desire to learn from each other and possibly adopt each others instruments or even achieve common strategies. In this paragraph some hurdles to and opportunities for such exchanges will be derived from the results of the analysis and previous discussion.

⁶³ A vast body of literature exists on this matter, see for instance Summerton [2003] or Smith [1996]

Difficulties regarding common strategies

In my opinion, serious difficulties will be involved in establishing a common strategy or strategies for coastal flood risk management, because of a difficulty inherent to the term “common strategy”

“Strategy” can refer to what in this study have been labeled aims, goals and a set of chosen instruments. Because of differences in the situation (caused by – amongst others aspects - geographic differences), the same instruments of policy makers will have a different effect and thus a different ‘score’. Instruments and aims can thus not be common at the same time.

For instance, the policy makers might all have the same aim. Such as only providing a defence if a positive net benefit for society can be achieved. This would mean however that along the Danish coast most defences would be abandoned, but along the Dutch coast many defences will be upgraded to a higher protection level. Common aims thus lead to differences in instruments.

If the policy makers choose to set a common standard of defence (for instance 1:500 years), this would lead to considerable differences in crest levels due to differences in hydrology and topology. For some Scottish coastal towns a wall of a few feet will be sufficient to achieve this standard, whereas in Schleswig-Holstein a huge reinforcement programme would be needed. In the Netherlands defences could be downgraded.

Moreover, such a common standard would mean that small Scottish towns would be economically speaking be overprotected, whereas such an

standard for Rotterdam would be an under-investment. Common instruments in different environments thus lead to different aims (defacto).

Common strategies are thus – already on the grounds of the definition of the term – difficult to achieve, given the different environments in which the policy makers operate. But there are also difficulties in terms of how realistic such extensive exchanges are. To provide an illustration:

Lets assume that the responsible minister in England decides to adopt the Dutch system of statutory guaranteed, high safety standards and that the responsible minister in the Netherlands decides to adopt the English approach to communicate their self responsibility to the public. As the English coast is long and at the moment unprotected or protected by lower standards, the English minister would have to ask his parliament for an multitude of his current budget. As the feeling of national solidarity in relation to floods is not as intense as in the Netherlands, his proposal would refused and he would at best retain his job.

The Dutch minister on the other hand launching a campaign with the slogan “flooding, we cannot prevent it, but you can prepare for it!” (“overstromingen, wij kunnen ze niet voorkomen, maar u kan zich erop voorbereiden!”), accompanied by pictures of flooded houses, would – at best – be ridiculed in parliament and the media, but probably be forced to resign.

Opportunities for adoption of instruments

I however do believe that there are opportunities to exchange or adopt some of each others instruments. When one considers the territory of the policy maker as a whole (for instance total flood-prone area), each of the policy makers face an unique situation, but upon closer examinations similar regions are present within the territory of the policy makers, at least with regard to geography.

For example, the central Netherlands is unique in the potential damage in the interior, but much of the current policy discussions are about damages in the dune zone. The potential size of these localised damages is in the same order of magnitude as in Denmark. If in future the amount of sand needed to nourish the dunes increases dramatically, it might be attractive to adopt a well-prepared evacuation scheme and compensation funds instead.

Another example, at some locations in England deep polders are present, where floods have the potential to cause loss-of-life. For these areas a 'Dutch' approach to coastal defences (high standards, supervised, right of protection), might be interesting.

Dealing with societal attitude and arguments of equity

One might argue against the example of a different approach for the Dutch dunes, that Dutch society will not accept that some citizens are less protected by coastal defences. In Germany the demand for equal protection is even explicit. However examples in the studied cases show that these societal pressures for equity may not be insurmountable.

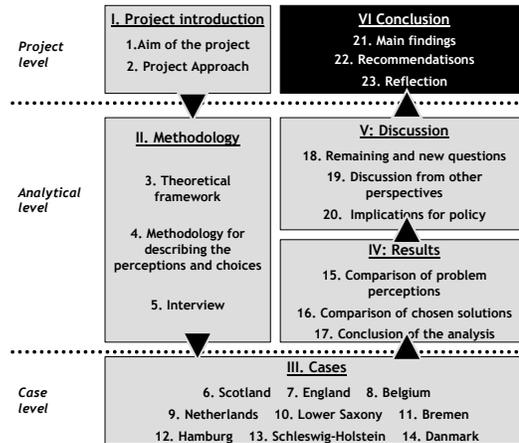
Denmark and Schleswig-Holstein also border the Baltic sea. The management at the Baltic coast (with a lower risk), differs completely from the North Sea coast. At the Baltic coast, more responsibility is placed with lower level government and citizens.

Schleswig Holstein also provides another example, indicating that differentiation of approaches is possible, even under great societal pressure to provide equal protection. Although the differentiation of protection levels is unacceptable, the works to achieve these levels are prioritised on the basis of the value they protect and this has been accepted. As planned works take up to decades to be implemented, *defacto* some differentiation of safety levels is achieved.

The Denmark case demonstrates that an optimisation does not need to be an optimisation of the national economic effect. In Denmark, the elimination of virtual all the risk to the individual is (to a certain extent) optimised by combining defences, evacuation planning and compensation.

Part VI Conclusion

This part will first outline the findings of the analysis and discussion (chapter 21). This is followed by recommendations (chapters 22), and reflections will take place (chapter 23)



21. Main findings

The research question, as formulated in paragraph 1.4, is:

What are the problem perceptions of the high-level policy makers bordering the North Sea with regard to storm flood risks, which instruments do they choose to deal with their problems and what additional insights in their choices can be gained from other analytical view points?

In this chapter, this question will be answered using the results and discussion of the analysis parts (IV and V). First a general overview will be presented, after this the subquestions (sq's) formulated in paragraph 1.6 will be discussed.

Overview

For each region a policy maker concerned with storm flood risk could be identified. The policy makers differ particularly in their perception of the risk and their goals. Two main groups of problem perceptions can be distinguished, which are depicted in figure 31. On one hand there are policy makers that are more concerned with relatively frequent occurring, material damages from flooding and have assumed only limited responsibilities for this. On the other hand there are policy makers concerned with catastrophes and that have (formally and/or informally) taken a considerable amount of responsibility for this risk.

In between these groups stands the Danish policy maker. The risk he perceives is limited, but the risk to human life receives much attention. He has accepted limited responsibility, but he does attempt to eliminate the risk almost completely.

		Scotland, England	Denmark	Flanders, Netherlands German states
Problem perception	Responsibility towards citizen	Citizen self responsible (although in DK policymaker very involved)	No binding duties, but policymaker very involved	Government responsible (Germany only for maintaining specified defenses)
	Responsibility to lower government	Varies	Limited	Varies
	Considered risk	Focus on frequent material damages (Catastrophes in England considered on background)	Limited, but attention for loss of life	Catastrophe
	Need to develop low-lying of land	In general not necessary	Unnecessary	Necessary
	Public spending (trade-off)	Optimalisation of collective net benefit	Minimum standard as societal decision, higher were economical justifiable. Highest standards where danger to life.	Societal decision, dominated by equity arguments Netherlands and Flanders have economic considerations
Method of choosing instruments		Selection from a range of alternatives.	Selection from a range of alternatives	Defences as starting point
Chosen Instruments	Intervention aimed at	Broad range of interventions	Broad range of intervention, but minimal level of defenses	Focus on defenses
	Steering type to achieve intervention	Varies, but more emphasis on voluntary instruments	Voluntary instruments	Varies, but more emphasis on regulation
Perspectives	Water management culture*	England: resilience Scotland unknown	Unknown	the Netherlands: control Belgium, Netherlands, German states unknown
	Geographic factors	Risk in line with risk perception	Risk in line with risk perception	Risk in line with risk perception (NL / Flanders: Standards relatively high Schl.-Holst.: Standards relatively low)

Figure 31 Overview of the analysis and discussion results. For each of the two groups the findings on the elements of the analysis and discussion from other perspectives is depicted. The bold double-headed arrows depicts a considerable difference between the groups. The dotted arrows indicate that on some elements the difference between the groups is less.

The high-level policy makers (sq 1)

As already indicated, in all the studied regions, a high-level policy maker concerned with coastal flood risk could be identified. These policy makers are departments on the (city-)state level in federal (like) systems and in non-federal systems the national level ministries. The other policy fields present in their ministry differ, but coastal defence is in general in the same department.

Their aims (and responsibilities) relevant to coastal flood risk management (sq 2)

The three groups of policy makers in the different countries have assumed very different degrees of responsibilities towards their citizens

In the United Kingdom and Denmark the policy makers consider the citizen to have the primary responsibility. Government encourages or provides some reduction in the risk of flooding, but is not obliged to do so. Denmark has a similar view on individual responsibility, however the policy maker does in practice aim at an almost total elimination of the risk.

The Dutch and Flemish policy bear considerable more responsibilities. The Dutch policy maker specifically feels that due to the feeling of national solidarity in the face of flooding, a responsibility that extends far beyond his legal duties is imposed upon him and that he will be held responsible in the event of any flood.

In Germany the policy makers also face a societal pressure to prevent any flooding, but they are semi-resistant to this pressure and restrict their direct responsibility to maintaining defences according to specified parameters. These parameters are operationalisations of their legal duties.

The division of responsibilities and tasks within the levels of government of the regions, vary as much within the groups as between them. Even within the same country the roles differ significantly, depending on the policy maker. This is probably due to the fact that the organisation of coastal flood risk management has to fit in a larger administrative framework.

Changes in their responsibilities (sq 3)

The involvement of the policy makers in the Netherlands, Denmark and Germany either started, or greatly increased in the early second half of the 20th century, often after floods. In England the arrangement of responsibilities was more historically determined. In Scotland and Flanders the involvement of the present policy makers resulted when more autonomy was granted to their region.

Their problem perception (sq 4)*The storm flood risk*

The risk perception of the policy makers differs greatly. In Scotland and Denmark the risk is considered to be limited. In contrast, the Flemish, German and Dutch policy makers focus on the potential disasters their regions face. The Dutch and Flemish policy makers - out of their far-reaching responsibilities – are also concerned with localised damage in the dunes. The English policy maker explicitly takes a whole range of possible events into account. Nevertheless a focus towards more frequent, material risks exists.

Other aspects (sq 5)

The two most important aspects are the nearby availability of higher land (to evacuate to and as alternative development location) and the trade-off between spending and offered protection

Both the UK and Danish policy makers regard consider it not necessary to develop low-lying land. With regard to spending, the UK policymakers aim at maximizing the (net) effect on a national scale, the Scottish policy maker has sufficient to reach the optimum, the English policy maker not. The Danish policy

maker pays attention to both the protection of the individual and the collective effect. This difference can be explained by the perceived pressure of Danish society to provide individuals in some way protection.

In the perception of the German, Dutch and Flemish policy makers it is unavoidable that many people will live and work in the large flood prone areas. A high level of protection for everyone is therefore required and society should make choices to this effect. Economic considerations are much more on the background.

Their solutions

Methods for reasoning from perception to instruments (sq 6)

The UK and Danish policy makers set out high-level, strategic aims and consider a wide range of alternative interventions to achieve these.

In Flanders, Germany and the Netherlands the distinction between means and ends is more vague. The policy makers are pre-disposed towards coastal defence. Various reasons for this can be given, such as legal duties, but no entirely satisfactory explanation was found within the substantive perspective.

The UK and Danish policy makers consider a range of alternatives and use a range of interventions. These policy makers aim at defences, flood management plans, and compensation (either by insurance or a disaster fund) as well as building protection.

The Flanders, Germany and Dutch policy makers, take coastal defences as their point of departure and rely strongly on defences in their risk management. An additional minor intervention is the operation of forecast services. The policy makers for Hamburg and Schleswig-Holstein also pay attention to flood management. The Dutch government uses spatial instruments in its dunes.

Steering type (ways to achieve interventions)

To achieve interventions, the governments either need to undertake direct action or influence society and/or lower levels of government (by regulation, economic incentive or communication). The difference between the two groups is less clear, probably because the larger institutional structure and culture would need to be taken into account to gain full understanding.

In general the UK and Danish policy makers pay more attention to voluntary instruments (funding to lower government in grants) and the other group of policy makers tend to have more binding relationships (lower governments have to maintain defences, the policy maker has to fund). The UK policy makers distinguish themselves by the emphasis on the encouragement of self action of citizens

However, on a number of points UK and Denmark policy makers do use binding instruments or even direct action (Scottish spatial regulation, English defences). So does the other group of policy makers use voluntary instruments (for instance, the states in Germany do not have to fund).

Communication as a way to influence society is used increasingly by all policy makers. All use it to coordinate better with other governments and involve citizens and organisations in coastal flood defence.

Campaigns aimed at the public have been held in the UK and the Netherlands, but with different aims. The Dutch policy maker tries to gain support for direct measures, whereas the UK policy makers try to activate the citizens to take responsibility for their own circumstances.

Geographic and cultural factors

Geographic factors are able to explain most of the differences in perception of the situation of the policy makers. However, the goals policy makers formulate with regard to these risks and the way they choose instruments to achieve these goals are also influenced by cultural differences, at least in the Netherlands and England.

In the Netherlands more of a culture to control water is present, whereas in England more attention to resilience is given; not everything can be controlled and predicted. This allies strongly with the results of the analysis. The English aim at multiple interventions to increase the robustness of their strategy, whereas the Dutch – implicitly – have more trust in their ability to control the water system.

22. Recommendations

In this chapter recommendations will be made. First I will formulate lessons that might be learned from this study, after this recommendation for further research will be made.

22.1. Recommendations for policy-making

The primary aim of this study was to compare, not to judge. Hopefully the results of this study will offer some food for thought to those involved in flood risk policy-making. However based on the discussion of the results some important learning points for policy makers can be identified.

Make the more fundamental choices explicit

I hope that by reading this document, those involved in policymaking will have realised that at a more fundamental level (implicit) choices are made. To give one example, the Dutch neither mention in their policy documents the equity considerations present in their approach nor that flood disaster management plans do not exist.

Many policy makers express the wish to enter into an open dialogue with society in their policy documents. To me these fundamental choices seem an essential part of such an dialogue.

Reconsider the meaning of 'common strategies' and the feasibility of such an harmonisation

The policy makers have different problem perceptions and this relates well to geographical and quite fundamental cultural differences. A harmonisation of aims will lead to different instruments, while if the same instruments are used, they will

affect the goals of the policy makers differently. Thus the policy makers cannot harmonise their entire line of reasoning.

If only the aims are harmonised, this might very well lead either to an explosion in the budget of the UK policy makers to approach the higher, equal standards of countries like the Netherlands or Germany, or to tremendous social protest in these countries against strong differentiations in the risk reduction.

Therefore, some serious doubts can be raised concerning the feasibility of a common 'strategy'. However, fortunately, the policymakers also expressed the desire to consider the adoption of specific practices. I believe that the opportunities for mutual learning and exchange of approaches are much better than for a harmonisation of strategies.

Develop a separate set of instruments for low risk areas from the high risk instrument set.

In Flanders and the Netherlands two types of risk can be distinguished: that of localised damage in the dunes and more extensive interior flooding. The policymakers focus on their defences for managing the risks in the interior. For this geographical as well as cultural reasons have been identified. Adoption of instruments from for instance Denmark or the UK will be quite difficult. However for, the more localised risks, the Danish and UK approaches can be very interesting for Flanders and the Netherlands. Especially because both the Dutch and Flemish policy-makers are reconsidering how to deal with these localised risks.

Be cautious not too oversimplify the incorporation of loss-of-life into the perception and approaches

The English policy maker is involved in incorporating intangibles such as the loss-of-life into his more economic oriented approach. The way this is done is by including 'scores' for this in cost:benefit approaches. The Danish policy maker has similar plans.

However the cases in the Netherlands and Germany show, that if a risk of loss-of-life is becomes dominant in the perception, the decision-making becomes more complicated. People and government might for instance feel stronger about equity, if loss-of-life is a possibility.

This might be the case particularly because the English approach is likely to results in explicit, simple quantitative trade-offs of the avoidance of deaths versus the avoidance of material damages ("project A that saves 100 million pound in annual damages will be executed, project B that saves on average 3 lives will not"). Not only is this quite confrontational, but it might not be able to adress important factors such as the 'voluntarity' of the risk.

Ensure a basic plan to manage floods (especially for the Netherlands)

The last suggestion I would like to mention make is more specific. In 1953 dykes burstat dozens of locations and flooded the interior of Zeeland. Hours earlier some mayors had refused to get out of bed, because they underestimated the risk. A more adequate disaster management response would most likely have saved some of the 1850 lives lost.

50 years onwards the Dutch have dramatically improved their defences with a remarkable feat of engineering. The disaster management structure has improved as well. In addition specific disaster management plans exist for plane crashes, chemical leaks, nuclear substances, disease outbreaks, large fires etc.etc.

However, astonishingly in a country largely at, or below the sealevel, which single biggest disaster after the second world war has been a storm flood and whose flood policy makers acknowledge they cannot guarantee their dikes will stop all floods, storm flood management plans are minimal to non-existent.

The main basis for this seem to be the low estimated probability of occurrence and impossibility of a complete evacuation. Both arguments are questionable in my opinion. The estimated probabilities are the result of advanced calculations, but at the end of the day the input to this calculations are a mere 100 year of recorded measurements. Serious doubts are justified if the justification for the lack of flood management plans is placed on extreme extrapolation of observations. Such simple measures could include the identifying buildings that are safe to take shelter could save lives (as is done in Hamburg).

Other cases, such as Schleswig-Holstein and Hamburg, demonstrate that an emphasis on defences can be combined with flood management planning.

Conclusion on harmonisation of strategy and adoption of instruments

It can be concluded that harmonisation of strategies is not recommendable to pursue. However on many different points, the policymakers may learn from each other. In this respect the ComRisk group has identified a valuable opportunity to learn from each other and the final recommendation is to continue this process..

22.2. Recommendations for further research

This study has touched upon many interesting subjects for which time was lacking for an indepth investigations, I will highlight two subjects that I find most interesting.

Extending in space and time

The cases of this study spanned a small time frame (approximately the 1950's to the present) and a small region (basically North West Europe).

The study showed that countries in North West Europe certainly exhibit a fair degree of diversity in the approaches adopted by their governments with regard to coastal flooding.

However it seems probable that the policy makers studied, compared to other countries have also aspect in common. For instance the basic premise that either the government or the citizen should reduce the (increase in) the risk of coastal flooding could be a common element. For this reason an extension would be most interesting. This would also help the countries in the North Sea region to place their policies in a more general context.

A continuous extension in both the temporal and spatial dimension of this study, is probably non-feasible, owing to the strong increase in the number of sources to be studied. However a series of snapshots into the distant past and different regions would provide very useful comparative insights. Large differences

with other regions may also increase the understanding of the subtle differences within the North West European region.

Understanding cultural aspects

Second, the water management perspective is a promising perspective to further explain the two groups of perceptions and instruments. Differences in the prevailing water management culture provide additional insight in the differences between the focused approach of the Netherlands and broad approach of England. It would be most interesting to explore whether this could also explain the broad approach of Denmark and the more focused approaches in Flanders and Germany.

23. Reflection

23.1. Reflection on the analysis

In this chapter the quality and the usefulness of the study will be reflected upon.

First the quality and comprehensiveness of the gathered information will be judged: could the framework set out in chapter 4 be filled in? After this, the validity of the substantive perspective (paragraph 23.2) and the use of other perspectives in the discussion (paragraph 23.3) will be reflected upon.

Information gaps and reliability

Sufficient information

Sufficient information was available to fill in the elements of the substantive perspective. In all cases at least one interview was held in person with policy maker, only in Bremen a written interview was necessary.

In Denmark and Lower Saxony, an interview was held with the policy maker, but not with the policy section of the department. As the policy in these regions is well established and stable for many years, I believe the cases are founded sufficiently well.

No key policy document could be studied for Denmark and for the Flemish coast directly at the North Sea. Respectively because of the confidentiality of such documents in Denmark and the lack of such a document from Flanders with regard to the west coast. However a clear picture was established from the interviews.

Experts or policy advocates?

Many of the expert interviewees are also actively involved in the policy-process. This does of course raise some questions as to the independence of their view.

However, it should be realised that the same people write the much of the scientific literature in this field. To doubt a whole scientific field, is beyond this final thesis project. Thus their independence is assumed.⁶⁴

Too many Dutch interviews?

17 out of 50 interviews were held in the Netherlands. In comparison to other countries, relatively more involved policy makers and experts have been interviewed.

Although the Dutch organisation of flood risk management is particularly complex and covers a large flood-prone region, fewer interviews would probably have been sufficient.

This does not affect the quality of the study, because I do not believe in other that more interviews were necessary in other regions. Moreover, a reduction of the Dutch interviews would not have enabled an increase in the number of foreign interviews, as these were combined with ComRisk, and took more resources to conduct.

Influence of the nationality of the interviewers

⁶⁴ This is also not so very crucial, given the substantive perception perspective

The interview were conducted by me, sometimes accompanied by other Dutch interviewers. This may have had an (unconscious) impact on the answers.

Some interviewees did refer to this in their answers, explaining their policy by outlining the differences between their policy and their idea of the Dutch policy. Some other interviewees perceived the interviewer(s) as 'European'.

On the other hand it cannot be excluded that in my interpretation of the answers and policy-documents, a small, unconscious bias is present. This also applies to the set-up of the analysis.

This is an unavoidable methodological concern, but has been limited as much as possible by using written documents and holding multiple, lengthy interviews with the policy makers.

Validity substantive perspective

A number of assumptions underly the choice for the substantive decision-making perspective made in paragraph 2.2 and chapter 4. These will now be summarised and reflected upon.

The presence of a leading policy maker with regard to coastal flood risk for a region

In Hamburg no leading department existed, thus the whole city administration has been taken to be the policy maker. In Bremen, Hamburg and Antwerp the policy makers have interdependencies with their neighbouring states, as measures adapted the down- and upstream region affect their risk, either negatively or positively.

In Scotland, England and Denmark an agency – department construction exists, making it more difficult to clearly demarcate a policy maker. The question is if the agent is independent or part of the policy maker. The choice was made to

include them in the policy maker, as they have no own political decision-makers or democratic representatives.

In Flanders sections dealing with the North Sea coast and the Antwerp region operate somewhat independently. The choice was made to still consider them together, as some of the policy is common and they reside under one minister.

Thus some minor difficulties occurred in applying the framework with regard to the identification of the policymaker. However a theoretical framework can never fit perfectly and the appropriate and/or representative policy makers are considered to be selected in all cases.

Coastal flood risk can be distinguished from other policy issues

Coastal flood risk policy is, in the opinion of all almost all policy makers, strongly interwoven with fluvial flooding, local flooding and erosion. However they also all pay separate attention to coastal flooding.

However, the cities near tidal rivers (Antwerp, London, etc.) river- and seaflooding are very interwoven. Demarcations need to be made somewhere. Though if river flooding were to be included, the next problem would be the relationship between local and river flooding.

Explicit situation perception and goals of the policy maker, not subject to fierce debate

In most regions an explicit policy-document exists. In Flanders and Denmark the situation (and goals) were explained in the interviews. Criticism from other actors in the regions regarding the perceptions of the policy makers does occur (for instance the impact of climate change or deterministic versus probabilistic methods), but they do not challenge the fundamentals of the perception. For instance even

environmental pressure groups in Lower Saxony recognise that the safety standard must be achieved.

The perceptions, goals and instruments can be described by using the elements: policy maker (and aims), position, perception and goals and choice of instruments

Means and ends cannot always be distinguished clearly from each other, primarily because some policy makers take their allocated tasks as aims. However the analytical framework was able to accommodate this.

The instruments can be classified by steering type and intervention point.

The classification of instruments by their steering type, sometimes spanned multiple categories.

For instance, Lower Saxony uses instruments to influence its water boards to build and maintain dykes. These include regulation (the waterboards are obliged to provide defenses), economical instruments (funding) and communication instruments (advice through NLWK). This is not incorrect, but does provide for less overview in the associated tables.

Actions undertaken by actors with little involvement of the policy maker are difficult to classify. For instance, in a situation where without the involvement of the policy maker a disaster fund has been realised, one can only speculate if the policy maker would have made an effort to create such an disaster funds if it were not in existence.

Conclusion on substantive perspective

The descriptive framework does not fit perfectly everywhere, however no major misfits or disturbances were observed. An overview per case is presented in table 4.

Policy maker	Case level (information)	Analytical level
Scotland		Interwoven with fluvial flooding and erosion.
England	Political sensitive issue	Env. Agency - Department relation. Interwoven with fluvial flooding and erosion
Flanders	No written policy for coast. Politically sensitive issue	Policy divided into coast and Antwerp. Antwerp interwoven with Dutch estuary.
The Netherlands	Refusal IV other department	Interwoven with erosion and fluvial flooding
Lower Saxony	Refusal IV ministry within policy maker.	Interwoven with erosion and fluvial flooding
Bremen	Only written set of questions asked [awaiting answer]	Interwoven with fluvial flooding
Hamburg		Responsibilities over several departments
Schleswig-Holstein		Newly formed ministry. Interwoven with fluvial flooding and erosion
Denmark	Key document confidential, no interview with policy maker ministry	Interwoven with erosion

Table 4 Overview of policy makers potential information problems and disturbances

Discussin in the light of other perspectives

From the beginning, it was clear that for the additional perspectives, only available information could be used. This practical limitation, reduced the number of perspectives that could be studied to two. Nevertheless, they have still provided valuable insights, such as the presence of cultural influences, and have demonstrated that viewpoints other than those of substantive decision-making are possible as well.

23.2. Answer to the main research question

In my opinion, the main research question has been answered satisfactory. In the previous paragraphs some minor disturbances were noted, but these are unlikely to exert a large influence on the general findings.

No comprehensive, exhaustive explanation from all possible perspectives has been presented, but this was not the ambition either. A large number of suggested perspectives could not be researched owing to the lack of information. This is unavoidable, as it is non-feasible to gather raw information for all these perspectives.

23.3. Reflection on the project aims

Fulfillment education requirements

The first goal of an independent piece of scientific research has in my opinion been achieved. Be it that 'independent' should not be interpretation as 'in isolation', as there has been an exchange of ideas and information between this study and ComRisk. However the theoretical and analytic framework (and thus the description of the cases) has been uniquely designed for this study (and partly been incorporated into the ComRisk subproject).

This thesis has taken on a quite challenging subject. A quick focus on certain aspects was not possible, as a broad comparison was expected. I feel the theoretical framework has proven that there are limits to the comprehensiveness of a comparative study. Within these limits many aspects have been integrated and brought back to a few models. One unifying model or theory has not been presented, but that would also not do justice to the complexity of the issue.

Taking a broad approach for many cases does lead to a challenging amount of information. It has proved difficult to select the necessary information sources quickly, as the methodology (including conceptual models) have evolved over the project.

The second goal was a professional orientation for the student, this is has been achieved due to the close connection to the ComRisk project and the provision of a workplace at KPMG. This workplace offered an inside view into consultancy work.

The last goal is contributing to scientific insight or a societal aim. Only one quite limited, study with a comparable subject and scope existed before this study was conducted [Dutch Dep of TPWM 2002]. Thus more knowledge about coastal flood risk management has been created with this study. During the conversations with experts from different fields, I noticed a strong interest into this research. The societal aim can be considered to be the ComRisk project

Added value for host-firm (and the ComRisk project)

I feel there has been an added value for KPMG to host this thesis at two levels. First on the level of information, much information has been gathered by the interviews and the extensive study of policy-documents and research.

Secondly, on a methodological level, ideas were exchanged, although the analytical frameworks are different. Important aspects have been added to the methodology, among which attention to differences in responsibilities and goals of policy makers and the two dimensions of instruments (steering type and intervention). Such aspects have in my opinion clarified the complex issue significantly.

Bibliography

- Association of British Insurers, News Release: Insurers Announce new principles for flood insurance
- Heile T. Ankenr, Vibeke Nelleman and Sten Sverdrup-Jensen, Integrated Coastal Zone Management in Denmark, Ways and means for further integration, discussion paper for the transnational seminar on the European Spatial Development Perspective, Göteborg October 1998
- Arcadis, Nieuwe Gracht and Alkyon, 2001, Strategische Visie Hollandse Kust 2050, Den Haag / Haarlem: Provincies Noord en Zuid-Holland
- Heinz Aschenberg and Gerhard Kroker, Sturmfluten und Hochwasserschutz in Hamburg - Ein Abriss der Geschichte des Deichbaus und der Binnenentwässerung im Sturmflutungsgebiet der Elbe, Hamburg: Baubehörde und Architekten- und Ingenieur-Verein
- Gerrit Baarse, Marcel Taal and Jill Slinger, 2000, Evaluation Procedure for the Assessment of ICZM Implementation Feasibility: Results of initial application and literature search, Delft: Resource Analysis
- "Rhoda C. Ballingera, Jonathan S. Potts, Nigel J. Bradlyc,
- Stephen J. Pettita, 2000, A comparison between coastal hazard planning in New Zealand and the evolving approach in England and Wales, in *Oceans & Coastal Management*, vol 43.
- Bernard Barraqué, 2000, Flood prevention in Europe: hydraulics, insurance or solidarity, in *La Houille Blanche*, 2000, no 2
- Bezirksregierung Weser-Ems, 1996, Generalplan Küstenschutz für den Regierungsbezirk Weser-Ems
- BN DeStem, Bestuur kan nieuwe stormvloed niet aan
- BN DeStem, Het risico blijft altijd aanwezig
- BN DeStem, Zeeuwen vrezden het water
- Earryt Boetes, Nies Brouwer, Sjan Martens, Ben Miedema en Ron van Vremde, juni 2003, Evacuatie bij Hoogwater - Informatie voor een verantwoord besluit tot evacuatie
- Asa Boholm, 1998, Comparative studies of risk perception: A review of twenty years of research, in *Journal of Risk Research*, 1998, no 1
- Borup, 1999, Integraal kustzonebeheer in Denemarken, Den Haag: Rijksinstituut voor Kust en Zee
- Eric van den Bosch, Arnoud Buiting, Hans Spobeck, Arjan Stam, juni 2003, Preparatie op overstromingen: Hoe bereiden landen zich voor op (de dreiging van) overstromingen, Eindschrift
- Harry van Boven, Henk Ensing, Cynthia de Jong, Hans van Wijk, juni 2003, Zee InZicht: Polderen aan de kust over klimaatverandering en veiligheid
- Brabants Dagblad, Helft van Zeeuwen voelt zich nog steeds niet veilig
- Die Senator für Bau und Umwelt Bremen, 2003, Allgemeine Informationen über die Wasser- und Bodenverbände in der Stadtgemeinde Bremen, www.umwelt.bremen.de (as of 6-5-2003)
- Linda Bridge and Albert Salman, 2000, Policy Instruments for ICZM in Nine Selected European Countries, Leiden: EUCC (for RIKZ)
- Broadland District Council and North Norfolk District Council, River Flooding - 2003 Edition
- Mark J. Browne and Robert E. Hoyt, 2000, The Demand for Flood Insurance: Empirical Evidence, *Journal of Risk and Uncertainty*, vol 20 issue 3
- R.J. Burby, A.C. Nelson, D. Parker and J. Handmer, Urban Containment Policy and Exposure to Natural Hazards: Is There a Connection? in *Journal of Environmental Planning and Management*, 44: vol 4,
- William J Burns, Paul Slovic, Roger E Kasperson, Jeanne X Kasperson, Ortwin Renn and Srinivias Emani, Incorporating Structural Models into Research on the Social Amplification of Risk: Implications for Theory Construction and Decision Making
- S.A. Changnon, 2003, Shifting Economic Impacts from Weather Extremes in the United States: A Result from Societal Changes, Not Global Warming in *Natural Hazards* 29 (pp 273-290)
- Chilton, Covey, Hopkins, Jones-Lee, Loomes, Pidgeon, Spencer, 2003, Public Perceptions of Risk and Preference-Based Values of Safety in *Journal of Risk and Uncertainty* Vol 25 no 3 pp 211-232
- John R. Clark, 1996, Coastal Zone Management Handbook, Boca Raton: CRC Press
- Commissie Waterbeheer in de 21ste eeuw, Advies van de Commissie Waterbeheer 21ste eeuw
- Commissie Waterbeheer in de 21ste eeuw, Basisrapport bij het Advies van de Commissie Waterbeheer 21ste eeuw
- ComRisk, 2002, Common Strategies to reduce the risk of storm floods in coastal lowlands, Kiel: Coastal Defence Division Schleswig-Holstein
- Francisco Nunes Correia (ed), 1998, Institutions for water resources management in Europe Vol. 1, Rotterdam: Balkema
- Centraal Plan Bureau, 2000, Ruimte voor water, Kosten en baten van zes projecten en enige alternatieven, werk document nr. 130, Den Haag: CPB
- D. Crichton, 2003, Flood risk & insurance in England & Wales: Are there lessons to be learned from Scotland?, London: Benfield Greig Hazard Research Centre
- David Croson and Andreas Richter, 2003, Sovereign Cat Bonds and Infrastructure: Project Financing, in: *Risk Analysis* Vol 23-No 3
- Frank B. Cross, Facts and Values in Risk Assessment in *Reliability Engineering and System Safety*, vol 58, pp 27-40
- DEFRA / Environment Agency, Risk, Performance and Uncertainty in Flood and Coastal Defence, A Review, R&D Technical Report FD2302/TR1

- DEFRA, 2001, Flood and Coastal defence, The Autumn 2000 floods, www.defra.gov.uk/environ/fcd/floodingsincidents/foodinf.htm
- DEFRA, 2001, Flood and Coastal Defence - High-level targets, www.defra.gov.uk/environ/fcd/hitarget/hitarget.htm
- British Department for Environment, Food and Rural Affairs, 2001, Shoreline Management Plans, A guide for coastal defence authorities, London
- DEFRA, 2002, The flood and coastal defence funding review
- DEFRA, 2002, The flood and coastal defence funding review - Outcome of consultation
- DEFRA - Environment Agency, 2002, High-level target 1, Policy Statement, Report to Defra.
- DEFRA, 2002, Flood Management - Aims and objectives, www.defra.gov.uk/environ/fcd/policy/aim.htm
- DEFRA, Environmental Agency, "The Coast is far from clear...", www.environment-agency.gov.uk as of 5-2003
- DEFRA, Environmental Agency, "Flooding History", www.environment-agency.gov.uk as of 5-2003
- DEFRA, Environmental Agency, "Timetable of events", www.environment-agency.gov.uk as of 5-2003
- DEFRA, Environmental Agency, "East Coast Floods 1953", www.environment-agency.gov.uk as of 5-2003
- DEFRA, 2003, Supplementary note on Climate Change Consideration for flood and coastal management
- DEFRA, 2003, Managed Realignment: Land Purchase, Compensation and Payment for Alternative Beneficial Land Use, www.defra.gov.uk/environ/fcd/policy/MRCOMP4.htm as on 24-4-03
- DEFRA, 2003, Flood Management: Introduction, www.defra.gov.uk/environ/fcd/default as on 6-10-03
- DEFRA, 2003, Strategy for Flood Management and Coastal Protection, www.defra.gov.uk/environ/fcd/policy/strategy.htm as on 6-10-03
- DEFRA, Flood Management - Aims and Objectives, www.defra.gov.uk/environ/fcd/policy/aim.htm as of 5-9-03
- DEFRA, Flood Management - Insurance, www.defra.gov.uk/environ/fcd/policy/insurance.htm as of 5-9-03
- DEFRA, 2003, Grant aid for Flood and Coastal Defence Capital Projects, www.defra.gov.uk/environ/fcd/policy/grantaid.htm
- DEFRA, 2003, Flood Management - Funding, www.defra.gov.uk/environ/fcd/policy/funding.htm
- DEFRA, 2004, Elaboration of the Environment Agency's Flood Defence Supervisory Duty, www.defra.gov.uk/environ/fcd/hitarget/envagenc.htm
- DEFRA, Grant Aid for Flood and Coastal Defence Capital Projects,
- DEFRA, EA, 2000, Forecasting extreme levels in estuaries for flood warning, stage 1 - review of current practice, R&D technical summary WS233
- DEFRA - Environment Agency, 2002, High-level target 1 - Policy Statements
- DEFRA - Environment Agency, 2002, High-level target 12 - Development and Flood Risk
- DEFRA - Environment Agency, 2002, High-level target 3- Emergency Exercises and Emergency Plans
- DEFRA, 2002, UK Climate Impacts Programme 2002 - Climate change Scenarios: Implementation for Flood and Coastal Defence: Guidance for users, R&D technical report WB5-29/TR
- DEFRA / EA 2002, Risk, Performance and Uncertainty in Flood and Coastal Defence - A Review, R&D Technical Report FD2302/TR1
- DEFRA - Environment Agency, Strategy for Flood Risk Management 2003-2007
- DEFRA - Environment Agency, Themes: Reducing Flood Risk, www.environment-agency.gov.uk/themes/reducingfloodrisk as on 6-10-03
- DEFRA - Environment Agency, 2003, Delivery Plan for Flood Defence Service Delivery Agreements 26 and 27
- DEFRA - Environment Agency, 2003, Delivery Plan for Implementing the Conclusions of the flood and coastal defence funding review
- DEFRA, 2003, Risk Assessment for Flood & Coastal Defence for Strategic Planning - High-level Methodology, R&D technical report W5B-030/TR1
- Deichacht Norden, 1989, Das Bollwerk des Norderlandes - Eine Dokumentation
- Delta InZicht project- en stuurgroep, 2003, De Delta in Zicht - Een integrale visie op de Deltawateren
- Rapport van de Deltacommissie, 1960
- Department of the Environment, Welsh Office, 1992 Planning and Policy Guidance 20: Coastal Planning
- Departement Leefmilieu en Infrastructuur, 2001, Samenleven met de zee, in Waterspiegel (magazine departement).april 2001.
- Willemijn Dicke, 2001, Bridges and Watersheds, Amsterdam: Aksant
- Mark J. Dixon and Jonathan A. Tawn, 1994, Extreme Sea-levels at the UK A-Class sites: Site-by-site analyses. Bidston Hill: Bidston Observatory
- Mark J. Dixon and Jonathan A. Tawn, 1997, Estimates of Extreme Sea Conditions - Spatial Analyses for the UK Coast, Final Report, Lancaster: Lancaster University, Department of Mathematics and Statistics
- Dutch Dialogue on Climate and Water, Water Climate and Risk Management - Summary of the report on the Dutch Dialogue on Water and Climate
- Thomas Dworak, Wenke Hansen, R. Andreas Kraemer, Precautionary Flood Protection in Europe - Workshop report, Berlin: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
- Marina Eismann / Michael Mierach, Wenn die Flut kommt... - Erinnerungen an die Katastrophe von 1962 und heutiger Hochwasserschutz, Hamburg: Dölling und Galitz Verlag
- Marina Eismann and Michael Mierach, 2002, Wenn die Flut kommt... erinnerungen an die katastrophe von 1962 und heutiger hochwasserschutz, Hamurg: Behörde für Baue und Verkehr
- EU (Committee for the activities of the council of Europ in the field of biological and landscape diversity),1998,European Code of Conduct for Coastal Zones ,Strassbourg:EU Direction of Environment and Local Authorities

- EU (European Commission, directorates Environment/Nuclear Safety/Civil Protection, Fisheries, Regional Policies and Cohesion), 1999, Towards a European Integrated Coastal Zone Management Strategy: General Principles and Policy Options: A reflection paper, Brussels: EU
- EU (Commission of European Communities), 2000, On integrated coastal zone management: A strategy for Europe, Brussels: EU
- EU, 2001, Lessons from the EU commission demonstration programme on ICMZ, Brussels: EU
- EuroSION, Inventory of European data sources relevant for coastal erosion assessment in Europe, final draft version, December 2002
- EuroSION, Coastal erosion policies defining the issues, scoping study, final draft report, September 2002
- EUroSION, 2003, EuroSION Pilot Series Report, Essex Estuary - United Kingdom FINAL DRAFT
- European Vertical Reference System, - Relations between the European National Height Systems and the UELN, evrs.leipzig.ifag.de/rerelations.html, as on 8-8-03
- Freie und Hansestadt Hamburg / Masuch + Olbrisch Beratende Ingenieure, 1986, Risiko-analyse der Hochwassergefährdung Hamburgs
- Freie und Hansestadt Hamburg, Baubehörde, Amt für Wasserwirtschaft, 1993, Küstenschutz in Hamburg - Deichbau und Ökologie
- Freie und Hansestadt Hamburg, 1995, Hamburger Senat entscheidet sich für langfristigen Hochwasserschutz durch Deicherhöhungen
- Freie und Hansestadt Hamburg, 2003, STURMFLUT - Hinweise für die Bevölkerung in der Elbniederung
- Freie und Hansestadt Hamburg, Behörde für Bau und Verkehr, Amt für Bau und Betrieb, 2003, Hochwasserschutz in Hamburg
- Fife Council, 1999, Fife Shoreline Management Plan, Fife: Fife Council
- John R. Fife and Derek J. McGlashan, 2001, An initial assessment of the Socio-Economic and Environmental Benefits from ICMZ in Scotland
- Climate change effects on storm surges: methodologies and results, 2001, Roger Flather and Jane Williams Bidston Hill: Bidston Observatory
- Roger Flather, Trevor Baker, Phil Woodworth, Ian Vassie and David Blackman, 2001, Integrated effects of climate change on coastal extreme sea levels, Bidston Hill: Bidston Observatory
- C.A. Fleming (ed), 1999, Coastal Management: Integrating Science, Engineering and Management, London: Telford
- Foresight, 2003, Foresight Flood and Coastal Defence Project - DRAFT report
- David E. Frame, 1998, Housing, Natural Hazards, and Insurance, in Journal of urban economics, vol 44.
- William R. Freudenberg, 2001, Risky thinking: Facts, Values and Blind Spots in societal decisions about risks, in Reliability Engineering and System Safety, volume 72, pp 125-130
- Grundgesetz für die Bundesrepublik Deutschland
- Gesetz über die Gemeinschaftsaufgabe "Verbesserung der Agrarstruktur und des Küstenschutzes"
- John Gibson (McAllister Elliot and Partners), Legal and Regulatory Bodies: Appropriateness to integrated coastal zone management. Brussels: European Commission
- Dr Hugh Govan and Dr John B Hambrey, 1995, Integrated Coastal Zone Management: Participatory Management, the way forward?, Nautilus Consultants
- Peter Haake, 2003, Hochwasserschutz in Hamburg
- Halcrow Group Ltd, HR Wallingford and John Chatterton Associates (for DEFRA), National Appraisal of Assets at Risk from flooding and Coastal Erosion, including the potential impact of climate change
- Andrew Hale and Michael Baram (eds), 1998, Safety Management - The Challenge of Change, Oxford: Pergamon
- William J. Hall and John H. Wiggins, , Acceptable Risk: A Need for periodic Review.
- Jim W. Hall, Ian C. Meadowcroft, Paul B. Sayers and Mervyn E. Bramley, 2003, Integrated Flood Risk Management in England and Wales
- Matthias Hamann and Jacobus Hofstede, GIS as a tool to optimise integrated coastal defence management
- Freie und Hansestadt Hamburg, Behörde für Bau und Verkehr, Amt für Bau und Betrieb, 2003, Hochwasserschutz in Hamburg
- Freie und Hansestadt Hamburg, Behörde für Bau und Verkehr, Amt für Bau und Betrieb - Peter Haake, 2003, Hochwasserschutz in Hamburg, unpublished
- John Handmer, 2001, Improving Flood Warnings in Europe: a research and policy agenda, in Environmental Hazards, 3, pp 19-28
- Kieran R. Hickey, The Storm of 31 January to 1 February 1952 and its Impact On Scotland in Scottish Geographical Journal, 117 (4) (pp 283-295)
- Kerstin Hinds, Katriona Carmichael and Harvey Snowling, "Public Attitudes to the Environment in Scotland, Scottish Executive, www.scotland.gov.uk/cru/resfinds/erf24-00.asp
- Jacobus Hofstede and Bernd Probst, 2002, Integriertes Küstenschutzmanagement in Schleswig-Holstein, Kiel: Ministerium für ländliche Räume, Landesplanung
- Asabo Holm, 1998, Comparative studies of risk perception: a review of twenty years of research, in Journal of Risk Research, vol 1
- T. Horlick Jones and D.K.C. Jones, Communicating Risks to Reduce Vulnerability in P.A. Merriman and C.W.A. Browitt (eds), 1993, Natural disasters: Protecting vulnerable communities, London: Telford
- S. Humphrey and P. Burbridge, 1999, Planning and Management Processes
- Innenministerium des Landes Schleswig-Holstein, 2003, Integrated Coastal Zone Management in Schleswig-Holstein
- Roger N. Joens, 2001, An Environmental Risk Assessment/Management Framework for Climate Change Impact Assessments in Natural Hazards 23 (pp 197-230)
- S.N. Jonkman, P.H.A.J.M Van Gelder, J.K. Vrijling, 2003, An overview of quantitative risk measures for loss of life and economic damages in Journal of Hazardous Materials A9
- Jorissen and Van Zetten, 2001, Management and Maintenance of Hydraulic Infrastructure, Den Haag: RIKZ

- Richard Jorissen, 1998, Flood Protection, Safety Standards and Societal Risk in R.E. Jorissen and P.J.M. Stallen (eds), 1998, Quantified Societal Risk and Policy Making, Dordrecht: Kluwer Academic
- Journal of Risk Research 6, Special Issue: RiskWorld
- Korbee & Hovelinck / Resource Analysis voor RIKZ, 2002, Beleidslijn kust: Reactionota (deel A), De Bilt / Delft: RIKZ
- Korbee & Hovelinck / Resource Analysis voor RIKZ, 2002, Beleidslijn kust: Reactionota (deel B), De Bilt / Delft: RIKZ
- Matthias Kannen, 2000, Analyse ausgewählter Ansätze und Instrumente zu Integriertem Küstenzonenmanagement und deren Bewertung, Dissertation, Kiel: Albrechts University
- Robert C. Kay, 1999, Coastal planning and management, London: Routledge
- Matthias Kiese, Britta Leineweber, 2001, Risiko einer Küstenregion bei Klimaänderung Ökonomische Bewertung und räumliche Modellierung des Schadenspotentials in der Unterweserregion, Hannover Working Papers in Economic Geography, Hannover: University of Hannover
- Barry Kirwan, Andrew Hale and Andrew Hopkins (eds), 2002, Changing Regulation - Controlling Risks in Society, Oxford: Pergamon
- Paul R. Kleindorfer and Howard Kunreuther, 1999, The Complementary Roles of Mitigation and Insurance in Managing Catastrophic Risks in Risk Analysis 19-4
- Prof. Dr. Heinz Klug and Dipl.-Geogr. Matthias Hamann, Wertermittlung für die potentiell sturmflutgefährdeten Gebiete an den Küsten Schleswig-Holsteins, Ministeriums für ländliche Räume, Landwirtschaft, Ernährung und Tourismus des Landes Schleswig-Holstein / Christian-Albrechts-Universität zu Kiel
- KNMI, 2003, Eens in de 10 000 jaar, www.knmi.nl
- M. Kok en A.H. Lobbrecht, Veiligheid van regionale watersystemen: Beleving en realiteit
- M. Kok, H.F. Dooper, I.B.M. Lammers, Verzekering van regenschade, in: Het Waterschap nr 17, pp 803-807
- M. van Koningsveld, M. Marchand, P. Heslenfeld, L van Rijswijk, A Salman, 1999, Spatial Planning in European Coastal Zones - Review of Approaches in Spatial Planning, Coastal Policy and Coastal Defence, Delft/Leiden: WL Delft Hydraulics / EUCC
- KPMG Economic Consulting, 2003, Evaluation of policies and strategies for coastal risk management - proposal -, Hoofddorp: KPMG
- Landeswassergesetz (Wassergesetz des Landes Schleswig-Holstein), In der Fassung vom 13. Juni 2000, GVOBl. Schl.-H. 2000 S. 490, ber. S. 550.
- Christian Lastrup, 2001, Coastal Protection Strategies, Danish Coastal Authority
- LAWA, Hochwassergefahr
- LAWA, 1995, Floods: Causes and Consequences, Berlin-Köpenick: Geschäftsstelle der Länderarbeitsgemeinschaft Wasser
- Länderarbeitsgemeinschaft Wasser (LAWA), 2000, Wirksamkeit von Hochwasservorsorge und Hochwasserschutzmaßnahmen The "Länderarbeitsgemeinschaft Wasser", Working Group of the Federal States on water problems, 2003, www.lawa.de as of 9-5-2003
- Local Government Association, On the edge: the coastal strategy
- Local Government Association and DEFRA, 2003, Delivering the flood and coastal defence capital programme (letter to local authorities)
- Ragnar E. Löfstedt and Elizabeth L. Anderson, 2003, European Risk Policy Issues, Risk Analysis Vol 23, No 2, 2003
- Bezirksregierung Lüneburg, Küstenschutz, www.bezirksregierung-lueneburg.de
- Ministry of Agriculture, Fisheries and Food, 2000, MAFF High-level targets for flood and coastal defence operating authorities - Template for use in preparing policy statements.
- MAFF / Welsh Office, 1993, Strategy for flood and coastal defence in England and Wales - Executive Summary
- Stephan Mai and Nicole von Leiberman, 2002, Risk Analysis Within Integrated Coastal Zone Management, in Final Programma of the 12th SRA Europa Annual Meeting "Integrated Risk Management Berlin"
- Stephan Mai and Nicole von Leiberman, 2002, A Decision Support System for an Optimal Design of Sea Dikes with Respect to Risk, Conference Hydroinformatics 2002.
- Stephan Mai and Claus Zimmerman, Diked Forelands and their importance in Coastal Zone Management, Hydro 2002 Conference paper
- Marchand, M., K.V. Heynert, H. van der Most en W.E. Penning, Dealing with flood risk, Delft Hydraulics Select Series I/2003
- Martyn Cox (Scottish Coastal Forum), Devolution in Scotland: the effect on coastal policy, conference paper presented at Coastal Management for Sustainability - Review and Future Trends, London.
- Timothy L. McDaniels, Robin S. Gregory, and Daryl Fields, 1999, Democratizing Risk Management: Successful Public Involvement in Local Water Management Decisions in Risk Analysis 19-3
- Derek J. McGlashan, 2002, Coastal Management and Economic Development in Developed Nations: The Forth Estuary, in Coastal Management, 30 (pp 221-236)
- Derek J. McGlashan, 2003, Funding in integrated coastal zone management partnerships, in Marine Pollution Bulletin 46, pp 393--396
- Miley W. Merkhofer, 1987, Decision Science and Social Risk Management - A Comparative Evaluation of Cost-Benefit Analysis, Decision Analysis, and Other Formal Decision-Aiding Approaches, Dordrecht: D. Reidel Publishing Company
- Aanleiding voor de Campagne Nederland Leeft met Water
- Ministerie van Verkeer en Waterstaat, Kustbalans 1995, de tweede kustnota
- Ministerie van Verkeer en Waterstaat, Vierde Nota waterhuishouding. Regeringsbeslissing, 1998
- Flood Defences Act & Policy Creating Space for the River, Delft
- Ministerie van Verkeer en Waterstaat, 3e Kustnota. Traditie, Trends en Toekomst, 2000
- Ministry of Transport, Public Works and Water Management / National Institute for Coastal and Marine Management RIKZ - E. Huijssteeden 2001, Bouwen in de kustzone? - Lange termijnverkenning van de ruimte voor stedelijke functies in de kustzone, The Hague: RIKZ
- Koersen op tijdgeest, trends en trendbreuken rond Verkeer en Waterstaat

- Ministry of Transport, Public Works and Water Management, Flooding risk in coastal areas. An inventory of risks, safety levels and probabilistic techniques in five countries along the North Sea coast, 2001
- Ministry of Transport, Public Works and Water Management, 2001, Koersen op tijdgeest.
- 2002 Begroting ministerie van Verkeer en Rijkswaterstaat
- Dutch Department of Transport, Public Works and Water Management, 2002, Towards an Integrated Coastal Zone Policy - Policy Agenda for the Coast, Den Haag: Dutch Department of Transport, Public Works and Water Management
- Rijksinstituut voor Kust en Zee, Naar integraal kustzonebeleid. Beleidsagenda voor de kust, 2002
- Ministerie van Verkeer en Waterstaat, 3e Kustnota. Traditie, Trends en Toekomst: Het vervolg, 2002
- Dutch Ministry of Transport, Public Works and Water Management, The Road and Hydraulic Engineering Institute, 2003, Project Floris: Flooding in the Netherlands - Probabilities and consequences
- , 2002, Waterbewustzijn in Nederland: Leren van risico-bewustwordingsprocessen in het buitenland
- Ministry of Transport, Public Works and Water Management / Bouwdienst Rijkswaterstaat - M.H. Flinterman, A.T.F. Glasius, P.G. van Konijnenburg, 2003, De perceptie van overstromingsrisico's
- Ministry of Transport, Public Works and Water Management / National Institute for Coastal and Marine Management RIKZ - C Dieperink, G.P. Boon en P. Glasbergen, Kust in kader? Opvattingen over integraal kustzonebeleid, The Hague: RIKZ
- Ministry of Transport, Public Works and Water Management / National Institute for Coastal and Marine Management RIKZ - Lisette de Heij, Erosion Pilot Series Report - The Holland Coast, The Netherlands, The Hague: RIKZ
- Ministry of Transport, Public Works and Water Management / National Institute for Coastal and Marine Management RIKZ, 2002, Tradities, Trends en Toekomst: het vervolg - Eerste voortgangsrapportage actiepunten derde kustnota, The Hague: RIKZ
- Ministry of Transport, Public Works and Water Management and Ergo, 2002, Huidige instrumenten voor implementatie van integraal kustzonebeleid, The Hague
- Ministerie van de Vlaamse Gemeenschap, AWZ, Bestuur Havens, Kust 2002 - Deel 1 De Zeewerende functie van de kust - Stand van Zaken - Voorbereidend Rapport
- Ministerie van de Vlaamse Gemeenschap, AWZ, April 2001, Waterspiegel No 4: Samenleven met de zee
- Ministerie van de Vlaamse Gemeenschap, AWZ, 2002, Onderrichtingen bij optreden van stormtij of gevaarlijk stormtij in het kustgebied en in het gebied van de Zeeschelde en haar bijrivieren - Stormseizoen 2002/2003
- Ministerie van de Vlaamse Gemeenschap, AWZ, Afdeling Water Wegen Kust, April 2003, Samen leven met de zee - Zeewering met een nieuw gezicht
- Ministerie van VROM, Ruimtelijk Planbureau, 2002, Atelier Naar Zee!, Naar Zee! (voorstudie)
- Ministerie van VROM, Ruimtelijk Planbureau, 2003, Atelier Naar Zee!, Naar Zee! (boek)
- Robert Muir-Wood, 1999?, Employing Catastrophe Loss Modelling to Price and Manage European Risk, London: Risk Management Solutions
- S. Müller-Navarra, Zur Vorhersage schwerer Sturmfluten an der deutschen Nordseeküste
- Niedersächsisches Deichgesetz (NDG)
- NLWK, Das Emssperrwerk - Mehrzweck-Wasserbauwerk an der Unterems für einen besseren Sturmflutschutz und für das Aufstauen der Ems zur Überführung tiefgehender Schiffe zwischen Papenburg und Emden
- NORCOAST – Review of national and regional planning processes and instruments in the North Sea Region – Full Study, 1999
- NorCoast, Recommendations on improved Integrated Coastal Zone Management in the North Sea Region, Aalborg: Norcoast project secretariat
- NorVision, 1999, A spatial perspective for the North Sea Region
- NRC Handelsblad, Thema: Waterschappen, 12-10-03
- NRC Handelsblad, 14-3-03, "Deel dijken voldoet niet aan norm", www.nrc.nl/binnenland/artike/10452033325641.html
- NRC Handelsblad, "Het succes van de zachte aanpak", www.nrc.nl/dossiers/profielen/de_kust
- NRC Handelsblad, "Een rampenscenario voor de volle Randstad"
- North Sea Coastal Management Group, A review of Netherlands Coastal Policy, final report, March 1998
- R.E. O'Connor, R.J. Bord and A. Fischer, 1999, Risk perceptions, General Environmental Beliefs, and Willingness to Address Climate Change in Risk Analysis, vol 19, no 3, p 461
- Office of the Deputy Prime Minister, Planning Policy Guidance 25: Development and Flood Risk
- Organisation for Economic Co-operation and Development, 1997, Integrated Coastal Zone Management: Review of Progress in Selected OECD Countries
- D. Okrent and N. Pidgeon, 2001, Risk Perception, Policy and Democracy - Guest Editors Introduction, in Reliability Engineering and System Safety, vol 72, pp 113-114
- Stephen B. Olsen, Kem Lowry and James Tobey, 1999, A manual for assessing progress in coastal management, Narragansett: The University of Rhode Island, Coastal Resource Center, Graduate School of Oceanography
- Elisabeth Pate-Cornell, 2002, Risk and Uncertainty Analysis in Government Safety Decisions in: Risk Analysis, Vol 22, No 3.
- Heinz Patt, 2001, Hochwasser handbuch: Auswirkungen und Schutz, Berlin: Springer
- Paul Slovic, 1999, Trust, Emotion, Sex, Politics, and Science: Surveying the Risk-Assessment Battlefield, in: Risk Analysis Vol 19 No 4
- Laurie Pearce, 2003, Disaster Management and Community Planning and Public Participation: How to Achieve Sustainable Hazard Mitigation, Natural Hazards, Vol 28.
- Martin Peterson, 2002, The Limits of Catastrophe Aversion, Risk Analysis, Vol 22 No 3
- Roel Pieterman, The Cautious Society? An essay on the rise of the precautionary culture
- R. Pieterman, Afscheid van risico? De paradox van relativisme en preventie
- Krzysztof W. Pilarczyk, Hydraulic and Coastal Structures in International Perspective

- Procoast, 2000, State of the Art report, Background for coastal zone planning and management in the Baltic Sea Region, Kiel: ProCoast project secretariat, Schleswig-Holstein State Ministry for the Rural Areas, State Regional Planning, Agriculture and Tourism
- Provincie Antwerpen - Dienst Waterbeleid, Maart 2002, Ruimte voor water
- Provincies Noord- en Zuid-Holland, 2001, Strategische Visie Hollandse Kust, Verkenningen naar bestuurlijke en juridische aspecten in de kustzone
- Provincie Zuid-Holland, 2003, Kansen voor Noordwijk - Bestuurlijke bijeenkomst 18 september 2003 (presentatie)
- Raad voor Verkeer en Waterstaat en de VROM-Raad, 2003, Verantwoorde risico's, veilige ruimte
- Steve Rayner and Robin Cantor, How fair is safe enough? The Cultural Approach to Societal Technology Choice
- Swaarop D. Reddy, 2000, Factors Influencing the Incorporation of Hazard Mitigation During Recovery from Disaster, Natural Hazards, vol 22.
- "Stefan Reese, Hans-Jörg Stefanmarkau, Horst Sterr, 2002, Mikroskalige Evaluation der Risiken in überflutungsgefährdeten Küstenniederungen, Bundesministerium für Bildung und Forschung und des Ministeriums für ländliche Räume, Landesplanung, Landwirtschaft und Tourismus des Landes Schleswig-Holstein."
- Verder met de Voortgangsrapportage 3e kustnota: Evaluatie en advies
- Uriel Rosenthal and Paul 't Hart, 1998, Flood response and disaster management in Western Europe, Berlin: Springer-Verlag
- S. Rupp and R.J. Nicholls, 2002, Managed Realignment of Coastal Flood Defences: A comparison between England and Germany, paper for proceedings of "dealing with flood risk", Delft
- A.J. Saul (ed), 1992, Floods and Flood Management, Dordrecht: Kluwer
- Ingenieurs/Adviesbureau SAVE & Adviesbureau van Dijke, 2000, Leidraad Maatrap - versie 1.3
- P.B. Sayers, J.W. Hall and I.C. Meadowcroft, Towards Risk-based flood hazard management in the UK, in proceeding of ICE - Civil Engineering, 150 (pp 36-42)
- Ministerin für ländliche Räume, Landesplanung, Landwirtschaft und Tourismus des Landes Schleswig-Holstein, Generalplan Küstenschutz."
- Reinhard F. Schmidtke, 2000, Klimaveränderung - sozioökonomische Konsequenzen, Kliwa Konferenz 2000, München: Bayerisches Landesamt für Wasserwirtschaft
- Scottish Coastal Forum, Methodology for preparing A strategy for Scotland's Coast and Inshore Waters
- Scottish Coastal Forum, A strategy for Scotland's coast and Inshore waters: Statement of intent.
- Scottish Coastal Forum, 2001, Coastal Plans Inventory.
- Scottish Executive, NPPG7 - Planning and Flooding
- Scottish Executive, Socio-Economic Scoping Study
- Scottish Executive, Central Research Unit, 1999, Climate Change: Scottish Implications Scoping Study
- Scottish Executive, CRU, 2001, Climate Change: Review of levels of protection - Main research findings
- Scottish Executive, CRU, 2002, Climate Change: Flood Occurrences Review. MAIN FINDINGS
- Scottish Executive, 2002, Analysis of Responses to "The Future for Scotland's Waters - Proposals for legislation"
- Scottish Executive, CRU, Assesment of the Effectiveness of Local Coastal Management Partnerships as a Delivery Mechanism for Integrated Coastal Zone Management
- Scottish Environmental Protection Agency, 1998, Flood Risk Assesment Strategy, Stirling: SEPA Head Office / Directorate of Environmental Strategy
- Scottish Environment Protection Agency, 1998, Policy No 22: Flood Risk Assessment Strategy
- Scottish Environment Protection Agency, 2000, Policy No 41: Development at Risk of Flooding: Advice and Consultation - A SEPA - Planning Authority Protocol
- Scottish Environment Protection Agency, 2000, Policy No 34: Flood warning strategy
- Scottish Environmental Protection Agency "Floodline" (leaflet)
- Kristin Shrader-Frechette; The Social Construction of Risk - Scientific Method, Anti-Foundationalism and Public Decision Making in Lennart Sjöberg, Explaining Risk Perception; An Empirical Evaluation of Cultural Theory
- Lennart Sjöberg, 2001, Political decision and public risk perception in Reliability Engineering and System Safety, volume 72, pp 115-123
- Lennart Sjöberg, 2001, Authors Reply: Whose risk perceptions should influence decisions?, in Reliability And Safety Engineering, 72, pp 149-151
- Paul Slovic, 1987, The psychometric Paradigm: Perception of Risk, in Science, 236
- Smith, Keith: Environmental hazards; assessing risk and reducing disaster. London Routledge 1996
- Jane Summerton and Boel Berner, Constructing risk and safety in technological practice. New York Routledge 2003. 200 blz.
- Horst Sterr, Richard Klein and Stefan Reese, Climate Change and Coastal Zones: An Overview of the State-of-the-Art on Regional and Local Vulnerability Assessment
- Hans von Storch, 2000, WASA Project
- Stuurgroep Strategische Visie Hollandse Kust 2050, 2001, Standpunt van de stuurgroep
- Technische Adviescommissie voor de Waterkeringen, 1995, Basisrapport Zandige Kust, Den Haag: Ministerie van Rijkswaterstaat
- Technical Advisory Committee for Flood Defence in the Netherland (TAW), 1998, Fundamentals on Water Defences, The Hague: Dep of Public Works, Transport and Water Management, TAW Secretariat
- Technical Advisory Committee for Flood Defence in the Netherland (TAW), 2000, From propability of exceedance to probality of flooding, Towards a new safety approach, The Hague: Dep of Public Works, Transport and Water Management, TAW Secretariat