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Master Thesis

Policy arrangements in dike strengthening projects in Husum and Delfzijl: barriers and opportunities of shrinking coastal cities to adopt a flood resilience approach

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Abstract

Effects of climate change and growing urbanisation will result in tough challenges for coastal cities and regions, which is why there is a growing trend to combine traditional water management with non-structural measures as spatial planning and awareness raising. This trend is seen as paradigm shift from flood control, simply reducing the probability of a flooding, towards a reduction of the consequences a flood might have. Against this background, the term flood resilience gained prominence, as this concept is composed of a robust basis, a dike for example, and a society and a hinterland which is prepared for possible disasters. The concept of policy arrangements is used to assess which barriers and opportunities to adopt a flood resilience approach exist in the two shrinking coastal cities Husum (Germany) and Delfzijl (the Netherlands). The described paradigm shift is already visible in the respective policy documents, but lacks on implementation in reality, as especially awareness of flood risk is hardly existent in the cases.

Keywords: flood resilience, paradigm shift, policy arrangements, shrinking cities, dike strengthening

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Abbreviations

BPRW	Beheer- en Ontwikkelplan voor de Rijkswateren (Management and Development Plan for National Waters)
BMUB	Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety)
CEO	Chief executive officer
EFD	European Floods Directive
EU	European Union
IPCC	Intergovernmental Panel on Climate Change
LKN	Landesbetrieb für Küstenschutz, Nationalpark und Meeresschutz Schleswig-Holstein (State Office for Coastal Protection, National Park and Marine Conservation)
LLUR	Landesamt für Landwirtschaft, Umwelt und ländliche Räume (Regional Authority for Agriculture, Environment and Rural areas)
LWG	Landeswassergesetz Schleswig-Holstein (Federal Water Management Act)
MEA	Ministerie van Economische Zaken (Dutch Ministry of Economic Affairs)
MELUR	Ministerium für Energiewende, Landwirtschaft, Umwelt und ländliche Räume Schleswig-Holstein (Ministry of Energy, Agriculture, Environment & Rural areas)

MIE	Ministerie van Infrastructuur en Milieu (Dutch Ministry of Infrastructure and the Environment)
NGO	Non-governmental organisation
PiKKoWatt	Pilotmaßnahmen zur Klimaanpassung mit Kommunen in der Schleswig-Holsteinischen Wattenmeer-Region (Pilot projects for adaptation to sea level rise in the Wadden Sea region of Schleswig-Holstein)
UNISDR	United Nations Office for Disaster Risk Reduction
WFD	Water Framework Directive
WHG	Wasserhaushaltsgesetz (Water Management Act of Germany)
WWF	World Wide Fund for Nature

*“A society’s ability to manage resilience resides in actors,
social networks, and institutions.”*

(Lebel et al., 2006, p. 4)

1. Introduction

Problem statement

The effects of climate change will result in tough challenges for coastal cities and regions (Beatley, 2012). Direct effects on settlements at the coast are, among others, damages resulting from extreme events like storm surges and floods (Wong *et al.*, 2014). As urbanised patterns stop the normal mitigation process of coastal systems to such developments, the vulnerability of coastal areas increases. In order to tackle this future challenges, the concept of resilience should become an important planning principle to plan effectively and guide future development. (Beatley, 2012) Strongly connected to this term is the vulnerability of cities (to natural disasters) which has been studied a lot, but so far especially in the context of megacities. Small communities have a higher vulnerability to natural hazards. They have a lower total population, but often a higher share of the population is affected by extreme events due to the lower spatial extent of the city. The total number of population in megacities is much higher, but so are the resources to deal with hazards. Therefore, small communities have a higher vulnerability and less resources to buffer extreme events. (Cross, 2001)

According to scientific literature, there has been a change in the management of floods lately, including a shift from structural to non-structural measures. This means that the focus of flood defence is no longer on physical defence constructions only, but is combined with measures that deal with public awareness, land use restrictions and information about risks, for example. The shift towards a more common use of these non-structural measures goes along with the acknowledgement that not only the probability, but also the flood risk has to be taken into account for flood protection. Against this background, the term flood resilience gained prominence. Flood resilience is composed of a robust basis, e.g. dikes, dams etc., as well as a society and a hinterland which is prepared for possible risks. This trend towards the use of non-structural measures is accompanied by a shift in the public-private divide, which can be summarized in the following three trends: *“(1) decentralization; [...] (2) involving the public at large which also means sharing responsibility in risk preparedness; and (3) a more prominent role of private actors.”* (Meijerink and Dicke, 2008, p. 508). Lemos and Agrawal (2006) also emphasize the importance of communities and local actors in these new configurations, which they call “hybrid” forms of governance. This transition implies a new distribution of responsibilities and implicates new challenges for the parties involved (Kuhlicke and Steinführer, 2013). These shifts can also be problematic, as Zuidema (2011) emphasizes: *“The outcomes of governance will become increasingly dependent on local performance and, hence, are influenced by the available local willingness and ability to perform decentralized tasks and responsibilities.”* (p. 106).

The approach to strengthen dikes is the main measure used in regard to flood protection in Germany and the Netherlands, not only in small communities. Although such long-term investments in structural measures are seen controversial by some scientists (e.g. Goltermann *et al.*, 2008), dikes provide a strong protection and therefore contribute to the robustness of a city, which makes them an important part of resilience.

Accordingly, the topic of flood resilience in connection to dike strengthening is not only of academic relevance, as there has been few research on resilience of small cities, but also of societal relevance, as also small communities have to be prepared as best as possible for future challenges. Shrinking cities might face different challenges and as they have less resources, their ability and willingness to perform might be limited.

Research objective

The core of this thesis will be a case study of the two shrinking coastal municipalities Delfzijl (the Netherlands) and Husum (Germany) and their respective dike strengthening projects. The aim is to investigate whether the concept of flood resilience influences the water and coastal management of these two cities and which barriers and opportunities to adopt a flood resilience approach exist in Husum and Delfzijl. The dike strengthening projects represent action in regard to climate change, but the question arises if especially shrinking cities with less resources can use the window of opportunity that emerges with sea-level rise itself, and therefore with the dike strengthening projects, to develop from cities that base their protection on flood control only (hard protection measures) towards more flood resilient communities that make use of non-structural measures as well. The concept of policy arrangements is used in order to find out what strategies and measures are used, who is involved in the projects and how does the involvement look like, as well as the conditions under which the actors work together. These criteria are checked on the basis of the characteristics of flood resilience and whether or not they can be found in the cases, hence if a flood resilience approach could be adopted by the two shrinking coastal cities and what barriers and opportunities exist in this regard.

Research question

Based on the problem statement the following research question has been developed:

What are the policy arrangements in current dike strengthening projects in Husum and Delfzijl, and which barriers and opportunities do these shrinking coastal cities encounter in adopting a flood resilience approach?

The below-mentioned sub-questions were set up in order to make the research question more comprehensible and will guide through the chapters of this paper.

What is flood resilience and why is such an approach necessary?

What are policy arrangements, and which characteristics are necessary to foster flood resilience?

How are the policy arrangements in the cases characterised?

Which barriers and opportunities in adopting a flood resilience approach do the two cases face?

Outline of the thesis

The outline of this thesis is visualised in Table 1.1. Chapter 1 introduces the problem, gives the research objective and questions. Chapter 2 contains the theories and concepts used. Chapter 2.1 explains the term resilience and how it is used in this thesis. Chapter 2.2 describes the paradigm shift in water management from flood control to a flood risk management approach, which deals with flood resilience. The explanation of policy arrangements follows in chapter 2.3. The theoretical framework is combined to a conceptual model in chapter 2.4, which also explains general criteria to investigate the dimensions, as well as the specific characteristics each dimension of a policy arrangement should fulfil in regard to flood resilience. Chapter 3 gives an overview over the used methods and analysis of the data. Chapter 4 describes the two cases and their policy arrangements, giving also the formal background the cases are embedded in. The question about barriers and opportunities of adopting a flood resilience approach is answered in the discussion in chapter 5, which also includes the conclusion.

Introduction	Ch. 1	Problem statement, research objective, research question, thesis outline
Theoretical framework	Ch. 2.1 Ch. 2.2	What is flood resilience and why is such an approach necessary?
	Ch. 2.3	What are policy arrangements, and which characteristics are necessary to foster flood resilience?
	Ch. 2.4	Conceptual framework
Methods	Ch. 3	
Cases	Ch. 4	How are the policy arrangements in the cases characterised?
Discussion and Conclusion	Ch. 5	Which barriers and opportunities in adopting a flood resilience approach do the two cases face?

Table 1.1: Thesis outline

2. Theoretical framework

2.1 Resilience

The etymology of the term resilience has its roots in the Latin word “resilire”, which means “to spring or jump back” (Beatley, 2012; Davoudi, 2012; Davoudi *et al.*, 2013) and was originally used by physical scientists to “describe the stability of materials and their resistance to external shocks” (Davoudi, 2012). The further development started in the 1960s with the use of the term by ecologists (Davoudi, 2012; Davoudi *et al.*, 2013). An important step was made by Crawford Stanley Holling in 1973, who published the article “Resilience and Stability of Ecological Systems” in which he made a distinction between two kinds of systems’ behaviour: stability and resilience. Stability, which he later refers to as “engineering resilience” (Holling, 1996), is “the ability of a system to return to an equilibrium state after a temporary disturbance” (Holling, 1973). Resilience is “a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables” (Holling, 1973). In his later publications this definition has changed a bit and the term “ecological resilience” is used, which is defined as follows: “the magnitude of disturbance that can be absorbed before the system changes its structure by changing the variables and processes that control behavior” (Holling, 1996). The underlying aspects of stability are contrasting, as the engineering resilience puts emphasis on the *efficiency* of function, whereas ecological resilience aims at maintaining *existence* of function (Holling, 1996). While engineering resilience focuses on a fast process of “bouncing back” to a single and stable equilibrium, predictability and constancy (Holling, 1996), ecological resilience concedes the existences of multiple equilibria which can be switched to through instabilities (Holling, 1973; Gunderson, 2000) and focuses on persistence, change and unpredictability, which is embraced by an evolutionary perspective (Holling, 1996; Davoudi *et al.*, 2013). Nonetheless, both perspectives acknowledge the existence of equilibrium in systems, “be it a pre-existing one to which a resilient system bounces back (engineering) or a new one to which it bounces forth (ecological).” (Davoudi, 2012, 2012, p. 301).

Davoudi (2012; 2014) argues in regard to urban areas and disaster studies that resilience is often only seen as the capacity to rebound (engineering perspective), with a focus on recovery in quantitative terms. Usually, the important part is the return to a “normal” state, without questioning how desirable “the normal” actually is (Pendall *et al.*, 2010; Davoudi, 2012). As a result of this, resilience dwindles to a “short-term emergency response”, whose success is measured in quantitative terms, e.g. how long it takes the fire brigade or ambulance to reach a certain place, instead of focusing on long-term solutions like adaptive capacity building (Davoudi, 2012, 2014). Scott (2013) describes this as the “conservative” interpretation of resilience and contraposes the “progressive” view, which takes an “evolutionary perspective” of resilience. Davoudi (2012) names this third concept of resilience “evolutionary resilience”. Evolutionary resilience “rejects the existence of systems equilibrium altogether and considers nature not as orderly, mechanical, and reasonably predictable (the clockwork Universe) but as complex, contingent, and inherently unpredictable” (Davoudi, 2014, 2014, p. 370). This kind of resilience is the one that White (2013) sees as approach to manage uncertainty, the uncertainty society is facing with climate change and consequences as sea-level rise. Evolutionary resilience embraces the fact that an apparently stable state around us can change all of a sudden and move towards a fundamentally different state (Kinzig *et al.*, 2006). This implies that “we hardly ever return to where we were” (Davoudi, 2012, p. 302).

For the context of this thesis, evolutionary resilience is seen as the appropriate starting point, focusing on the transformation towards new systems. Folke *et al.* (2010) put evolutionary resilience straight in an easy way, stating that the core idea is that social-ecological systems (cities) need the capacity to

adapt and transform in order to persist. This definition contains all important components of resilience, which are robustness, also referred to as persistence, adaptability and transformability.

Robustness is understood in regard to the physical infrastructure of cities (Davoudi *et al.*, 2013) and “*the power to resist attack or outside force*” (Godschalk, 2003, p. 139)

Adaptability, or adaptive capacity, is defined by Lemos and Agrawal (2006) as “*the capacity of [...] [a] system to resist, cope, and recover from a given hazard*” (p. 316). Lebel *et al.* (2006) even specify the notion of adaptability in a more holistic way. They state that “*the capacity to cope with nonlinearities or other forms of surprise and uncertainty requires an openness to learning, an acceptance of the inevitability of change, and the ability to treat interventions as experiments or adaptive management.*” (p. 4). Therefore, networks and the maintenance of important links between those networks, as well as “*cooperation across scales and times*” (Davoudi *et al.*, 2013, p. 316) is an important part of adaptability. Additionally, social learning, “*using human capacities and knowledge to reduce vulnerability and risk in the face of the unknown and unexpected*” (Hudson, 2010, p. 12), is essential to adaptability. In other words, adaptability is made up of physical and social “*adjustments within the system to make it less vulnerable*” (Restemeyer *et al.*, 2015, p. 47). Beatley (2012) gives a definition of adaptability which includes the attempt to learn from disasters and move towards a different and possibly improved state, which can rather be seen as a definition of *transformability*, as this builds on the use of windows of opportunity in order to “*transform socio-ecological processes towards radically different and more desirable paths*” (Davoudi *et al.*, 2013, p. 318). The transformation is not solely based on technical measures, but rather a creative and political challenge, which has to be based on knowledge and experience of a diversity of groups and people, whose social capital is important to use in order to reach a desirable and publicly accepted future (*ibid.*).

Resilience is not something that is simply there, it is the result of disturbance and stress, there is a need of a triggering process, which can not only be an acute event, but also “*chronic slow burns*” (Davoudi, 2012, p. 304). Climate change can be seen as such a triggering process or window of opportunity (Davoudi *et al.*, 2013).

Resumed, resilience is about “*taking actions and steps ahead to build the adaptive capacity, to be ready ahead of a crisis or a disaster. Resilience is anticipatory, conscious, and intentional in its outlook; while much cannot be known about future events, much can be anticipated, and planning ahead becomes a key aspect of resilience.*” (Beatley, 2012, p. 6). Godschalk (2003) argues that resilient cities become stronger if the social networks the cities are composed of learn from disasters and adapt to the changing circumstances. Resilient cities might bend because of a disaster or hazard, but they would not break (*ibid.*).

2.2 Paradigm shift in water management – towards flood resilience

Increasing flooding or near flooding events, e.g. disasters like Hurricane Katrina in 2005, triggered discussions about the effects of climate change (Wiering and Immink, 2006) and an increasing probability of floodings with the consequence of a higher potential impact in many regions (Meijerink and Dicke, 2008). Meanwhile there is a broad consensus about the increasing risk of natural hazards (Kuhlicke and Steinführer, 2013; Scott, 2013), complemented with the recognition of an increased vulnerability and a heightened awareness of uncertainty (Pelling, 2003; Scott *et al.*, 2013; Kuhlicke and Steinführer, 2013; Scott, 2013). This uncertainty is not only about the extent to which and how climate change will affect populations and areas, but also about the scale of risk that is associated to predicted changes like sea-level rise (Pelling, 2003; Beatley, 2012; O'Neill, 2013). The reason for this is the fact that extrapolating or forecasting of future events based on systems' behaviour of the past is no longer possible, as the outcomes would not be reliable in face of the re-shaped conditions past events have

been contextualised in (Pelling, 2003; Davoudi *et al.*, 2012; Scott *et al.*, 2013; Davoudi, 2012; Kuhlicke and Steinführer, 2013).

A cause for the increased vulnerability is the intensive urbanisation (Scott, 2013). According to Davoudi (2014), the 21st century can be referred to as the first urban century, as the majority of the population is living in cities. The process of urbanisation has been encouraged by various hard-engineering hazard defences, as these buildings (e.g. dikes, dams) stimulate the development on precarious sites (Pelling, 2003). The process depicted in Fig. 2.1 is referred to as “control paradox” (Rommelzwaal and Vroon, 2000).

Heightening dikes encourages more land use, as flood prone areas are often located economically strategic and the grounds are fertile (Meijerink and Dicke, 2008). Therefore more people and higher assets are at risk in case of an incident – the possible damage is higher (Wiering and Immink, 2006). This again leads to an increased feeling of insecurity which may result in another strengthening of the dike. In fact, this vicious circle does not really solve the problem but rather creates new risks (Wiering and Immink, 2006). O'Neill (2013) speaks about an increasing recognition of the fact that these traditional, hard-engineering, solutions are not able to fight the upcoming challenges in regard to climate change all alone.

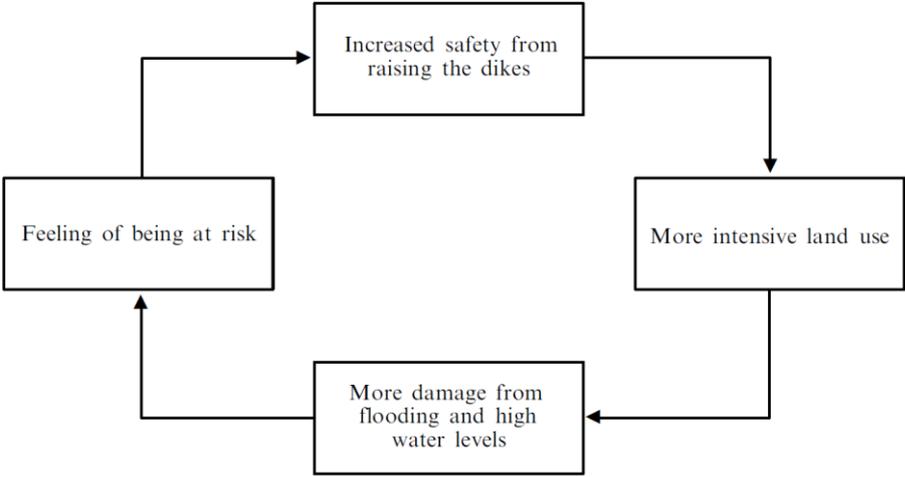


Fig. 2.1: Control Paradox (Wiering and Immink, 2006; Rommelzwaal and Vroon, 2000)

All this reasons led to a change in the flood management approach (Wiering and Immink, 2006; Meijerink and Dicke, 2008; Cooper *et al.*, 2013; Kuhlicke and Steinführer, 2013; O'Neill, 2013; Scott *et al.*, 2013), from flood control and simply reducing the probability of a flooding, towards flood risk management that takes the potential impact into account (Meijerink and Dicke, 2008). The flood risk management approach as an equation looks as follows:

$$Flood Risk = probability \times potential impact$$

This change in the flood management approach is referred to as “paradigm shift in water management” (Meijerink and Dicke, 2008; Cooper *et al.*, 2013) and implies a whole range of changes.

Table 2.1 shows this paradigm shift from the 'old' approach of hard-engineering measures and 'keep water out' (Scott, 2013), which aimed at separating the water from land use by the construction of dikes (Wiering and Immink, 2006), towards a more holistic and long-term approach (Scott, 2013) or 'live with the water', which comes along with soft-engineering and non-structural approaches (Bruijn, 2005; Meijerink and Dicke, 2008). Whilst the former approach targeted at the reduction of the flood probability, the new approach aims at a reduction of the impact of flooding, thus focuses on the flood risk.

While some authors (e.g. Goltermann *et al.*, 2008; Gibson and Tarrant, 2010) argue against the further use of hazard reduction measures, being expensive, outdated and not suited for future uncertainties, others (e.g. Davoudi *et al.*, 2013; Restemeyer *et al.*, 2015) see robustness as an important part of flood resilience. This also holds true for the context of this thesis, as robustness, adaptability and transformability have already been defined in chapter 2.1 as the aspects that make up resilience. In regard to flood resilience, robustness is seen as the capacity to withstand floodings with the help of hard-engineering constructions.

Adaptability refers on the one hand to an adjustment of the hinterland, which includes adjustments to individual houses and infrastructure, but also spatial planning, so that potential damage is reduced, but needs to be complemented by the social dimension on the other hand. To prepare individuals and reduce the impact of a potential flood event, acceptance, awareness and individual responsibility are crucial. Adaptability provides the basis to fulfil the paradigm shift, but only when there is a combination of a change to the physical environment and a change of mind-sets, then there is the capacity to transform and take the new path of 'living with the water' (Restemeyer *et al.*, 2015).

						
Strategy	Reduce <i>Probability</i> of flooding		Reduce <i>Impact</i> of flooding			
	Hazard reduction “Keep floods away from urban areas”		Vulnerability reduction “Prepare urban areas for floods”		Exposure reduction “Keep urban areas away from floods”	
Measures	Technical: Dams, dikes, storm surge barriers	Spatial: Space for water (retention areas)	Early warning and evacuation	Adjustments to individual houses and infrastructure	Inhibiting flood plain occupancy	Re-locating houses/ de-urbanization
Institutional requirements	Strong sectoral water management		Individual and local acceptance and responsibility		Strong spatial planning	
Instruments	Legal mandate Secure financing Expropriation or “priority use”		Information Flood risk maps Flood insurance		Mandatory dialogue of water managers and spatial planners Legally binding spatial plans	
	Robustness +		Adaptability + Transformability = Flood Resilience			

Table 2.1: Paradigm shift in water management (adapted from Oosterberg *et al.*, 2005; Meijerink and Dicke, 2008)

This shift towards the use of non-structural measures and the response to future challenges calls for an increased involvement of the public and innovative ways of thinking and working (Beatley, 2012; Kuhlicke and Steinführer, 2013). As Wiering and Immink (2006), Kuhlicke and Steinführer (2013), O'Neill (2013) and Scott (2013) point out, the legislative framework plays an important role in this shift. International treaties, but more important, legislation of the European Union as the Water Framework Directive and the Floods Directive, since they not only encourage and partly demand cooperation across regional and national borders, but also enhance the possibilities for interested parties to take part in the development of flood risk management plans.

The proper legislative basis which encourages participation is important, as

“the implementation of a paradigm shift from defending our communities by building higher walls or dredging channels deeper, to managing flood risk through a number of

different strands of cross sectoral policy and measures requires good communication and engagement at community level.” (Cooper et al., 2013, p. 139)

The development of water management *“into a more open and communicative, less introvert and expertise-based policy field”* (Wiering and Immink, 2006) often entails new forms of authority and a different distribution of responsibilities (Kuhlicke and Steinführer, 2013). Lemos and Agrawal (2006) call these new governance arrangements *“hybrid”* forms of governance, while Kuhlicke and Steinführer (2013) talk about a transformation towards *“risk governance”*. These modifications in the public-private divide include more decentralisation and a shift towards a growing influence of the private sector, which consists of market parties on the one hand and citizens or NGOs on the other hand. (Meijerink and Dicke, 2008; O'Neill, 2013).

These new distribution of responsibility goes along with an important role of information. Even if experiences of the past revealed that the bare fact of knowing the risk does not necessarily result in a reduction of losses, prepared communities, which have enough knowledge, are able to reduce the impact of a flood (Schelfaut et al., 2011).

Although flood resilience seems a promising concept and some argue that it is the only possible way to fight the tough challenges of the future (e.g. Beatley, 2012), the concept remains vague in some parts and leaves ample room for a diversity of interpretations. This is why Davoudi (2012) and Porter and Davoudi (2012) remark that *“resilience”* might be just a new buzzword which replaces *“sustainability”* and therefore also ends as a hollow concept.

Nonetheless, the concept of resilience went through some development in recent years which led to the implementation of governance aspects into the sphere of resilience (Olsson et al., 2006), e.g. decentralisation and a greater involvement of private actors. Therefore, flood resilience can be seen as a new policy concept. New policy concepts can be *“new definitions of problems or the presentation of new approaches to solutions”* (Arts et al., 2006, p. 100) and have the power to influence policy arrangements, which can lead to policy innovation (ibid.).

Coastal protection is the responsibility of state authorities, however, there are shifts taking place towards different arrangements. Policy arrangements take the content of a sector (in this case water management), the strategies and measures that are used, as well as the organisational structure, which consist of governance aspects, into account. Consequently, the concept of policy arrangements provides an optimal tool to assess the flood resilience of cities, as it enables to grasp how the ongoing changes influence daily practice. How this can be done is explained in the following chapters.

2.3 Policy arrangements

“A ‘policy arrangement’ refers to the temporary stabilisation of the organisation and substance [content] of a policy domain [...]” (Van Tatenhove et al., 2000, p. 54). Fig. 2.2 visualizes that content and organisation of policy arrangements further split up into four dimensions: discourse, coalition of actors, power and resources, as well as rules of the game. Everything that adds up to this four dimensions, all *“methods, habits and views”* (Wiering and Immink, 2006, p. 424) are shaped over time and get institutionalised. This relatively stable policy and its implementation are normally framed in a sectoral way and the performance becomes daily routine. Nonetheless, there is a constant state of flux which influences policy arrangements and can create new arrangements. (Wiering and Immink, 2006)

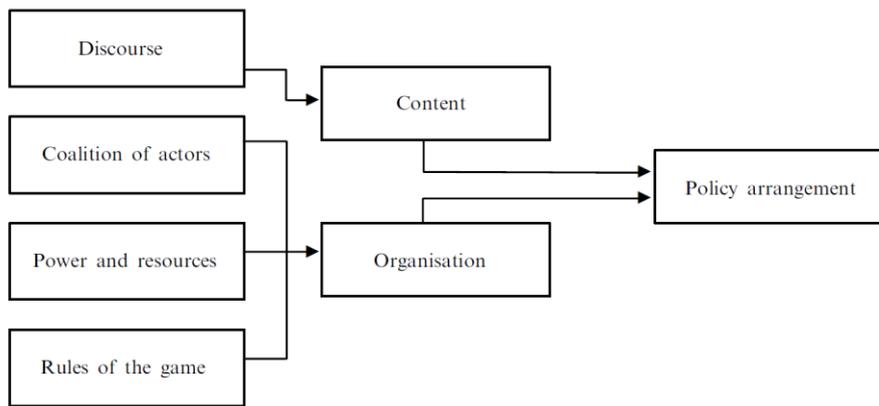


Fig. 2.2: The dimensions of a policy arrangement (Wiering and Immink, 2006 after Van Tatenhove et al., 2000)

Fig. 2.3 illustrates the inextricable linkage between the four dimensions, as they are presented in a tetrahedron. A change in any of the dimensions (corners of the tetrahedron) will result in changes to other dimensions and therefore also the policy arrangement itself. Existing policy arrangements are the product of stability and change in these four dimensions, which is why an analysis of the dimensions is necessary in order to understand a specific policy arrangement. (Arts et al., 2006)

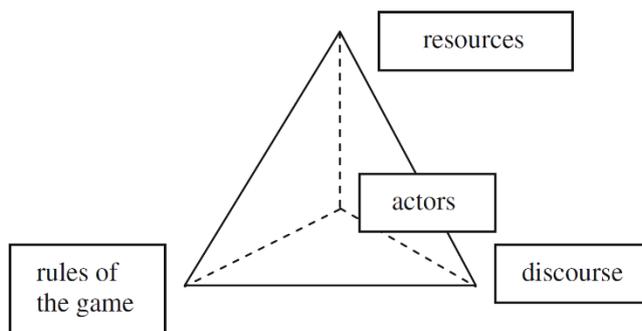


Fig. 2.3 The tetrahedron as symbol for the connections between the dimensions of an arrangement (Arts et al., 2006)

Although the division into four dimensions is useful to illustrate how policy arrangements are structured, the dimension 'rules of the game' is split up for the purpose of this thesis and added to other dimensions. This dimension can be separated in formal and informal rules of the game. The 'discourse' dimension is rather seen as content, which will be explained in the following. Therefore, the formal rules of the game, e.g. authority, formal institutional design, etc., are implied in the general strategy and are consequently added to the content dimension. The informal rules of the game can be found in the 'power and resources' dimension and are added to it for that reason.

2.4 Conceptual Model

The theory and concepts explained in this chapter all sum up to the conceptual model of this thesis, which is illustrated in Fig. 2.4. Starting from the dike strengthening projects, the respective policy arrangements are looked at, which are structured by content, coalition of actors, and power and resources. Within this three dimensions, the focus is on the three components of flood resilience, robustness, adaptability and transformability, and whether or not characteristics of this components, which have already been described in chapter 2.2, are found in the cases. The content dimension consists of hard-engineering structures as basis of a robust approach, complemented with adjustments to the hinterland, including not only adjustments to infrastructure and houses, but also spatial planning. The last part of this dimension is the existence of early warning and evacuation systems. Important points for the second dimension, coalition of actors, are cooperation and participation,

which imply the involvement of private actors, as well as decentralisation. The last dimension is influenced by willingness and ability to act, one the one hand of authorities, but also of the citizens. Additionally, the way information is distributed by authorities and used by inhabitants is important. Individual awareness and responsibility play a central role for the acceptance of risk. The last important characteristic are financial matters as funding for adjustments and adaptation. In this regard insurances can have an important role as well.

The combination of the characteristics in the three dimensions shown in Fig. 2.4, displays the optimal policy arrangement for flood resilience, which provides the basis to discuss barriers and opportunities of the cases to adopt a flood resilience approach. The following chapters further explain each dimension.

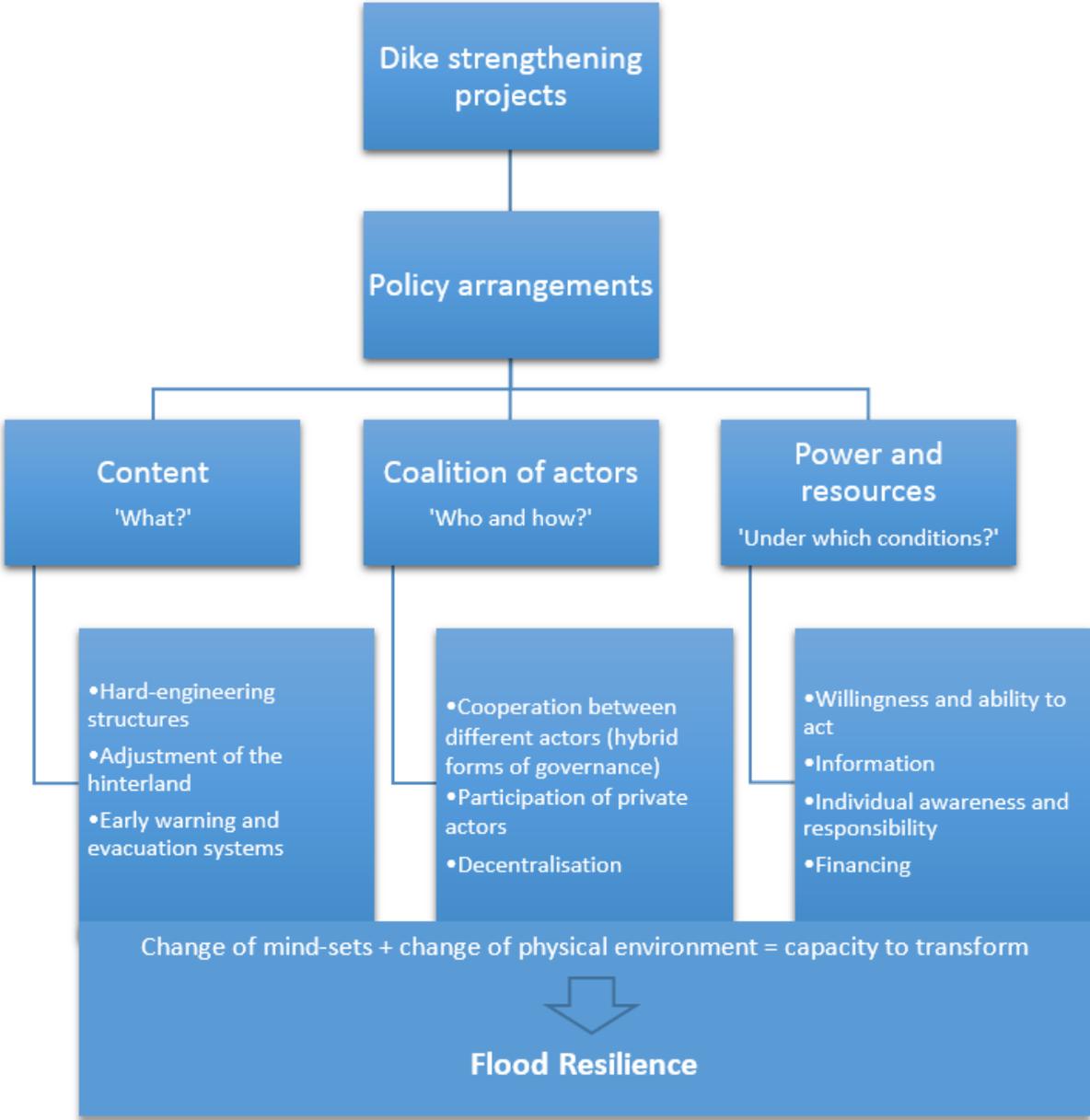


Fig. 2.4: Conceptual Model

2.4.1 Content

The content dimension of policy arrangements is expressed with the term discourse in scientific literature (see Arts *et al.*, 2006; Wiering and Immink, 2006). As this dimension is rather seen as content

description than as discourse in this thesis, the definition of Hajer (2006) describing it as *“an ensemble of ideas, concepts, and categories through which meaning is given to social and physical phenomena[...]”* (p. 67) is used to describe this dimension. Accordingly, this dimension asks for the 'what?' and builds on policies, strategies and measures that are used in the water management sector, including the formal rules of the game. These rules refer to the current legislation of the European Union, the state or federal state for formal procedures and interaction (Arts *et al.*, 2006; Wiering and Immink, 2006), and also include regulations on decision making (Arts *et al.*, 2006; Kuhlicke and Steinführer, 2013).

The paradigm shift in water management, explained in chapter 2.2, can be seen as change in the content dimension of water management, from one dominant concept to another.

Arts *et al.* (2006) give some helpful hints on which questions are best to be asked in order to analyse discourse and content respectively: *“What are the main concepts in policy discourse and the policy programme? What are the basic assumptions of the policy? What do relevant policy documents contain?”*(p. 100).

2.4.2 Coalition of actors

This dimension explains the 'who and how?' of a policy arrangement. There is not only a paradigm shift in water management towards resilience, but there are also changes in the governance arrangements concerning flood management, embedded in the wider frame of environmental governance. The emergence of these new governance forms goes along with the shift in flood management towards non-structural measures and the included greater involvement of the public (Kuhlicke and Steinführer, 2013), and also represents the general idea of governance as it *“emerges from the interactions of many actors, including the private sector and not-for-profit organizations”* (Lebel *et al.*, 2006, p. 2).

Descriptions of the process of change differ within scientific literature. Wiering and Immink (2006) describe an increasing internationalisation and regionalisation, Kuhlicke and Steinführer (2013) term new configurations against the background of resilience which leads to a new *“governance of preparedness”*, and Lemos and Agrawal (2006) state that there is an increasing trend in environmental governance to better involve lower level administration and communities into formal processes, as *“purely market-, state-, or civil society based governance strategies depend for their efficacy on support from other domains of social interactions.”* (p. 298). In short, hybrid forms of governance emerge (*ibid.*). Meijerink and Dicke (2008) summarise this shift in the private-public divide in three main points: *“(1) decentralization; of (2) involving the public at large which also means sharing responsibility in risk preparedness; and (3) a more prominent role of private actors.”* (p. 508)

The process of decentralisation can be seen as response to increased complexity (Zuidema, 2011), society is faced with due to climate change and sea-level rise. Local parties gain influence to provide time- and place-specific knowledge for the context of their specific area (see also Lemos and Agrawal, 2006), as the new policy arrangements allow for different types of participation (Leroy and Van Tatenhove, 2000). This pro-active and integrated approach therefore allows local units to find locally matching solutions as response to higher levels of complexity.

A flood resilience approach has to be complemented by hybrid forms of governance as there is a new distribution of responsibilities between the parties (Meijerink and Dicke, 2008). Or as Leroy and Van Tatenhove (2000) state: *“State, civil society and market are not separated sub-spheres”* (p. 204). In general, there are three groups of actors with different responsibilities that have to work together. First of all, the government which is in charge of flood policies and legislation to protect flood prone societies. Second, the market which often plays an important role in regard to flood insurances. Third, the community of a flood prone area, which is also in charge to take action themselves by adjusting their property to floods for example. (Meijerink and Dicke, 2008)

Although there is broad consensus that increased involvement and participation of citizens, communities, local institutions, and the public, is needed for this new forms of governance (Pelling, 2003; Lemos and Agrawal, 2006; Kuhlicke and Steinführer, 2013; Meijerink and Dicke, 2008; Kuhlicke and Steinführer, 2013), the change towards local priorities and increased power of local government can lead to conflicts.

Certain protection and safety are best reached with central guidance (Zuidema, 2011). This is how the system has worked so far, given certain thresholds, minimum heights for dikes etc. On the opposite side, the concept of resilience builds on participative interaction – networks (Kuhlicke and Steinführer, 2013) and “*cooperation across scales and times*” (Davoudi *et al.*, 2013, p. 316), exchanging knowledge in order to increase the adaptability of cities (*ibid.*). Nonetheless, in some parts central guidance is helpful or even necessary in order to support local authorities, but at the same time too much central guidance can “*constrain [the] local freedom to act*” (Zuidema, 2011, p. 123). Decentralisation has its limits and therefore the solution is always to find an “*optimal institutional arrangement*” (De Vries, 2000, p. 220).

2.4.3 Power and resources

This last dimension gives further insight into the conditions that are necessary to foster flood resilience. Zuidema (2011) states that the outcomes of governance are determined by local willingness and ability, which can be constrained by different factors. First of all, the *economies of scale* play a role as there is a need of sufficient resources to perform decentralised tasks, such as time, expertise and staff. Limitation of local financial resources is a further hindrance. A second important factor are *external effects*, e.g. global warming, which do not have their cause within the sphere of influence of the local authority. These effects can reduce the willingness and especially the ability of local authorities to cope with environmental problems. The last important factor is a *weak environmental profile*. While environmental standards are normally set by central governments, based on scientific research, environmental issues are not necessarily treated with a sense of urgency on the local level. Local actors often have an interest in different projects, such that are very likely to be realised in short-term and might be financially attractive. Therefore, it is hard for local governments to exert influence. In this regard, power relations on the local level and the weak profile of environmental issues influence the willingness and ability.

In regard to flood resilience, which can be seen as a long-term goal of a community, these factors play an important role as the immediate benefit of such a concept will not be as visible as the presence of a high dike. For shrinking coastal cities with limited resources, especially the economies of scale are an important factor.

Lemos and Agrawal (2006) stress the importance of “*capacity building, local knowledge and individual rationality*” (p. 305) as central points of decentralised environmental governance. The involvement of a range of actors in multi-level and cross-scale governance, as mentioned in chapter 2.4.2, can reveal the range of interests that are affected as a result of environmental problems and can also enhance social learning (Lemos and Agrawal, 2006), which is at the core of evolutionary resilience. This learning process can be translated into social capacity building which consists of the acknowledgement of “*unexpected consequences, reflections upon past behaviour, feedback loops and interactions with others*” (Kuhlicke and Steinführer, 2013, p. 116). How important these social capacities are in regard to resilience is stressed in one of the priorities set by the World Conference on Disaster Reduction in Hyogo (Japan) in 2005: “*Both communities and local authorities should be empowered to manage and reduce disaster risk by having access to the necessary information, resources and authority to implement actions for disaster risk reduction*” (UNISDR, 2007, p. 5).

Kuhlicke and Steinführer (2013) developed a typology of important social capacities in regard to flood risk management, which are amongst others, knowledge-, motivational- and financial capacities. The accumulation, use and strategic exchange of knowledge are central to the knowledge capacity. The motivational capacity *“relates to the general willingness to take notice of and deal with natural hazards. It includes awareness, responsibility and ownership.”* (Kuhlicke and Steinführer, 2013, p. 117). The last capacity, *“financial resources, include incentives, public and private funds as well as insurance policies”* (ibid.).

Social networks can transmit these capacities (Kuhlicke and Steinführer, 2013), but power-relations play an important role on how and by whom resources as knowledge, motivation, as well financial capacities are used (Arts *et al.*, 2006). The use of these resources influences the policy outcome (Arts *et al.*, 2006; Wiering and Immink, 2006), therefore resources can be seen as tools (Wiering and Immink, 2006).

One of the major challenges implied in capacity building are the questions of who needs which capacities, how can capacities be improved and how should a final outcome look like? – in short: the assessment of capacities (Lebel *et al.*, 2006; Kuhlicke and Steinführer, 2013). Closely connected to this problem is the similar problem in regard to resilience: what is the desired outcome of the resilience we strive towards and who benefits from it? What are trade-offs that have to be made? - Some people might suffer from the resilience of others (Lebel *et al.*, 2006; Meijerink and Dicke, 2008; Davoudi, 2012), which is why the issue of social justice cannot be disregarded in this context (Davoudi, 2012; Minnery, 2013). Pelling (2003) stresses the importance of planning and decision-making ahead of a disaster in this context as an indicator of a community’s adaptive capacity.

Another problem is the lack of awareness of flood risk amongst the public (Cooper *et al.*, 2013; Minnery, 2013; O'Neill, 2013). This leads to the problem described by Meijerink and Dicke (2008) that the shift towards new governance arrangements is wanted but not institutionalised yet, with the consequence that citizens still trust in protection by the government, whereas the government relies on the preparedness towards risk of the citizens. *“Therefore, assessing communities’ true perception of risk, their perception of what “safe” is, and undertaking visioning and scenario exercises to involve and inform the wider public will be critical to identifying joint visions about the future design of adapted urban environments.”* (O'Neill, 2013, p. 133).

3. Methods

This chapter will follow the structure of Fig. 3.1, which visualises the building blocks of research. One additional last step to the ones presented will be added – the analysis of the collected data in the interviews. This strategy will clarify which way was chosen in order to answer the research question *“What are the policy arrangements in current dike strengthening projects in Husum and Delfzijl, and which barriers and opportunities do these shrinking coastal cities encounter in adopting a flood resilience approach?”*

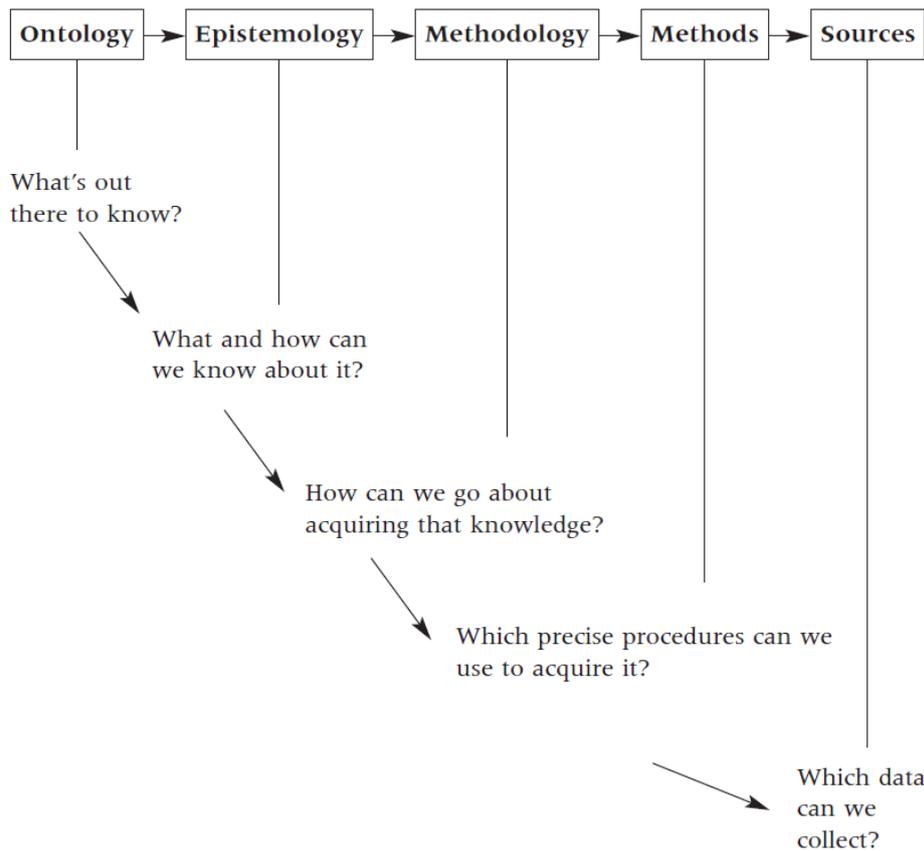


Fig. 3.1: The interrelationship between the building blocks of research (Grix, 2002; adapted from Hay, 2002)

3.1 Ontology

According to Blaikie (2000), ontology *“refer[s] to the claims or assumptions that are made about the nature of social reality, claims about what exists, what it looks like, what units make it up and how these units interact with each other. In short, ontological assumptions are concerned with what we believe constitutes reality.”* (p. 8). It is obvious that different cultural contexts and belief systems differ in the way they perceive the world (Grix, 2002), which is why Hay (2002) proposes to answer the question *“what is the nature of the social and political reality to be investigated?”* (p. 63) in order to find out the own position in this regard.

Two main ontological views, but also the most opposing ones, are *objectivism* and *constructionism*. Bryman (2012) defines these terms in the following way:

“Objectivism [...] asserts that social phenomena and their meanings have an existence that is independent of social actors.” (p. 33)

“Constructionism [...] (often also referred to as constructivism) asserts that social phenomena and their meanings are continually being accomplished by social actors. It implies that social phenomena and categories are not only produced through social interaction but that they are in a constant state of revision.” (p. 33)

Accordingly, the main difference between these two views is if social phenomena exist independent of social actors, or if they are constructed by them. This division is quite strict and in the context of this thesis, the question mentioned above cannot be clearly answered with any of them, but rather with a path in between. One cannot be sure if there is an existence of social phenomena independent of actors or not, but even if they exist independently, it cannot be denied *“that human beings attach meaning to their social reality”* (Boeije, 2010, p. 6). Therefore, it is not a decision for either of this views, but rather a tendency towards a constructionist view.

3.2 Epistemology

While ontology refers to the nature of social reality, epistemology refers to the nature of knowledge (Boeije, 2010) and asks for the what and how things about social reality can be known (see Fig. 3.1). Blaikie (2000) refers to the term as *“the claims or assumptions made about possible ways of gaining knowledge of social reality, whatever it is understood to be.”* (p. 8).

As for the ontology, there are also two opposing views for epistemology, positivism and post-positivism. Positivists apply the methods of natural science also on the social reality (Bryman, 2012), and therefore simply see social reality as an object that is predictable (O'Leary, 2004). While this predictability might hold true for some natural laws, as gravity for example, we cannot know everything about the complex world around us, let alone completely predict it. The latter reflects a post-positivist opinion, which also acknowledges the fact that there is not the one reality, as something that is true in one context or for a person, might be seen completely different by another. (ibid.)

A decision for either of them seems not logical in regard to their polarising meanings. A certain objectivity is needed in scientific research, but it is again the mixture that makes it. Objectivity and general laws are the basis to some extent, but social interaction and complexity add another dimension, which is subjectivity and the fact that we cannot know everything.

3.3 Methodology

The methodology addresses the research design of this thesis, the way in which knowledge was acquired. First of all, an in-depth research was chosen to be the fitting one for the research question, connected to a qualitative approach and empirical research. Qualitative research is appropriate for this thesis, as it helps to investigate social phenomena (Bergmann *et al.*, n.d.). The chosen research strategy is the case study, more specific a comparative case study. This type consists of an intensive study of at least two cases in order to produce *“more generalizable knowledge about causal questions”* (Goodrick, 2014, p. 1) and adds to the understanding and explanation of how the success of an intervention, e.g. a special programme or concept, is influenced by the context (ibid.).

In order to make the cases comparable, the most similar cases approach is used. This means that the selected cases are similar in a number of factors (Lijphart, 1971), attempting to keep as many external factors as possible constant (Anckar, 2008).

	Husum	Delfzijl
EU legislation	✓	✓
Coastal city	✓	✓
Shrinking city	✓	✓
Small city (22 – 26.000)	✓	✓
Dike strengthening project	✓	✓

Table 3.1: Similar factors of Husum and Delfzijl

The two cities Husum (Germany) and Delfzijl (The Netherlands) have been chosen based on the criteria shown in Table 3.1. First of all both cities fall under the legislation of the European Union, which is the most important factor to compare how they deal with flood risk. The cities itself also have the same characteristics in regard to their location at the coast, their size, and the fact that they lose inhabitants. The last important factor is that both cities have dike strengthening projects, which are executed at the moment in order to prepare for the predicted sea-level rise and the connected increase of floods. The aim is to compare these two cities in regard to how they deal with the described paradigm shift and if they attempt to not only strengthen their dikes, but also develop towards flood resilient communities that are better able to cope with the uncertainties connected to sea-level rise.

Accountability

The process of research had to be open and accountable, to show that the drawn conclusions are the logical result of the methods used. Therefore, not only audibility, “*full explication of methods*” (O’Leary, 2004, p. 63), but also reproducibility is needed. This means that the research can be replicated with the same findings, if the context of research stays the same (Ibid.). In order to define the context, similar factors have been identified above (Table 3.1).

The applied methods are explained in the next chapter. By giving the criteria that were used to analyse the documents and interviews, it is made sure that the research can be replicated using the same conditions.

3.4 Methods

The methods that were identified to be most suitable for the research are document analysis and semi-structured interviews. By analysing important documents related to the water management of each case, the broader context in which each specific case is located could be identified. This was of special importance, as the legal background even reaches the EU-level and is necessary to understand the particular situation in the cases. Additionally, this was essential to be adequately prepared for the interviews.

Document Analysis

The analysed documents are directives, laws, but also newspapers and webpages. In order to properly conduct the interviews, it was necessary to do the document analysis first. Analysing the most important policy documents in regard to water management of each city provided important background information for the interviews. Table 3.2 gives an overview about the analysed documents per country. In order to find important documents, the internet was browsed for the names of the projects, for the Dutch case the webpages of the project partners provided the most important documents. The German case is in an earlier stage, which is why it is not that well documented yet. Therefore mainly newspaper articles and protocols of the meetings of the Environmental- and Planning Committee have been used.

	Germany	The Netherlands
International regulations	Water Framework Directive	
	European Floods Directive	
National regulations	Water Management Act (Wasserhaushaltsgesetz)	Water Act
		National Water Plan
		Flood Protection Plan (Hoogwaterbeschermingsprogramma)
		Delta Programme
		Management and Development Plan for National Waters

Federal regulations	Federal Water Management Act of Schleswig Holstein (Landeswassergesetz)	
	General Coastal Protection Plan (Generalplan Küstenschutz)	
Project level	<p>Protocols of the Environmental and Planning Committee (http://www.stadthusum.de/session/bi/si0041.php?__kgrnr=11)</p> <ul style="list-style-type: none"> • 28.08.2013 • 24.09.2013 • 17.09.2014 • 22.04.2015 • 02.09.2015 • 27.04.2016 • 25.05.2016 	<p>Ambition and vision plans of the different project partners</p> <ul style="list-style-type: none"> • Gemeente Delfzijl (2009): “Maritieme Concepten in Beeld. Eindrapportage verkenning mogelijkheden versterking maritieme karakter Delfzijl Project Marconi” • Gemeente Delfzijl (2013): “Actieplan Centrum Delfzijl. 2012 -2022” • Gemeente Delfzijl (2016): „Marconi-over dit project“ • Gemeente Delfzijl, Waterschap Noorderzijvest, Waterschap Hunze en Aa’s, Rijkswaterstaat, Provincie Groningen (2012): “Maritieme zone Delfzijl. Een ruimtelijke visie”
Webpages	<ul style="list-style-type: none"> • WWF: “Pilotprojekt zur Klimaanpassung im Wattenmeer” (http://www.wwf.de/themen-projekte/projektregionen/wattenmeer/pilotprojekt-zur-klimaanpassung-im-wattenmeer/) 	<ul style="list-style-type: none"> • Marconi (http://www.delfzijl.nl/waterfront-delfzijl-marconi/) • Ecoshape: “Kwelderproef Marconi Buitendijks, Delfzijl” (http://www.ecoshape.nl/nl_NL/kwelderproef-marconi-buitendijks.html)
Newspaper articles/ press releases	<p>Newspaper articles (Husumer Nachrichten)</p> <ul style="list-style-type: none"> • “Der Dockkoog im Klimawandel” 18.10.2013 • “Freie Hand für die Projektgruppe” 09.09.2015 • „Eine „Hallig“ für Husum“ 01.05.2016 • „Wir sind frei und prüfen alle Varianten“ 24.05.2016 	<p>Press releases</p> <ul style="list-style-type: none"> • Waterschap Noorderzijvest: Overheden en natuurorganisaties werken samen in voorbereiding dijkverbetering“ 15.09.2014 • Provincie Groningen: “Bijna 10 miljoen euro voor project Marconi in Delfzijl” 05.12.2014 • Waddenfonds: “Project Marconi Buitendijks” 05.12.2014
Articles		<ul style="list-style-type: none"> • “Delfzijl keert terug naar zee” , Betten (2015), Noorderbreedte

Table 3.2: Analysed documents per country

For the qualitative analysis of the documents the criteria of flood resilience (see Table 3.3), defined for each dimension of policy arrangements (content, coalition of actors, as well as power and resources) have been used, as the dimensions provide the basis of analysis. In some documents synonyms for the

words were used, therefore it was not possible to simply search the documents for special words, instead it was necessary to read bigger parts of the documents in order to find the paragraphs needed.

Content	What are the main concepts of the policy programme? How is the concept of flood risk management understood? Formal authority Early warning and evacuation Adjustments to individual houses and infrastructure Spatial Planning Who is authorised to take decisions
Coalition of actors	Who is involved? Decentralisation Cooperation Participation Role of private actors
Power and resources	Willingness and ability to act Information Awareness Responsibility Financing Flood Insurance

Table 3.3: Categories for document analysis

Semi-Structured Interviews

Semi-structured interviews have the advantage to allow for a certain flexibility (Macdonald and Headlam, 2009), which gives the interviewer the possibility to react on replies of the interviewee and to change the order of questions as well as to come up with new questions (Bryman, 2012). This flexibility was necessary in order to understand what is really going on in the cases and gives the opportunity to ask for details and coherences (Boeije, 2010) but also to adjust to the specific role of an interviewee in the project.

To allow for comparability between the two cases, a certain amount of structure is still needed (Bryman, 2012). Therefore, and to ensure comparability with the content of the documents, the interviews were guided along the same criteria as the document analysis (see Table 3.3 and appendix 1 for the full interview guide), but were not necessarily bound to be addressed in a specific order. The interview guide was designed according to the structure of policy arrangements, starting with specific questions about the project followed by questions about the broader context. In order to make proper use of the interview, the conversation was recorded and transcribed afterwards to make a coding of the text possible.

As the interviews were partly done in German, only important quotes and parts used in the text were translated to English.

Interview Partners

As the core of this thesis are the dike strengthening projects in Husum and Delfzijl, it was necessary to search for interview partners which are involved in the projects.

For the dike strengthening in Husum, a project group was built to develop options. Out of this group actors from the following organisations were interviewed: the municipality, the coastal protection authority, the WWF as NGO, the citizen’s initiative, the Chamber of Commerce and Industry Husum and the economic alliance of Husum. The different interest groups provided a variety of viewpoints in

regard to the project and the composition of interviewees made a more objective and holistic view on the dike strengthening project possible.

The same accounts for the interview partners that were chosen for the Dutch case. The Province of Groningen, the water boards Noorderzijlvest and Hunze en Aa's, and the municipality Delfzijl are all partners involved in the project. Het Groninger Landschap and PAU, as advisory bodies, provided additional insight to the project.

	Germany	The Netherlands
Coastal protection authorities	Landesbetrieb für Küstenschutz, Nationalpark und Meeresschutz Schleswig Holstein (LKN) Husum, 21.06.2016	Waterschap Noorderzijlvest Groningen, 30.06.2016
		Waterschap Hunze en Aa's Via phone, 20.06.2016
Municipality/ Province	Stadt Husum Husum, 04.07.2016	Gemeente Delfzijl Delfzijl, 05.07.2016
		Provincie Groningen Groningen, 29.06.2016
NGOs	WWF Husum, 22.06.2016	Het Groninger Landschap Haren, 29.06.2016
Interest groups	Industrie- und Handelskammer Husum Husum, 21.06.2016	
	Bürgerinitiative Husum Husum, 04.07.2016	
	Husumer Wirtschaft Via phone, 01.07.2016	
Other		PAU Groningen, 13.06.2016

Table 3.4: List of interview partners per case

3.6 Data Analysis

The analysis of the transcribed text has been done with the computer software MAXQDA. The steps taken will be described hereafter.

First of all the transcripts of the interviews have been coded according to the scheme depicted in Fig. 3.2, which is based on the categories that have been used for the document analysis and the structure of the interview, but have been complemented with two additional criteria afterwards: 'Power relations' and 'shrinking cities'.

For practical reasons, some categories have been merged. 'What are the main concepts of the policy programme?' and 'How is the concept of flood risk management understood?' are assembled under 'strategy'. 'Awareness' and 'responsibility' have also been put into one code.

Code	Count
Codesystem	306
Content	0
Hard-engineering structures	1
Adjustment of the hinterland	36
Early warning and evacuation	4
Formal authority	35
Strategy	33
Coalition of actors	0
Decentralisation	4
Cooperation	28
Participation	63
Power and resources	0
Willingness and ability to act	13
power relations	21
Information	20
Individual awareness and responsibility	26
Financing	19
Shrinking cities	3

Fig. 3.2: List of codes used for analysing the interviews

The parts that have been coded with the different labels were processed to an excel chart with the help of the Segment-matrix function (see Fig. 3.3). This tool helps to attach every coded part to the respective category and was additionally divided into the two cases Delfzijl and Husum. By doing this, a full overview of what has been said about a variable is created. Afterwards the statements of each category got summarised and written down in the respective part of the results.

	A	B	C
3	Content		
	Hard-engineering structures	Stumbitz The Buitendijks projects is about the defence structure, dikes, salt marshes etc. [redacted] yes, that was one of the urgencies in the project	
4	Adjustment of the hinterland	Delfzijl [redacted] 13.06: 2 - 3 (0) Stumbitz Do you know if there are further adjustments to the hinterland in regard to safety, additionally to strengthening the dike? Connected to the restructuring of the city centre, e.g. make individual houses or infrastructure flood proof? [redacted] There are experiments with different forms/structures of dikes, but I don't know if there are plans to make the infrastructure in the hinterland flood resilient. But you know about the dike experiment of the water boards, to make it not just higher but broader? Delfzijl [redacted] 13.06: 4 - 5 (0) Stumbitz Yes. But the main concept is to improve the dike and trust that defence and the adjustment of the hinterland is not that important? [redacted] No, the focus is on the dikes and there is an experiment	Inwiefern werden auch Maßnahmen für die Anpassung der Stadt geplant, gerade vor dem Hintergrund des Resilienz-Konzeptes. Wird das landesinnere angepasst? Husum [redacted] LKN 21.06: 3 - 3 (0) Also derzeit müssten wir für Husum keine weiteren Vorschriften oder dergleichen erlassen, was die Umsetzung der HWRM-Richtlinie angeht. Wenn allerdings das LWG geändert wird und da was bestimmte Gefährdungsbereiche angeht, das rechtlich Eingang findet, dann würde das Auswirkungen haben auf die Raumordnung Stumbitz Das ist bisher also nicht nötig? [redacted] Als nötig erachten wir das schon, aber wir können es gesetzlich nicht durchdrücken. Es wird aber voraussichtlich seinen Platz finden im Gesetz, sodass dort für bestimmte

Fig. 3.3: Extract from the segment-matrix excel-chart

4. Cases

The selected cases Husum (Germany) and Delfzijl (the Netherlands) are located at the North Sea (see Fig. 4.1) and have to strengthen their main dike lines in order to be prepared for the predicted sea-level rise. As Germany and the Netherlands are both member states of the European Union (EU), the same directives, which have to be transposed into national law, apply for both countries. The following part gives an overview about the context on the level of the EU, as this legal background provides the basis for the execution of water management on the national level. After giving this broader context each case will be explained in more detail, guided along the structure of policy arrangements: content, coalition of actors, and power and resources. In order to better understand each case and the basic strategies, the respective formal background of the national and federal level respectively, will be elucidated as well.

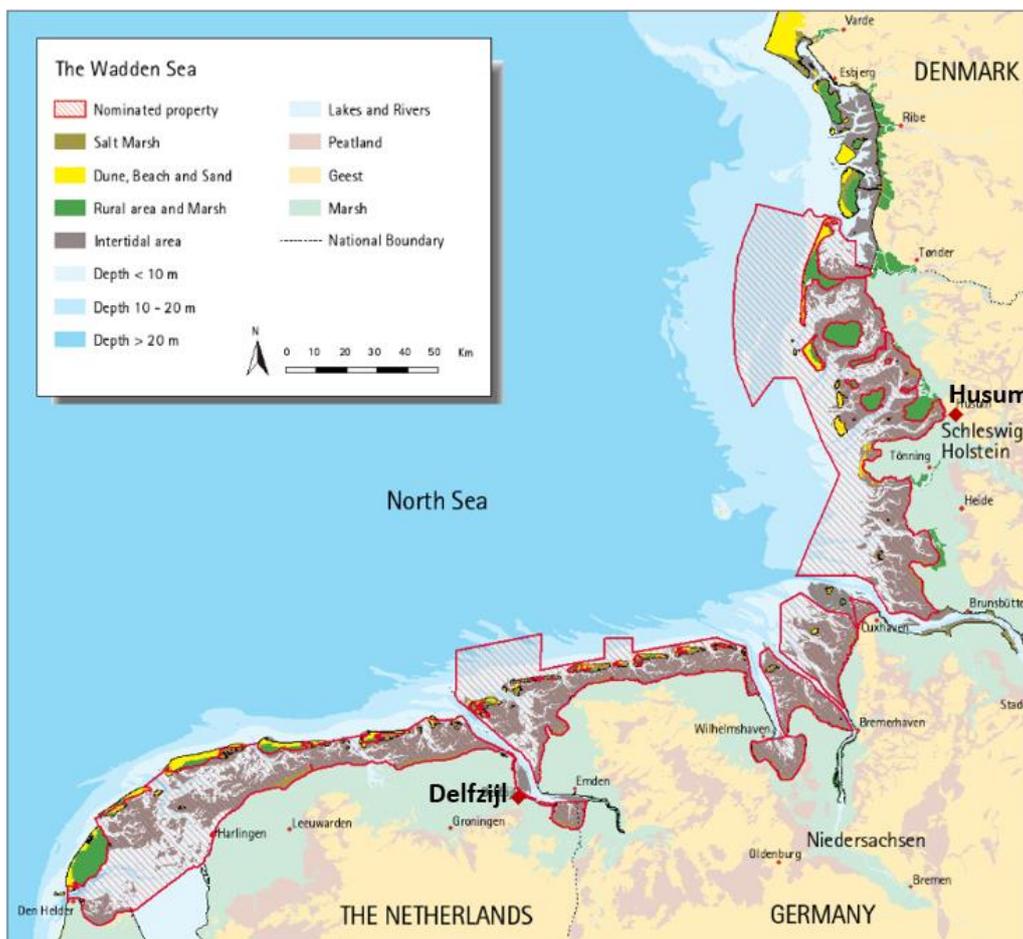


Fig. 4.1: Location of Husum and Delfzijl (adapted from Common Wadden Sea Secretariat, 2008, p. 9)

The two most important directives are the Water Framework Directive (Directive 2000/60/EC), for short WFD, and the European Floods Directive (Directive 2007/60/EC), referred to as EFD hereinafter. First of all, the EFD acknowledges the fact of increasing uncertainty in regard to climate change, as (2) of the directive reads:

“Floods are natural phenomena which cannot be prevented. However, some human activities (such as increasing human settlements and economic assets in floodplains and

the reduction of the natural water retention by land use) and climate change contribute to an increase in the likelihood and adverse impacts of flood events.”

It further identifies “*floods from the sea in coastal areas*” (EFD Art. 2 No. 1) as floods which fall under the provision of this directive. Furthermore, the term flood risk includes not only the probability of a flood event, but also refers to the “*potential adverse consequences*” (EFD Art. 2 No. 2). The main purpose of the WFD is that river basins should be organised in river basin districts (WFD Art. 3 No. 1) and not, as before, within the usual administrative borders. Art. 3 No. 1 states that “*coastal waters shall be identified and assigned to the nearest or most appropriate river basin district or districts*”. Accordingly, both directives cover coastal floods. The EFD complements the contribution of the WFD “*to mitigating the effects of floods*” (WFD Art. 1e) by the use of river basin management plans with another tool: flood risk management plans. These flood risk management plans focus

“on prevention, protection, preparedness, including flood forecasts and early warning systems [...]. Flood risk management plans may also include the promotion of sustainable land use practices, improvement of water retention as well as the controlled flooding of certain areas in the case of a flood event.” (EFD Art. 7 No. 3)

The implementation of the EFD was supposed to happen in different steps. The first step were flood hazard and flood risk maps. While flood hazards map shall show flood prone areas based on different scenarios (EFD Art. 3 and 4), “*flood risk maps shall show the potential adverse consequences*” (EFD Art. 5), i.e. how many inhabitants and which kind of economic activity are potentially affected by a flood in the different scenarios of the flood hazard maps. These maps had to be finished by December 2013 (Art. 6 No. 8) to provide “*an effective tool for information, as well as a valuable basis for priority setting and further technical, financial and political decisions regarding flood risk management [...].*” (EFD (12)). Based on this, flood risk management plans had to be published two years later, by December 2015 (Art. 7 No. 5). Summarised, the EFD aims at “*effective flood prevention and mitigation*” (EFD (6)). The river basin management plans of the WFD and the flood risk management plans of the EFD are “*elements of integrated river basin management*”, [...] [which] should [...] use the mutual potential for common synergies and benefits” (EFD (17)). EFD and WFD therefore cannot be seen as independent directives, but as intertwining tools in regard to flood risk management.

4.1 Dockkoog Husum

The city of Husum is a middle-order centre (*Mittelzentrum*) in the rural area of Schleswig-Holstein’s west coast in the north of Germany (see Fig. 4.1). It is also the county town of the county Nordfriesland. Although Husum is the centre of the regional labour- and housing market, it is suffering from emigration to surrounding communities (Heimfarth *et al.*, 2006). The population dropped from 22.477 in 2006 to approximately 22.000 today (UrbiStat, 2016). The decrease is not enormous, but constant and prognoses for growth of the city are negative (Heimfarth *et al.*, 2006).

Additionally, two of Husum’s major economic factors, the shipbuilding industries and fisheries, have suffered from an enormous decrease and hardly exist anymore. The two remaining factors, tourism and the wind industry, have to compete with other coastal regions. (ibid.)

One of Husum’s guiding principles in this regard is to develop the tourism sector by creating new offers for different target groups and review the existing structures that are mainly outdated. This review includes accommodation, gastronomy, museums and touristic infrastructure like the area of the Dockkoog. (Heimfarth *et al.*, 2006)

Plans to build a new hotel at the Dockkoog were stopped in 2012. The reason for this was the check of the Dockkoog dike in regard to its compliance with the safety level, which is done for all dike stretches every ten years. As the wave overtopping at this dike stretch was too high, it was included in the list of parts that have to be improved. (Interview LKN Husum, 2016)

The WWF (World Wide Fund for Nature) initiated the project group “*Zukunft Dockkoog*” (Future Dockkoog) which is part of the 'PiKkoWatt' project (Pilotmaßnahmen zur Klimaanpassung mit Kommunen in der Schleswig-Holsteinischen Wattenmeer-Region/ Pilot projects for adaptation to sea level rise in the Wadden Sea region of Schleswig-Holstein) of the WWF (Von Brocken, 2015). The main objectives of PiKkoWatt, which is funded by the BMUB (Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety), are nature conservation and coastal protection in the face of climate change (Fröhlich, 2016). Innovative concepts for a “growing with the sea” shall be developed in pilot projects (ibid.).

For the Dockkoog area, as pilot project of PiKkoWatt, options are going to be developed that combine climate adaptation, coastal protection and nature conservation, as well as tourism and recreation (Von Brocken, 2015), indicating that the creation of multiple gains plays an important role.

4.1.1 Content

The goal of the project group is to develop options that keep the scenery and diversity of species, and improve local recreation and touristic infrastructure. Four preliminary scenarios have been developed, which are to be further evaluated and checked until September. In general, there is a division between two main concepts with two sub-options each. The first main scenario is to keep the existing primary dike line with different options for the location of a new hotel. The second main scenario, the opening of the main dike line, would mean that a large part of the existing main dike line is removed to let the sea in and use the dike of the polder behind that as new primary defence line. This scenario includes the construction of a 'Hallig' (small island without a dike), which could be a possible location for a Hotel. This second scenario, as the more innovative one, raises much more questions about safety for possible investors, but also how the border of the National park will change, if the original primary dike line will be partly removed. Apart from that, all options are legally and practically feasible. (Von Brocken, 2015)

The goal is to develop a joint vision and a concept to realise the scenario for the future (Stadt Husum, 2015). The basis of this is “*no dike, no man, no life*” (Interview LKN Husum, 2016)ⁱ, as coastal defence is a necessity for life (ibid.).

As state planning authority, the LKN is responsible for the dike strengthening and the safety of the dike, whereas the municipality as the local planning authority is responsible for urban land-use planning and spatial planning in the polder which is under discussion (Interview LKN Husum, 2016).

The term flood resilience has not been used in the Dockkoog project and is also not used in the daily practice of the LKN. Instead, the concept is used rather implicitly, as the main objective of the strategy for the Wadden Sea until 2100 is to preserve nature while also finding room for people to live within it. (Interview LKN Husum, 2016)

The interviewees, who do not work with water management or nature protection regularly, did not know the term flood resilience or did not have a concrete idea of what it might include (e.g. Interview Stadt Husum, 2016; Interview Bürgerinitiative Dockkoog, 2016). The interview partners from the LKN and the WWF whereas, had quite similar ideas about the term. A combined definition would look like this: Flood resilience is seen as some kind of resistance against perils (Interview LKN Husum, 2016), not with the aim to recover as fast as possible after a disaster, but to plan in a sustainable way which enables to cope with future challenges on the long term (Interview WWF, 2016). Planning ahead to be prepared, a key aspect of evolutionary resilience, therefore goes along with a robust basis.

Adjustments to the hinterland have not been a topic in this project as well (Interview Stadt Husum, 2016; Interview LKN Husum, 2016). One reason for this is that special regulations for areas of risk in regard to spatial planning are not part of the federal water law so far, although it is seen as a necessity

by the State Office for Coastal Protection, National Park and Marine Conservation of Schleswig-Holstein (LKN): *“we see it as a necessity, but there is no legal base to push it through. But presumably it will be implemented into the law [...]”* (Interview LKN Husum, 2016)ⁱⁱ. These regulations would also be a measure of precaution to take flood risk already into account when new building areas are designated, especially for industrial plants which should take storage of special substances, oil for example, into account. The LKN already mentions these necessities, when it comments as public agency, which are only an advice so far and not legally binding. (Interview LKN Husum, 2016) The steering of settlement structures is seen as future challenge, which carries conflict potential, for example with touristic purposes (ibid.), but is also seen as an ethical question in regard to whether human kind has to abandon agricultural land to use it as area for flooding (Interview Stadt Husum, 2016). A tool to adjust structures of settlements could be a mandatory flood insurance, which simply does not insure buildings in flood-prone areas: *“[...] if it would succeed to make the elemental damage insurance mandatory, it would be possible to steer where people settle”* (Interview LKN Husum, 2016)ⁱⁱⁱ.

For a good flood protection, passive coastal defence – dikes, is complemented with active coastal defence, or disaster management, which is in charge for early warning and evacuation. This disaster management is existing for the area and also gets practiced. There are command post exercises, but also very practical exercises, e.g. to put stop logs into place, and exercises of the fire brigade. For the early warning there is, in addition to the HSI, a pilot project being carried out for an area close to Husum (Nordstrand), a webpage that provides specific information for that area in case of a storm surge. If this pilot project is successful, it could also be used for other areas. (Interview LKN Husum, 2016)

The strengthening of the Dockkoog dike is based on the formal background of national and federal laws, which will be explained in the following to get a better understanding of the formal authority and strategy of water management in Germany.

Both the Water Framework Directive and the EU Floods Directive have been transposed into German law by implementing it in the German Water Management Act (Wasserhaushaltsgesetz –WHG). Flood protection in Germany is the task of the federal states, which is why the WHG gives the general rules, but transfers the carrying out to the federal states. Both the state and the federal state have to implement the EU directive (BMUB, 2004). Husum lies in the jurisdiction of the federal state Schleswig-Holstein, therefore the water management is arranged in the Federal Water Management Act of Schleswig-Holstein (Landeswassergesetz – LWG).

Another very important policy document is the General Coastal Protection Plan (GCPP) of Schleswig-Holstein, which is published by the Ministry of Energy, Agriculture, Environment & Rural areas (MELUR). It was developed after the devastating storm surge in 1962 and got updated within the years. In 2001 the plan got a new dimension, which was integrated coastal zone management. Based on the reports of the IPCC in regard to climate change and expected sea-level rise, as well as to integrate the new legal frame which arose with the EU Floods Directive in 2007, the GCPP got updated again in 2012, which is the latest version of it. This version also includes the strengthening of the Dockkoog dike. The plan works as a guideline for coastal protection in Schleswig-Holstein and formulates aims of development and action. (MELUR, 2013)

The LWG divides the different authorities in upmost, upper and lower water and coastal protection authorities, which is illustrated in Table 4.1. The MELUR is the upmost water authority (LWG §105), coastal protection authority (LWG §108) and at the same time the river basin authority. The ministry is responsible to draw up the management plans for the river basins, to do the risk assessment in order to compile the flood hazard and flood risk maps, as well as to issue the flood risk management plans

(LWG §105). The Regional Authority for Agriculture, Environment and Rural areas (LLUR) as upper water authority determines technical and natural principles for the water regime and is in charge for monitoring, together with the coastal protection authorities (LWG §106). The MELUR as upmost coastal protection authority determines the lower authority, which is the LKN. The function of construction and maintenance of coastal defence structures, which reside with the federal state of Schleswig-Holstein, is executed by the LKN. These include the main dikes, regional dikes, as well as constructions within the dike line. (MELUR, 2013)

	Water authorities	Coastal protection authorities
Upmost	MELUR (River basin authority)	MELUR
Upper	LLUR	
Lower	District Administrator	LKN

Table 4.1: Division of water and coastal authorities in Schleswig-Holstein (based on the LWG)

In the GCPP as most important document for flood protection in Schleswig-Holstein, the main objective is formulated to be the long-term preservation of the protection capacity of the primary dike line (*Landesschutzdeiche*), especially in regard to the expected sea-level rise. The MELUR acknowledges that the process and pattern of sea-level rise is unknown, which is why 'no-regret' measures are needed that leave room for decisions of future generations. These 'no-regret' measures refer to a special way of strengthening the dike line, where the dike is not only heightened by 50cm in regard to expected sea-level rise ('climate surcharge'), but the shape of the dike is adjusted in a way that an additional heightening can be done without much effort (the concept of a *Baureserve*). (MELUR, 2013) Additionally to these measures, the MELUR stresses the need for a coastal risk management against the background of uncertainty of climate change, to minimise the damage in case the technical coastal protection constructions fail. Therefore alternative measures need to be taken, which are based on the legal frame of the EU Floods Directive. Coastal risk management in the GCPP is illustrated as a feedback control loop 'coastal risk management', which is depicted in Fig. 4.2. (MELUR, 2013)



Fig. 4.2: Feedback control loop coastal risk management (MELUR, 2013)

Fig. 4.2 shows the six steps of the feedback control loop: Prevention refers to spatial planning and urban land-use planning which should steer the land-use and building in coastal areas in order to

prevent such activities in flood-prone areas. Protection relates to the technical coastal protection measures and preparedness to the personal risk awareness of the population. This awareness is needed to let people take personal precaution, which is why information about possible dangers, as well as forecasts and warning systems are necessary. Emergency measures simply include measures as warning, evacuation or the placing of sandbags. Recovery refers to the creation of the original condition, getting back to normal by, e.g. fixing the infrastructure. The last point, check, includes the evaluation of the measures of this loop, including monitoring of sea-level rise and spatial development, as these factors determine the risk of future floods. The LKN has a hydrological service which constantly monitors the water levels and processes reports from the Federal Maritime and Hydrographic Agency to judge a possible flood event and take necessary measures. (MELUR, 2013)

Summarising, most characteristics of flood resilience in the content dimension are formally existing in the guiding strategies of water management. Disaster management (early warning and evacuation) is part of the strategy and also executed in practice. Adjustment of the hinterland is only included in the strategy in regard to spatial planning and urban land-use planning and is not legally binding so far. However, adjustments to individual houses and infrastructure are not part of the strategy.

4.1.2 Coalition of actors

The project group *“Zukunft Dockkoog”* consists of various actors. For the state there are the municipality of Husum, the LKN and the lower nature conservation authority of Nordfriesland. The market is represented by the economic alliance of Husum, the Chamber of Industry and Commerce and the Tourism agency. The citizens’ initiative is a representative of the community. Additionally, the WWF as an NGO and the initiator of the group takes part. The group is chaired by the planning office Gertz Gutsche Rügenapp from Hamburg (Schlüter, 2016).

The initiative for this project group came from the WWF, as they were searching for projects with climate adaptation planning, where they could launch a dialogue and try something new in a pilot project, based on an open process. They saw the need for that, since in many cases the scope for decision making is only very small at the point at which participation is possible. (Interview WWF, 2016) Since the municipality Husum liked the idea, they gave the mandate for the project group (Interview LKN Husum, 2016). The task of the project group is to develop a basis for decision-making of the UPA (Environmental- and Planning Committee of Husum) (Interview Bürgerinitiative Dockkoog, 2016). Some see as advantage of this process, and that would be the optimal case, that conflicts are solved beforehand and no legal debate is necessary in the formal plan approval procedure, so that the project can be implemented easier (Interview LKN Husum, 2016; Interview Stadt Husum, 2016; Interview WWF, 2016). The general problem seems to be that all formal processes take way too long in Germany, which is why *“there is a need for communication- and negotiation processes to take the people along in the process”* (Interview Stadt Husum, 2016). One reason is that the formal participation methods do not reach the normal citizen (Interview IHK Husum, 2016; Interview Stadt Husum, 2016), they are not suitable anymore, as citizens do not care about plans that are publicly displayed (Interview Stadt Husum, 2016). Although the working process itself was not easy all the time and there have been conflicts (Interview IHK Husum, 2016; Interview Bürgerinitiative Dockkoog, 2016), some interviewees have the opinion that discussion and participation is also needed for future projects (Bürgerinitiative Dockkoog, 2016; WWF, 2016; Stadt Husum, 2016). *“I think it is useful. I also experienced it as instructive [...]”* (Interview Bürgerinitiative Dockkoog, 2016)^{iv}.

Nonetheless, the process is seen with mixed feelings, on the one hand it brings opportunities and can have advantages, on the other hand there are barriers and doubts about the usefulness of the process. *“I don’t think that this speeds up the process on the long run. I think participation should maybe be done in the end”* (Interview Husumer Wirtschaftskreis, 2016)^v, when preliminary decisions have

already been made. There is also the wish for more openness of the parties, the wish that actors are open for new things, although everyone joins the group with a specific role (Interview Stadt Husum, 2016; Interview LKN Husum, 2016; Interview WWF, 2016). This wish also accounts for the political actors and the way they deal with the subject (Interview Bürgerinitiative Dockkoog, 2016; Interview Stadt Husum, 2016). At the same time there are concerns if certain interests can still be represented, and if the role with which one entered the project group can still be fulfilled if there are compromises with other interests (Interview IHK Husum, 2016). Another point was made with the emphasis on the fact that Germany has a representative democracy, in which people get elected to make decisions for the population. The question arose in this context how far the concept of participation can be combined with a system like this and if it is the right way to relocate a political decision:

“[...] maybe it is the trend that we need more participation of citizens in general, more discussion. In the end it is also a relocation of the political discussion, this is the reverse of the medal. We live in a representative democracy, which means that we have elected representatives, who make decisions for us. [...] the question is [...] does this form of participation, participation of citizens, fit in this kind of representative democracy.” (Interview IHK Husum, 2016)^{vi}. *“Why do we have a democracy, a representative, if there is no trust in it?!”* (Interview Husumer Wirtschaftskreis, 2016)^{vii}

A full assessment of the process can only be done in the end, and this is also what some actors want to wait for before they make their final decision about it (e.g. Interview LKN Husum, 2016). In general it can be said that such processes also have a learning effect for the involved actors even if they do not bring the results people have hoped for (Interview Stadt Husum, 2016).

Although this case does not show cooperation between the state and private actors, there is at least cooperation between actors, although the LKN and the municipality Husum are both state actors. Even if the LKN is not legally bound to take any opinion of the city about where the dike should be located into account, they work together on a solution for that area (Interview IHK Husum, 2016; Interview LKN Husum, 2016).

Participation is seen critical by some actors and also cooperation with private actors is not central in this project. This reflects the fact that these characteristics of flood resilience are also not mentioned in the LWG or GCPP. The WFD whereas, especially stresses the need to involve the public by stating that

“The success of this Directive relies on close cooperation and coherent action at Community, Member State and local level as well as on information, consultation and involvement of the public, including users.” (WFD (14)).

This participation of the public is also emphasised again in the EFD (with reference to Art. 14 of the WFD): *“Member states shall encourage active involvement of interested parties in the production, review and updating of the flood risk management plans [...]”* (EFD Art. 10 No. 2). Both directives refer to the setting up of flood risk maps and management plans which do not interact directly with the authority of the LKN to manage the main dike line. Consequently, this could be the reason why participation, cooperation and decentralisation do not play an important role in the dike strengthening project of the Dockkoog in Husum.

4.1.3 Power and resources

The project group only provides a basis for the final decision, which is taken by the city council meeting (Schlüter, 2016). Important to mention is that there has been the decision of the UPA, after the four preliminary options have been presented by the project group in an interim presentation, that they do not want any options in which the primary dike will be partly removed (Petersen, 2016), which means that an important decision was already made before the work of the project group is finished. The fact that the UPA already made a decision before the project group presented its final results is seen as unpleasant by the majority of the project group (Interview LKN Husum, 2016; Interview WWF, 2016; Interview Bürgerinitiative Dockkoog, 2016; Interview Stadt Husum, 2016) and an unnecessary demonstration of power (Interview Stadt Husum, 2016). Nonetheless, the project group decided to continue and check all options for their final report, which will be presented to the UPA. How things develop from then on cannot be predicted at the moment (Interview WWF, 2016).

The implementation of results from former citizen workshops did also not happen so far, although it could have been realised with few resources, indicating that the willingness to change things is limited to a certain degree: *“the realisation is lacking and the willingness, also in politics [...]”* (Interview Bürgerinitiative Dockkoog, 2016)^{viii}.

The awareness of flood risk is also limited in the population of Husum, as they *“have not seen water at a wrong place again”* (Interview LKN Husum, 2016)^x since 1962. While some awareness might be there within the older population (Interview Bürgerinitiative Dockkoog, 2016), there is also the fact that people forget very fast after disasters (Interview Stadt Husum, 2016). *“The better the coastal defence, the more awareness gets lost in the population”* (Interview LKN Husum, 2016)^x. This is different on the Halligen, which have a situation that is called “Land unter” (the land is flooded) around 20 times a year (ibid.). The people living here are well aware of what it means to live with the water (Interview Bürgerinitiative Dockkoog, 2016; Interview Stadt Husum, 2016; Interview LKN Husum, 2016). Since you cannot flood people on the mainland to make them aware, the people living on the Halligen are important (Interview LKN Husum, 2016).

“Because if I don’t have that man out there anymore [...], who still experiences the North Sea, the ‘Blanken Hans’ par for par, who exposes himself more to the danger as the people 10km behind the dike, if I don’t have that people anymore, I also lose the awareness for the peril, since I always need those people, who tell stories.” (Interview LKN Husum, 2016)^{xi}.

Consequently, there is the necessity to make the people more aware, but there is also the need to use easy language to inform people (Interview Bürgerinitiative Dockkoog, 2016; Interview LKN Husum, 2016). Although there are exhibitions and special events in the Nissen-Haus (local museum), there is the wish to have more possibilities to remind people about the past. A feasibility study for an additional exhibition in the Nissen-Haus has already been done. This could work as basis and might also be suited as an extra-school venue, since there is a special need to reach younger people and make them aware of the potential danger, but also about the fact that they will need to spend money on that in the future. Good work in this regard is also done by the media, as TV stations sometimes send reportages directly from a Hallig when there is a storm surge, which is a good way to reach people. (Interview LKN Husum, 2016) The option to open the primary dike line could also create a stronger feeling for the fact that people are living close to the sea (Interview WWF, 2016), and therefore contribute to the awareness. Information plays a crucial role for awareness in many ways, which is why it is tried to reach people with press coverage about important meetings of the UPA and to make things as transparent as possible in that way (Interview Stadt Husum, 2016).

Although storm surges are often connected to fears (Interview WWF, 2016), there seem to be many resigned and disinterested people, who are very hard to reach (Interview Bürgerinitiative Dockkoog, 2016; Interview Stadt Husum, 2016). Additionally, *“it is perceptible that there are many other topics in society, which are more important than [flood risk awareness]”* (Interview LKN Husum, 2016)^{xii}. The bottom line of this is that people still only seem to learn something, when it hurts (Interview Stadt Husum, 2016; Interview LKN Husum, 2016).

To prevent that in a financial way, the first insurance company (Provinzial) offers an elemental damage insurance, which also includes storm surges (LKN Husum, 2016).

The strengthening of the dike itself will be financed by money from the state and the federal state, as usual for the primary defence line, but there is also the possibility to use funds from the EU, so called Health-Check funds, for innovative measures. (Interview LKN Husum, 2016)

In this regard Husum is not affected by the fact that it is shrinking and might have less resources than other cities. The reason why coastal defence is organised in communities of solidarity is that no individual could fight the sea alone, but needs the community of solidarity for protection. This community reaches from lower level authorities, e.g. dike associations, up to the EU for financing. The fact that *“the level of safety is not connected to the number of people living behind the dike”* (LKN Husum, 2016)^{xiii} results in an equal level of protection, also for small communities. (Interview LKN Husum, 2016)

The same accounts for the economies of scale in regard to experts. Coastal defence needs specialised staff in different fields, who are expensive, and could not be paid by the small and decentralised Water and Soil Associations in Schleswig-Holstein. Therefore the LKN, being responsible for coastal defence in the whole federal state, provides all these experts. (Interview LKN Husum, 2016)

Summarising, the willingness of water related authorities to act and inform is there, but the ability to reach the people is limited. This is caused by the fact that the willingness within the population to think about possible risks seems restricted, which is why there is low individual awareness and responsibility. Furthermore, the willingness and openness of politics also seems limited to a certain degree, which influences the possibilities for innovation.

The way information should be distributed formally is regulated in §59 (2) of the LWG. The paragraph states that affected communities have to point out the flood risk, appropriate precautionary measures and rules of behaviour with the annual enclosure of the real estate tax demand, on resident assemblies and through local notifications. The publication of the flood risk assessment, the flood hazard and flood risk map, as well as the risk management plans can be done by pointing out in the gazette of Schleswig-Holstein where these can be looked at (LWG §133a).

Additionally, the MELUR provides an internet platform in order to inform the public and increase the risk awareness of the population (www.hsi.schleswig-holstein.de). The platform gives up to date information about water levels and provides links to other services which forecast floods and issue warnings. (MELUR, 2013)

In regard to the financing of dike strengthening projects, the rule of 70% paid by the state and 30% paid by the federal state applies. This division is based on the law about the common task 'Improvement of the agrarian structure and coastal protection'. Based on the changed requirements facing sea-level rise, a special framework 'Coastal protection measures as a consequence of climate change' was set up by the state and the federal coastal states. Additional 550 Mio. Euro are provided within this framework to help the federal coastal states to realise their adaptive measures faster. (MELUR, 2013)

Coastal protection constructions, as dikes, generally have to run through a plan approval procedure (*Planfeststellungsverfahren*) (WHG §68). The Federal Administrative Law (*Landesverwaltungsgesetz*) regulates this procedure in §§139 ff. Accordingly, the authority which is responsible (for the main dike line the MELUR), has to hand the plan to an authority which conducts the hearings (plan approval authority - LKN) of affected authorities, but also private persons, which can contradict. In this case, the objections get discussed afterwards. The LKN is also responsible for the official planning approval. This late possibility to comment on projects in the formal procedure was the reason why the WWF initiated the project group.

4.2 Marconi Delfzijl

Delfzijl is located in the north-east of the province of Groningen in the north of the Netherlands, directly located at the Ems-Dollard Estuary (see Fig. 4.1). Due to its position, it is an important economic centre with industry and a seaport, but the municipality is shrinking because of insufficient employment opportunities (Gemeente Delfzijl, 2013). As a consequence, many flats but also shop areas are vacant (Gemeente Delfzijl *et al.*, 2012). The number of inhabitants dropped from ~ 32.000 in 1990 (Gemeente Delfzijl, 2013) to only 25.695 in 2013 (UrbiStat, 2016), although Delfzijl is the regional centre of the area along the Ems-Dollard estuary (Gemeente Delfzijl, 2013). This enormous decrease makes Delfzijl the fastest shrinking municipality of the Netherlands (*ibid.*).

In order to keep the cities' function and make it more attractive, measures were needed that are in line with the new demand for spatial development and water safety. This is why Delfzijl started the Marconi project (**Mar**ietieme **Con**cepten in Beeld, which translates to “impressions of maritime concepts”) in 2009, which aims at developing the future of Delfzijl with a maritime character (Gemeente Delfzijl *et al.*, 2012). The part of Marconi which relates to the dike is connected to the project “*Dijkverbetering Eemshaven – Delfzijl*”, a dike strengthening project between Eemshaven and Delfzijl that is included in the Flood Protection Programme (Programmadirectie Hoogwaterbescherming, 2015).

4.2.1 Content

An important basis for all the visions and ambitions developed in the Marconi project was the statement “*van de nood en deugd maken*” (to make a virtue out of a necessity) (Gemeente Delfzijl, 2009, p. 4) which refers to the fact that there is a need to strengthen the primary defence line latest by 2050 because of the descending ground and the expected sea-level rise. Delfzijl decided to use this huge investment, which has to be done anyway, to improve Delfzijl's structural position and make it a liveable and attractive city with a maritime character. (*Ibid.*)

The Marconi project consists of many smaller projects, one of them and the first one that is executed is Marconi Buitendijks (referring to projects that are outside the dike line). Marconi Buitendijks is further divided into partial projects, which are depicted in Fig. 4.3



Fig. 4.3: Partial projects Marconi Buitendijks (Ecoshape, 2012)

Number 1 in Fig. 4.3, the restructuring of the centre of Delfzijl is not part of Marconi Buitendijks but has connections to No. 2, which is the creation of a beach land inwards, a multifunctional coastal protection, and the connection of this new area with the city centre. In order to create a beach that is five times bigger than before, located on a higher level, and suitable for events (Gemeente Delfzijl, 2016a), a new dike will be built, which is located ~200m land inwards from the original dike (Antea Group, 2015). The relocation of the dike offers the opportunity to create a 'rijke dijk', which is broader than a regularly strengthened dike would have been, and therefore does not only provide safety but also leaves room for nature, recreation and tourism. By building a bridge for pedestrians and cyclists, as well as a beach promenade, the connection between the harbour, the city centre and the sea will be improved. (Gemeente Delfzijl, 2016a) Spatial policy therefore goes along well with coastal protection (Gemeente Delfzijl *et al.*, 2012).

While the future options for the 'Schermdijk' (No. 3) were not fully clear in the first Marconi report (Gemeente Delfzijl, 2009), the decision to create a salt marsh of 56ha in front of it was now made (Betten, 2015). This goes along with a wooden path through it, which makes the first part (lower, right No. 3) accessible for visitors. It will be complemented with a lookout point to watch birds and a breeding island for them (Gemeente Delfzijl, 2016a).

The last part of Marconi Buitendijks, mentioned for the sake of completeness, is the removing of the Griesberg. This is a huge amount of gesso- and limestone waste, which are remains of soda production in the coastal area. (Waddenfonds, 2014; Gemeente Delfzijl, 2016a)

In general there is individual responsibility for the different parts. The municipality is responsible for the Marconi Buitendijks project (Interview Gemeente Delfzijl, 2016b), whereas the water board is responsible for the dike strengthening part of it (Interview Het Groninger Landschap, 2016; Interview Gemeente Delfzijl, 2016b), and the province is responsible for the area as a whole, which is why they also have a say in the project (Interview Provincie Groningen, 2016)

Also in this case, the term flood resilience was not used (Interview PAU, 2016; Interview Provincie Groningen, 2016) and is not used in daily practice very often (Interview Het Groninger Landschap, 2016). Instead, the concept of multi-layer safety, which is used in the Netherlands, was referred to as comparable with the resilience concept by the interview partners (e.g. Interview Waterschap Noorderzijvest, 2016; Interview Het Groninger Landschap, 2016).

Generally, building dikes is seen as cheaper compared to the individual protection of buildings, and is therefore the chosen way to protect the country. Nonetheless, something changed with the

development of the Delta Programme, and other measures are also taken into account. As the Delta Programme is still a young policy, it will take a while until things are really implemented in practice. (Interview Provincie Groningen, 2016)

For the dike in Delfzijl there was the wish of the municipality to keep it as low as possible and adjust the hinterland in a way that it can cope with the water that might spill over the dike, so that the city has a better connection to the waterfront (Interview Gemeente Delfzijl, 2016b). Although the municipality and the province thought this was a possible option, the dike is going to be heightened by 2 m, since it has to comply with special standards in order to guarantee a certain safety (Interview Provincie Groningen, 2016). Therefore there are no further adjustments to the hinterland within the scope of the Marconi Buitendijks project (Interview Het Groninger Landschap, 2016; Interview Gemeente Delfzijl, 2016b; Interview Waterschap Noorderzijlvest, 2016; Interview Provincie Groningen, 2016). This looks different for the dike further towards Eemshaven, as there is a pilot project with a double dike line:

"[...] we are going to have a pilot in the agricultural area to build a dike behind the dike and let saltwater in for nature and for sedimentation and part of it is reserved for saltwater agriculture. That's a new dike concept, where you can slowly level up the coastal zone."

(Interview Provincie Groningen, 2016)

By letting the water in, the land can slowly grow (ibid.) and catch up with sea-level rise, which is *"some sort of resilience, because even if your dike breaks these areas are much higher and less vulnerable"* (Interview Het Groninger Landschap, 2016). This could strengthen the coastline on the long term if it would be done along the whole coast (Interview Het Groninger Landschap, 2016).

For disaster management, the Netherlands are divided into safety regions, which are equal to the provinces. Within this regions, the national government, the province, as well as the municipalities work together to protect the people according to the third layer of the multi-layer risk management, which are measures for early warning and evacuation. (Interview Waterschap Noorderzijlvest, 2016)

The formal background of the Marconi project is a variety of policy documents, which are explained in the following.

In order to react to the challenges climate change poses to the Netherlands, a new Water Act was passed in 2009. This law follows the approach of integrated water management as it combines and replaces many already existing ones, e.g. about water management and water pollution, into one framework. Additionally, it complies with the WFD and the EFD and therefore paves the way for a new water management which is able to face future challenges. (Rijkswaterstaat, 2009)

The most important Dutch policy documents in regard to water management are visualised in Fig. 4.4. The Water Act regulates the drawing up of two plans: The National Water Plan and based on that, the Management and Development Plan for National Waters (BPRW). The National Water Plan provides *"the broad outlines for the national water policy and the related aspects of spatial policy"* (MIE and MEA, 2015, p. 7).

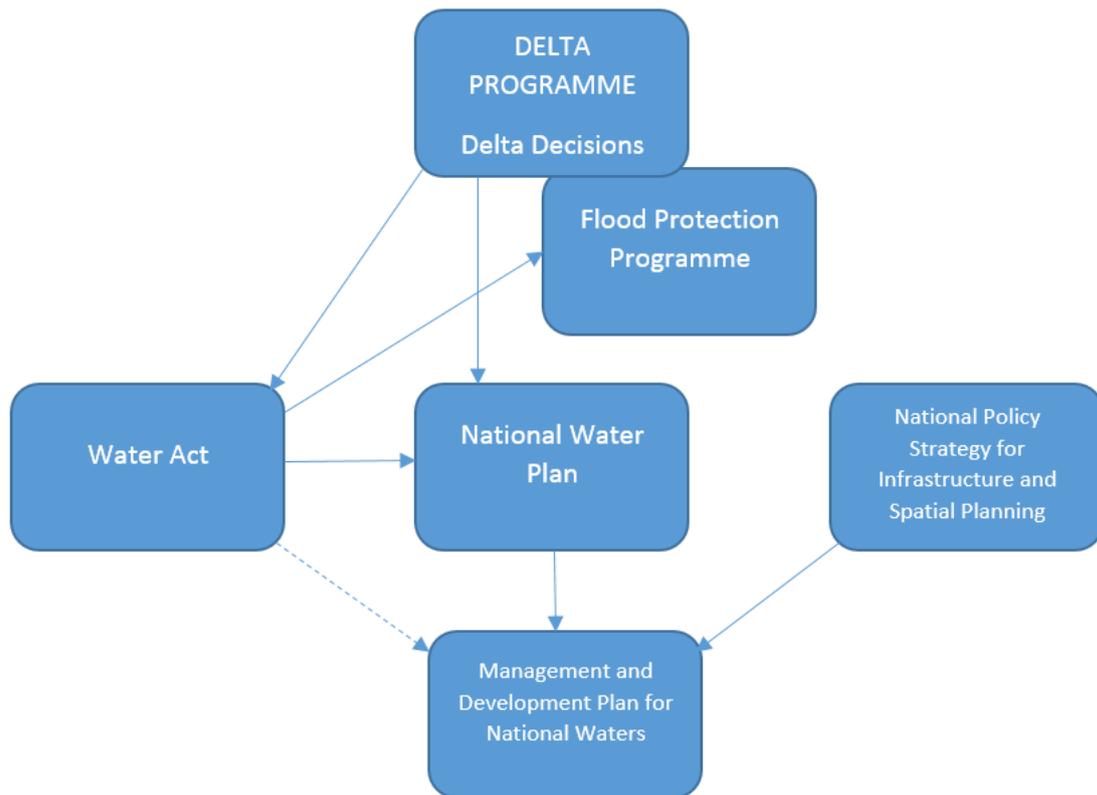


Fig. 4.4: Important Dutch policy documents in regard to water management

Influential for the plan have been the Delta Decisions of the Delta Programme 2015, which have amongst other things been about the use of a flood risk management approach and a “*water-robust and climate-proof (re)development in built-up areas*”(MIE and MEA, 2014, p. 7). The Flood Protection Programme (Hoogwaterbeschermingsprogramma) has been connected to the Delta Programme, and aims to reach a higher level of safety on the short-term, while it connects this measures with the long-term tasks of the Delta Programme (Programmadirectie Hoogwaterbescherming, 2015). The BPRW translates “*the National Water Plan [...] and the National Policy Strategy for Infrastructure and Spatial Planning in[to] the management and maintenance of national waterways.*” (Rijkswaterstaat, 2015, p. 9). The Directorate-General for Public Works and Water Management (Rijkswaterstaat) develops this plan, as it is also the executing body of this plan.

The standard setting for flood risk management in the Netherlands is task of the central government, in this case the Ministry for Infrastructure and the Environment (MIE). The executive body of this Ministry is Rijkswaterstaat, which is responsible for the implementation of the flood risk management of the primary flood defence system, together with the water boards. The implementation is supervised by the MIE. (MIE and MEA, 2015)

The Dutch are very clear in their goal for water management, which is “*a robust and future-oriented design of [the] water system, aimed at effective protection against floods [...]*” (MIE and MEA, 2015, p. 5). In order to keep the primary flood defence structures on a good safety level, there are phases to check all these constructions (Programmadirectie Hoogwaterbescherming, 2015). These checks are enshrined in the Water Act (ibid.). As a consequence of the Delta Programme, new standards will be developed that classify the probability of flooding for each dike stretch and be put into force with a update of the Water Act by 2017. “*The aim is for all dykes to meet the new standards by 2050*” (MIE and MEA, 2015, p. 15). All primary defence structures that are not sufficient in regard to their safety level become part of the Flood Protection Programme, in order of their urgency (Programmadirectie

Hoogwaterbescherming, 2015). The level of safety is dependent on the amount of people at risk, as well as possible economic damage or damage to infrastructure of national importance (MIE and MEA, 2014).

The ongoing changes, including challenges of climate change and a growing number of people living in possibly affected areas, request for a *“progressive flood risk management”* (MIE and MEA, 2015, p. 13). This progressive food risk management is based on a risk approach, which takes the possible consequences of a flood into account. Therefore a multi-layer flood risk management approach was developed, based on the Delta Decisions on Flood Risk Management and Spatial Adaptation. The approach consists of three layers: The first one, *“preventive measures to limit the consequences of any flood”* (MIE and MEA, 2014, p. 14), has the highest priority and refers to the primary flood defence structures. The second layer is *“spatial organisation of an area to limit the consequences of any flood”* (ibid.) and the third layer is *“disaster and crisis management to respond effectively to any flood”* (ibid.). Accordingly, the focus lies on prevention, on improving defence constructions. But additionally, there is the effort to connect water and space, e.g. by measures to widen rivers or smart combinations, which propose to use flood defence structures also in alternative ways, for instance as parking space. Flood risk management therefore clearly implies spatial planning, with the aim to make Dutch spatial planning *“as climate-proof and water-robust as possible”* (MIE and MEA, 2015, p. 60) by 2050. Part of the ambition is to make everyone, including authorities, businesses and the population aware about the implications of living with the water and that this can not only include threats but also opportunities. Additionally an adaptive approach shall be used, which allows for effective measures in the short-term but leaves space to adapt in the long-term. (MIE and MEA, 2015)

Although the water management strategy of the Netherlands includes all important characteristics of flood resilience in the multi-layer flood risk management approach, the project shows that adjustments to the hinterland are not of major importance in practice.

4.2.2 Coalition of Actors

The involved actors are, as state authorities, Rijkswaterstaat, the Province of Groningen, municipality Delfzijl, water board Noorderzijlvest, water board Hunze en Aa's, the landscape managing agency (Het Groninger Landschap) as NGO, and Groningen Seaports.

Delfzijl chooses for a plan development, which is done collectively from the first ideas until it is finished, while keeping each specific responsibility. This approach leads away from the old way of letting the local government make a plan, which is executed later by the market. For every area development, agreements with the partners have to be made beforehand on who has which role and responsibility, as this is crucial for trust. (Gemeente Delfzijl, 2009)

The municipality but also the province see participation and cooperation of all actors as very important for the project (Interview Gemeente Delfzijl, 2016b; Interview Provincie Groningen, 2016). In order to involve the citizens, they were asked in the very beginning what they would do with the area, if they were the “boss” of Delfzijl. In total there was a process of three years where people from authorities, but also citizen representatives of each district of the city, as well as CEOs (Chief executive officers) from the local industry where involved in communications at the round table (see Fig. 4.5). This time was used to gather information, but also give information back to the people, which is seen as essential for a successful project. The municipality tried to take also small ideas of the inhabitants into account in order to let them see that they are heard and to make sure that there is support from the locals. (Interview Gemeente Delfzijl, 2016b)

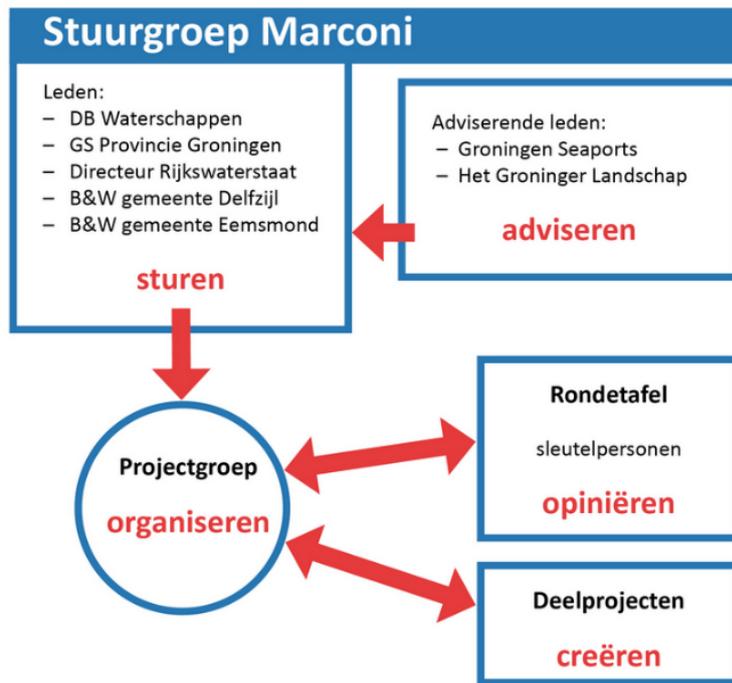


Fig. 4.5: Projectorganisation of the Marconi Project (Gemeente Delfzijl, n.d.)

There is a good cooperation between all the parties involved (Interview Provincie Groningen, 2016; Interview Gemeente Delfzijl, 2016b; Interview Waterschap Noorderzijlvest, 2016). Especially the province, which sees integral development as very important, tried to bring all the different parties together and combine their interests in the project (Interview Het Groninger Landschap, 2016). All these parties work together and help each other, while every authority keeps its own responsibility for the project. Although the municipality of Delfzijl is responsible for Marconi Buitendijks, they got help from Rijkswaterstaat in legal questions. The same accounts for the water boards, which is responsible for the dike, and which took the wish of the municipality into account in their plans, to relocate the dike land inwards. (Interview Gemeente Delfzijl, 2016b) Things about the dike are discussed and a plan is developed by the water board which has to be approved by the province (Interview Provincie Groningen, 2016).

The cooperation of the different actors in the project conforms to the way in which the main policy documents describe it.

Collaboration “with government authorities and stakeholders” (MIE and MEA, 2015, p. 10) is one of the main principles set up by the cabinet. Additionally, the fact that the role of the central government is changing due to tasks being decentralised, and an increasingly important role of the society, is recognised. In consequence, there is “a growing demand for other steering options, partnerships and funding arrangements” (MIE and MEA, 2015, p. 5).

The decentralisation is part of the new governance model, written down in the Flood Protection Programme. According to that, the Minister for Infrastructure and Environment is only politically responsible for the programme, while the respective authorities (water boards) are responsible for their own projects (Programmadirectie Hoogwaterbescherming, 2015).

The BPRW also states that Rijkswaterstaat works with partners and the market. Thereby, the active search for connection possibilities with societal goals and interests of other authorities plays an important role, as collaboration with other water administration should be improved, especially in regard to information measures and permission grants. (Rijkswaterstaat, 2015)

Even though the market as private actor is not involved in the project, the citizens have the possibility to participate in the project. Also the cooperation between state and non-state (Het Groninger Landschap) actors is working. Additionally, the project is executed in a decentralised way, as the water board is the lowest level of water management in the Netherlands.

4.2.3. Power and Resources

In general people in the Netherlands are not aware of the flood risk (Interview PAU, 2016; Interview Het Groninger Landschap, 2016; Interview Provincie Groningen, 2016; Interview Waterschap Noorderzijlvest, 2016), as the government takes care of everything, which is why they see flood safety as a standard which is there and not something they have to think about (Interview Waterschap Noorderzijlvest, 2016; Interview Het Groninger Landschap, 2016).

“I don’t think they think daily about it. Maybe they know somewhere, far away in their heads. But it is not a big issue, because in Holland it is pretty well organised, the flood risk.” (Waterschap Noorderzijlvest, 2016)

Although there are campaigns to raise awareness (Interview PAU, 2016; Interview Provincie Groningen, 2016), it is difficult to change things if people are not interested, or simply do not see the need to think about risks, as everything is taken care of so good by the government. (Interview Het Groninger Landschap, 2016; Interview Waterschap Noorderzijlvest, 2016)

This is also reflected in the view that the individual should not have too much responsibility (Interview Provincie Groningen, 2016).

A flood insurance system could make the people more aware (Interview PAU, 2016), although it is questionable if an insurance system could cover the dimension of a big flood: *“If we have a real flood, then it is a national disaster, there is not an insurance company that can cover that.”* (Interview Provincie Groningen, 2016).

The financing for the Marconi Buitendijks project was mainly done through money from the province and the Waddenfonds (Interview Gemeente Delfzijl, 2016b; Interview Provincie Groningen, 2016). This money is also used to pay the additional costs the water board has through relocating the dike in front of Delfzijl, as this has to be paid by the municipality (Interview Gemeente Delfzijl, 2016b). Therefore there is no influence of the fact that Delfzijl is shrinking on the project, as the parties work together in order to realise it (Interview Provincie Groningen, 2016).

Although water is omnipresent in the Netherlands, people forget more and more about the risks of living with water due to the good protection status. The aim of the government is to make people aware again *“about the concerted efforts that are needed to keep the Netherlands dry and inhabitable and that the risk of flooding is not simply hypothetical.”* (MIE and MEA, 2015, p. 9) Lacking awareness of the risk *“can lead to diminished support for measures”* (ibid.). This is why one of the principles set up by the cabinet reads *“inform, encourage, act”* (MIE and MEA, 2015, p. 10), which aims at encouraging people to take responsibility and *“measures for themselves”* (ibid.). In order to increase the knowledge and motivational capacities of the population, the 'Our Water' campaign (www.onswater.nl) was launched in collaboration with different partners. The webpage informs about (drinking) water related topics and was designed to explain the necessity to invest, as well as the importance of awareness and the personal involvement of people. Additionally, the App 'Will I flood?' (Overstroom ik?) was developed, which gives information about the water level that can be reached at the place of residence in case of a flooding and which actions should be taken in case of an actual event. The government is aware of the fact that it is necessary to start awareness raising at an early age, which is why schools are encouraged to pay extra attention to water related topics. All this is

based on the fact that if people *“knew how to anticipate and respond to extreme situations of drought or floods, such situations would be less likely to have serious consequences”* (MIE and MEA, 2015, p. 9).

The financing of projects in the Flood Protection Programme is equally divided between the water boards and the state. In order to promote innovation, there is a possibility to get 100% funding for experimental and showcase measures that are combined with the project itself. (Programmadirectie Hoogwaterbescherming, 2015)

There seems to be a high willingness and also the ability to act in regard to future challenges on the side of the authorities. However, there seems to be no willingness within the population to acknowledge possible risks and the need to take own responsibility. Giving too much responsibility to the population is, against the aim of the government, also not seen as realistic in practice.

5. Discussion and Conclusion

The document analysis and the interviews provided a huge amount of data which will be discussed against the background of the conceptual model in the following, while also evaluating possible barriers and opportunities that exist in regard to adopting a flood resilience approach.

As Germany has to implement the WFD as well as the EFD, most of the characteristics of flood resilience are formally written down in the policy documents. This accounts for the need to involve private actors, mainly the public, and the requirement to work together with different parties, to cooperate across different scales in order to manage the river basins. However, it does not hold true formally for the project, as the project group is only a pilot project and the possibility to comment about the project would normally be way later in the plan approval procedure. Nevertheless, there is at least some cooperation, as the LKN cooperates with the municipality Husum for the dike strengthening project, although there was no legal reason to do so. The involvement of the market does not play a role. For the content dimension there is a certain mismatch between the legal basis and how practice would like to deal with adjustments to individual houses and infrastructure. Although adjustments to the hinterland have not been a topic in the Dockkoog project, the LKN clearly sees the necessity to take measures into account that fulfil the need to make certain infrastructure flood-proof in areas which have a certain risk. This becomes obvious in the advices the LKN gives when asked as public agency and it is also part of the risk management approach which is written down in the GCPP. Nonetheless, the LWG does not imply any standards so far which would force the municipalities to take account of this when setting up binding site-plans. The need to steer the use of land against the background of flood risk is also written down in the GCPP, but proper tools to do so are missing in practice.

The use of hard-engineering structures as coastal defence is formally written down and also used in practice as the main flood defence. Also the necessity to have early warning and evacuation plans is translated into practice. Another, and probably the biggest mismatch, is located in the power and resources dimension. Although the need to have citizens that are aware of the risks is clearly stressed in the policy documents, people do not seem to be aware at all, which is also a reason why individual responsibility is not existent.

Even though the term flood resilience is not used, many characteristics are found in the formal strategy for coastal protection. This offers the opportunity to further develop the resilience strategy in practice, as the basis is formally there. Also the approach of the project group to create multiple gains with their scenarios provides a first step towards flood resilience. Additionally, there is confidence that the LWG will be adjusted, so that the flood risk has to be taken into account for the binding site-plans, which would further strengthen the legal basis. Things also seem to start moving in the insurance sector, as the first insurance in Schleswig-Holstein offers to insure for flood risk. With the help of insurances, a lot of work could be done in regard to precaution for settlement structures, although a mandatory flood insurance system brings a lot of new questions of practicability and might be problematic to implement.

Large barriers seem to be especially in the social aspect, regarding everything that needs the involvement and awareness of the population, which is of special importance for flood resilience. Despite the fact that there are efforts to make the citizens aware of flood risk, there is hardly any awareness of what consequences living in a flood-prone area could have. One reason might be that the formal participation methods are simply not suitable (anymore) to reach the people. No one, who does not really care about the subject, will look at risk maps that are publicly displayed in any authority, especially not if there is no feeling that there is a need to do that. This is what good coastal protection results in, the people lose the feeling of risk and therefore the awareness, which would be so important

to be prepared. Additionally citizens forget very fast. While there might be some awareness left at people who experienced the last flood, younger generations do not have a feeling for that, and there seems to be a general problem of a resigned and disinterested population, which is hard to reach. Furthermore, there is an openness of some parties missing to truly cooperate with others in a process, which is also connected to power relations, as the biggest benefit for oneself stays the main driving force for some. The process was additionally influenced by the political decision that tried to stop the working group from assessing all options, which was a demonstration of power that questioned the whole work which was done by the group. Power relations are therefore a huge barrier for proper cooperation.

The term flood resilience is also not used in the Netherlands, but they still provide many characteristics that are necessary for flood resilience. This is on the one hand due to the fact that also the Netherlands have to implement the WFD and the EFD, but also thanks to the new approach that was created with the Delta Programme. All characteristics of flood resilience are found in the policy documents to a greater or lesser extent, although some leave room for interpretation. Their multi-layer flood risk approach covers all points of the content dimension, although adjustment of the hinterland was also not a topic in the Marconi Buitendijks project. The coalition of actors seems to work quite well in the Marconi project and is done in a decentralised and cooperative way, which also allows for participation. Therefore, this is in accord with how the policy documents indicate to do it best. There is only one minor remark, which has to be done. The involvement of the market does not seem to be important, not in the documents and also not in practice. The biggest mismatch between the documents and practice can be found in the social aspect again. The awareness about flood risk is hardly there and also the need to take individual responsibility is not seen in daily life. Although one major principle of the Ministry of Infrastructure and the Environment aims at encouraging the population to take own responsibility and measures, this does not appear to be of importance in practice.

Still, the opportunities of Delfzijl to become flood resilient are there. The Delta Programme provides a good basis and the cooperation of all actors is already there, which makes up an important part of flood resilience. Nonetheless there are barriers, with the lacking awareness and responsibility being probably the most problematic to overcome. A major reason for this is that flood defence is taken care of so good by the government, people simply do not see the necessity to care. Additionally, the adjustment of the hinterland was not taken into account in the project and the information gathered in the interviews indicates that measures to adjust houses, but also spatial planning in regard to settlement structures is not really an issue in practice. Nonetheless, there are pilot projects close to Delfzijl, which experiment with double dike lines and natural sedimentation to create land which is less vulnerable.

Although thought differently in the beginning, the barriers the cities face are not connected and influenced respectively by the fact that the cities are shrinking, as for example the awareness problem is not restricted to those cities, but of national concern.

Seen formally, both projects had almost the same basic prerequisites, as their policy documents contain the characteristics of flood resilience, which is the most important basis in order to fulfil the paradigm shift from flood control towards flood resilience and shows the general willingness to act in this regard. Interestingly, they have quite similar barriers to overcome. In regard to robustness there is the need of stronger spatial planning which avoids a further control paradox. This is strongly connected with the adaptability of the cities, where the adjustment of the hinterland should attract more attention in order to reduce the vulnerability and risk. In order to do so, it is also of importance that an openness to learning develops, as well as the acceptance of the fact that change is inevitable.

This accounts for the citizens in general, who need to raise their awareness, but also for politics, as the transformation towards a new, but also publicly accepted future, is a political challenge for a big part. The transformation, respectively the paradigm shift, needs to be based on the cooperation of a diversity of people. This seems to be working better in Delfzijl than in Husum so far, respectively better in the Netherlands than in Germany, although the conducted interviews only provided a small insight and do not show a representative picture. Interesting in this regard is the fact that the WWF as NGO and nature conservation organisation was the initiator for a joint working process in Husum, which represents an impulse from outside the common water management system. In contrast to this, the authority that mainly pushes a good cooperation in Delfzijl is the province, which tries to reach an integral development. This is therefore rather a development from inside the system which seems to create a more fruitful basis for cooperation. Furthermore, it is questionable in how far raised awareness can be reached by the authorities against the background that people feel safe behind the dike and do obviously not see a need to act themselves in any way. This seems to be the case although, or just because, action is taken in regard to sea-level rise with strengthening the dikes. Instead of making people think about consequences of that for the life behind the dike, they have the feeling that it is taken care of their safety. Interestingly, this accounts for both countries, although the Netherlands differentiate between the level of safety of their dikes depending on the social and physical assets behind the dike line, while Germany has the same safety level everywhere, independent of people and assets behind the dike. Nonetheless, this difference in the approach does not seem to influence the feeling of being at risk or the awareness. In this regard, climate change does not trigger resilience on the side of the population, but it obviously does for the authorities that are in charge for the concepts of water management. Therefore, the content dimension already made a big step in the shift from flood control to a flood risk management approach in both cases but a complete change of mind-sets has definitely not taken place yet. The wanted shift, which is formally already written down, does simply not seem institutionalised so far, resulting from a lack of willingness within the population to take care about risks. Especially in Husum there is still the need to overcome barriers in regard to power relations and find an institutional arrangement that suits the local context and the need to adjust in regard to future challenges. In the end, flood resilience is about planning and also decision making ahead, about being prepared. Even if it stays a vague concept, which is interpreted by different actors in very different ways, tools are needed that force people to take action. If things do not change within the population and people do not start thinking, if it does not succeed to create adaptive capacity, it might stay with the fact that people only learn, when it starts to hurt.

This results show implications for planning practice, as they illustrate the need to adjust the way in which things are done. It shows with a practical example how important it is to think about measures that make people aware of the fact that flood risk is not only a task of authorities and the government, but that it is a task of everyone personally to think about the consequences and help to provide a good basis of knowledge and experience to be able to cope with future challenges. It also shows that the starting conditions are there, which only need to be used by continuing to work together in an integrated way. Only a combination of spatial planning and water management, together with a society that is aware and willing to accept changes, will create areas that are flood-proof and prepared for the future, areas that are flood-resilient.

References

- Anckar, C. (2008), "On the Applicability of the Most Similar Systems Design and the Most Different Systems Design in Comparative Research", *International Journal of Social Research Methodology*, Vol. 11 No. 5, pp. 389–401.
- Antea Group (2015), "Dijkverbetering Eemshaven-Delfzijl. Notitie Reikwijdte en Detailniveau", available at:
http://www.provinciegroningen.nl/fileadmin/user_upload/Bekendmakingen_XML/Dijkverbetering_Eemshaven_-_Delfzijl_Notitie_Reikwijdte_en_Detailniveau.pdf (accessed 17 November 2015).
- Arts, B., Leroy, P. and van Tatenhove, J. (2006), "Political Modernisation and Policy Arrangements: A Framework for Understanding Environmental Policy Change", *Public Organization Review*, Vol. 6 No. 2, pp. 93–106.
- Beatley, T. (2012), *Planning for Coastal Resilience: Best Practices for Calamitous Times*, Island Press.
- Bergmann, M., Eberle, T., Flick, U., Förster, T., Horber, E., Maeder, C., Mottier, V., Nadai, E., Rolshoven, J., Seale, C. and Widmer, J. (n.d.), "Qualitative Research Methods. Statement".
- Betten, E. (2015), "Delfzijl keert terug naar zee", in *Noorderbreedte*, special edition "Zilte vitaliteit", pp. 34–35.
- Blaikie, N. (2000), *Designing social research: The logic of anticipation*, Polity Press, Cambridge, UK, Malden, MA.
- BMUB (2004), "Umsetzung von Europäischen Richtlinien in Deutschland - Drucksache15/3902. Antwort der Bundesregierung auf die Kleine Anfrage der Abgeordneten Dr. Peter Paziorek, Josef Göppel, Dr. Rolf Bietmann, weiterer Abgeordneter und der Fraktion der CDU/CSU – Drucksache 15/3745 –", available at: <http://dip21.bundestag.de/dip21/btd/15/039/1503902.pdf>.
- Boeije, H. (2010), *Analysis in qualitative research*, Sage, Los Angeles.
- Bruijn, K. de (2005), *Resilience and flood risk management: A systems approach applied to lowland rivers*, DUP Science, Delft.
- Bryman, A. (2012), *Social Research Methods*, 4th rev ed., Oxford University Press, Oxford, UK.
- Bürgerinitiative Dockkoog (2016), *Interview about policy arrangements in the dike strenghtening project in Husum*, 04.07.2016, Husum.
- Common Wadden Sea Secretariat (2008), "Nomination of the Dutch-German Wadden Sea as World Heritage Site. Volume Two. Annexes", available at: <http://www.waddensea-secretariat.org/sites/default/files/downloads/whn-annexes-volume08-01-16.pdf> (accessed 8 July 2016).
- Cooper, J., Adamson, M. and Russell, E. (2013), "Flood risk management - Challenges to the effective implementation of a paradigm shift", *Planning Theory & Practice*, Vol. 14 No. 1, pp. 135–140.
- Cross, J. (2001), "Megacities and small towns: different perspectives on hazard vulnerability", *Global Environmental Change Part B: Environmental Hazards*, Vol. 3 No. 2, pp. 63–80.
- Davoudi, S. (2012), "Resilience: A Bridging Concept or a Dead End", *Planning Theory & Practice*, Vol. 13 No. 2, pp. 299–307.
- Davoudi, S. (2014), "Climate change, securitisation of nature, and resilient urbanism", *Environment and Planning C: Government and Policy*, Vol. 32 No. 2, pp. 360–375.
- Davoudi, S., Brooks, E. and Mehmood, A. (2013), "Evolutionary Resilience and Strategies for Climate Adaptation", *Planning, Practice & Research*, Vol. 28 No. 3, pp. 307–322.
- Davoudi, S., Shaw, K., Haider, L.J., Quinlan, A.E., Peterson, G.D., Wilkinson, C., Fünfgeld, H., McEvoy, D. and Porter, L. (2012), "Resilience. A Bridging Concept or a Dead End? "Reframing" Resilience: Challenges for Planning Theory and Practice Interacting Traps: Resilience Assessment of a Pasture

- Management System in Northern Afghanistan Urban Resilience: What Does it Mean in Planning Practice? Resilience as a Useful Concept for Climate Change Adaptation? The Politics of Resilience for Planning: A Cautionary Note”, *Planning Theory & Practice*, Vol. 13 No. 2, pp. 299–333.
- De Vries, M. (2000), “The rise and fall of decentralization. A comparative analysis of arguments and practices in European countries”, *European Journal of Political Research*, Vol. 38 No. 2, pp. 193–224.
- Ecoshape (2012), “Kwelderproef Marconi Buitendijks, Delfzijl”, available at: http://www.ecoshape.nl/nl_NL/kwelderproef-marconi-buitendijks.html.
- Folke, C., Carpenter, S.R., Walker, B., Scheffer, M., Chapin, T. and Rockström, J. (2010), “Resilience Thinking: Integrating Resilience, Adaptability and Transformability”, *Ecology and Society*, Vol. 15 No. 4.
- Fröhlich, J. (2016), “Pilotprojekt zur Klimaanpassung im Wattenmeer”, available at: <http://www.wwf.de/themen-projekte/projektregionen/wattenmeer/pilotprojekt-zur-klimaanpassung-im-wattenmeer/> (accessed 6 June 2016).
- Gemeente Delfzijl (n.d.), “Projectorganisatie”, available at: http://www.delfzijl.nl/waterfront-delfzijl-marconi/projectorganisatie_41975/ (accessed 7 June 2016).
- Gemeente Delfzijl (2009), “Maritieme Concepten in Beeld. Eindrapportage verkenning mogelijkheden versterking maritim karakter Delfzijl Project Marconi”, available at: http://www.delfzijl.nl/waterfront-delfzijl-marconi/achtergrondinformatie_41961/ (accessed 4 June 2016).
- Gemeente Delfzijl (2013), “Actieplan Centrum Delfzijl. 2012-2022”, available at: http://www.delfzijl.nl/internet/beleidsstukken_42481/item/delfzijl-actieplan-centrum-tweede-druk-27-mei-2013_50687.html (accessed 4 June 2016).
- Gemeente Delfzijl (2016a), “Marconi - over dit project”, available at: <http://koers2022.nl/index.php/nl/page/view/54/marconi> (accessed 3 June 2016).
- Gemeente Delfzijl (2016b), *Interview about policy arrangements in the dike strengthening project in Delfzijl*, 05.07.2016, Delfzijl.
- Gemeente Delfzijl, Waterschap Noorderzijlvest, Waterschap Hunze en Aa’s, Rijkswaterstaat and Provincie Groningen (2012), “Maritieme zone Delfzijl. Een ruimtelijke visie”, available at: http://www.delfzijl.nl/waterfront-delfzijl-marconi/archief_41959/item/maritieme-zone-delfzijl-a5_45261.html (accessed 5 June 2016).
- Gibson, C. and Tarrant, M. (2010), “A ‘conceptual models’ approach to organisational resilience”, in *The Australian Journal of Emergency Management*, 25 No. 02, pp. 8–14.
- Godschalk, D. (2003), “Urban Hazard Mitigation: Creating Resilient Cities”, *Natural Hazards Review*, Vol. 4 No. 3, pp. 136–143.
- Goltermann, D., Ujeyl, G. and Pasche, E. (2008), “Making coastal cities flood resilient in the era of climate change”, available at: http://gfzpublic.gfz-potsdam.de/pubman/item/escidoc:6080:6/component/escidoc:6081/148_Goltermann.pdf (accessed 3 May 2016).
- Goodrick, G. (2014), “Comparative Case Studies. Methodological Briefs. Impact Evaluation No. 9”, available at: https://www.unicef-irc.org/publications/pdf/brief_9_comparativecasestudies_eng.pdf (accessed 8 June 2016).
- Grix, J. (2002), “Introducing Students to the Generic Terminology of Social Research”, *Politics*, Vol. 22 No. 3, pp. 175–186.
- Gunderson, L.H. (2000), “Ecological Resilience—In Theory and Application”, *Annual Review of Ecology and Systematics*, Vol. 31 No. 1, pp. 425–439.
- Hajer, M. (2006), “Doing discourse analysis: coalitions, practices, meaning”, in van den Brink, M. and Metze, T. (Eds.), *Words matter in policy and planning: Discourse theory and method in the social*

- sciences, Netherlands geographical studies*, Koninklijk Nederlands Aardrijkskundig Genootschap; Netherlands Graduate School of Urban and Regional Research, Utrecht, pp. 65–75.
- Hay, C. (2002), *Political Analysis: A Critical Introduction*, Palgrave, Basingstoke.
- Heimfarth, M., Kreutz, S., Pflüger, N. and Schadowski, K. (2006), “Stadtentwicklungskonzept Husum. Kurzfassung”, available at: http://husum.de/media/custom/15_2175_1.PDF?1163758815 (accessed 16 November 2015).
- Het Groninger Landschap (2016), *Interview about policy arrangements in the dike strengthening project in Delfzijl*, 29.06.2016, Haren.
- Holling, C.S. (1973), “Resilience and Stability of Ecological Systems”, *Annual Review of Ecology and Systematics*, Vol. 4 No. 1, pp. 1–23.
- Holling, C.S. (1996), “Engineering Resilience versus Ecological Resilience”, in Schulze, P. (Ed.), *Engineering Within Ecological Constraints*, National Academies Press, Washington, pp. 31–43.
- Hudson, R. (2010), “Resilient regions in an uncertain world. Wishful thinking or a practical reality?”, *Cambridge Journal of Regions, Economy and Society*, Vol. 3 No. 1, pp. 11–25.
- Husumer Wirtschaftskreis (2016), *Interview about policy arrangements in the dike strengthening project in Husum*, 01.07.2016, Via phone.
- IHK Husum (2016), *Interview about policy arrangements in the dike strengthening project in Husum*, 21.06.2016, Husum.
- Kinzig, A., Ryan, P., Etienne, M., Allison, H., Elmqvist, T. and Walker, B.H. (2006), “Resilience and regime shifts”, *Ecology and Society*, Vol. 11 No. 1.
- Kuhlicke, C. and Steinführer, A. (2013), “Searching for resilience or building social capacities for flood risks?”, *Planning Theory & Practice*, Vol. 14 No. 1, pp. 114–120.
- Lebel, L., Anderies, J., Campbell, B., Folke, C., Hatfield-Dodds, S., Hughes, T. and Wilson, J. (2006), “Governance and the Capacity to Manage Resilience in Regional Social-Ecological Systems”, *Ecology and Society*.
- Lemos, M.C. and Agrawal, A. (2006), “Environmental Governance”, *Annual Review of Environment and Resources*, Vol. 31 No. 1, pp. 297–325.
- Leroy, P. and Van Tatenhove, J. (2000), “New policy arrangements in environmental politics. The relevance of political and ecological modernisation”, in Spaargaren, G., Mol, A.P.J. and Buttel, F.H. (Eds.), *Environment and Global Modernity, Sage studies in international sociology*, Sage, London, pp. 187–208.
- Lijphart, A. (1971), “Comparative Politics and the Comparative Method”, *The American Political Science Review*, Vol. 65 No. 3, p. 682.
- LKN Husum (2016), *Interview about policy arrangements in the dike strengthening project in Husum*, 21.06.2016, Husum.
- Macdonald, S. and Headlam, N. (2009), *Research methods handbook: Introductory guide to research methods for social research*, Centre for Local Economic Strategies, Manchester.
- Meijerink, S. and Dicke, W. (2008), “Shifts in the Public–Private Divide in Flood Management”, *International Journal of Water Resources Development*, Vol. 24 No. 4, pp. 499–512.
- MELUR (2013), “Generalplan Küstenschutz des Landes Schleswig-Holstein. Fortschreibung 2012”.
- MIE and MEA (2014), “Delta Programme 2015. The decisions to keep the Netherlands safe and liveable”.
- MIE and MEA (2015), “National Water Plan 2016 - 2021”, available at: https://www.noordzeeloket.nl/en/Images/National%20Water%20Plan%202016-2021_4948.pdf (accessed 24 May 2016).
- Minnery, J. (2013), “Planning and retrofitting for floods: Insights from Australia”, *Planning Theory & Practice*, Vol. 14 No. 1, pp. 125–128.

- O'Leary, Z. (2004), *The essential guide to doing research*, Sage, London.
- Olsson, P., Gunderson, L., Carpenter, S., Ryan, P., Lebel, L., Folke, C. and Holling, C. (2006), "Shooting the Rapids: Navigating Transitions to Adaptive Governance of Social-Ecological Systems", *Ecology and Society [online]*, Vol. 11 No. 1.
- O'Neill, E. (2013), "Neighbourhood design considerations in flood risk management", *Planning Theory & Practice*, Vol. 14 No. 1, pp. 129–134.
- Oosterberg, W., Drimmelen, C. van and Vlist, M. van der (2005), "Strategies to harmonize urbanization and flood risk management in deltas. ERSA conference papers (ersa05p174)".
- PAU (2016), *Interview about policy arrangements in the dike strengthening project in Delfzijl*, 13.06.2016, Groningen.
- Pelling, M. (2003), *The vulnerability of cities: Natural disasters and social resilience*, Earthscan Publications, London, Sterling, VA.
- Pendall, R., Foster, K.A. and Cowell, M. (2010), "Resilience and regions. Building understanding of the metaphor", *Cambridge Journal of Regions, Economy and Society*, Vol. 3 No. 1, pp. 71–84.
- Petersen, M. (2016), "Niederschrift über die 4. öffentliche Sitzung des Umwelt-und Planungsausschusses", available at: http://www.stadthusum.de/session/bi/si0041.php?__kgrrnr=11 (accessed 9 June 2016).
- Porter, L. and Davoudi, S. (2012), "The Politics of Resilience for Planning: A Cautionary Note", Vol. 13 No. 2, pp. 329–333.
- Programmadirectie Hoogwaterbescherming (2015), *Hoogwaterbeschermingsprogramma: Projectenboek 2016. De waterschappen en Rijkswaterstaat zetten door*.
- Provincie Groningen (2016), *Interview about policy arrangements in the dike strengthening project in Delfzijl*, 29.06.2016, Groningen.
- Remmelzwaal, A. and Vroon, J.H. (2000), *Werken met water: Veerkracht als strategie, RIZA rapport, nr. 2000.021*, Ministerie van Verkeer en Waterstaat, Directoraat-Generaal Rijkswaterstaat, Rijksinstituut voor Integraal Zoetwaterbeheer en Afvalwaterbehandeling RIZA; Rijksinstituut voor Kust en Zee RIKZ, Lelystad, [Den Haag].
- Restemeyer, B., Woltjer, J. and van den Brink, M. (2015), "A strategy-based framework for assessing the flood resilience of cities – A Hamburg case study", *Planning Theory & Practice*, Vol. 16 No. 1, pp. 45–62.
- Rijkswaterstaat (2009), "The Water Act in brief. The Netherlands", available at: <https://www.rijksoverheid.nl/documenten/brochures/2009/01/01/the-water-act-in-brief-the-netherlands> (accessed 24 May 2016).
- Rijkswaterstaat (2015), "Beheer- en ontwikkelplan voor de rijkswateren 2016 - 2021".
- Schelfaut, K., Pannemans, B., van der Craats, I., Krywkow, J., Mysiak, J. and Cools, J. (2011), "Bringing flood resilience into practice: the FREEMAN project", *Adapting to Climate Change: Reducing Water-related Risks in Europe*, Vol. 14 No. 7, pp. 825–833.
- Schlüter, S. (2016), "Eine "Hallig" für Husum?", *Husumer Nachrichten [online]*, 1 May, available at: <http://www.shz.de/lokales/husumer-nachrichten/eine-hallig-fuer-husum-id13572191.html> (accessed 4 June 2016).
- Scott, M. (2013), "Living with flood risk", *Planning Theory & Practice*, Vol. 14 No. 1, pp. 103–106.
- Scott, M., White, I., Kuhlicke, C., Steinführer, A., Sultana, P., Thompson, P., Minnery, J., O'Neill, E., Cooper, J., Adamson, M. and Russell, E. (2013), "Living with flood risk/The more we know, the more we know we don't know. Reflections on a decade of planning, flood risk management and false precision/Searching for resilience or building social capacities for flood risks?/Participatory floodplain management: Lessons from Bangladesh/Planning and retrofitting for floods: Insights from

- Australia/Neighbourhood design considerations in flood risk management/Flood risk management – Challenges to the effective implementation of a paradigm shift”, Vol. 14 No. 1, pp. 103–140.
- Stadt Husum (2015), *Wachstumsstrategie Husum-Tourismus 2025: Infrastrukturentwicklungsplan 2015*, Husum.
- Stadt Husum (2016), *Interview about policy arrangements in the dike strenghtening project in Husum*, 04.07.2016, Husum.
- UNISDR (2007), “Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters. Extract from the final report of the World Conference on Disaster Reduction (A/CONF.206/6)”, available at: http://www.unisdr.org/files/1037_hyogoframeworkforactionenglish.pdf (accessed 7 February 2016).
- UrbiStat (2016), “Municipality of Delfzijl”, available at: <http://www.urbistat.it/AdminStat/en/nl/demografia/dati-sintesi/delfzijl/23055887/4> (accessed 6 June 2016).
- Van Tatenhove, J., Arts, B. and Leroy, P. (2000), *Political modernisation and the environment: The renewal of environmental policy arrangements*, *Environment & policy*, v. 24, Kluwer Academic Publishers, Dordrecht, Boston.
- Von Brocken, R. (2015), “Freie Hand für die Projektgruppe”, *Husumer Nachrichten [online]*, 9 September, available at: <http://www.shz.de/lokales/husumer-nachrichten/freie-hand-fuer-die-projektgruppe-id10662021.html> (accessed 5 June 2016).
- Waddenfonds (2014), “Project Marconi Buitendijks”, available at: http://www.waddenfonds.nl/Projecten_detail.2918+M5b0fadd07a3.0.html (accessed 7 June 2016).
- Waterschap Noorderzijlvest (2016), *Interview about policy arrangements in the dike strenghtening project in Delfzijl*, 30.06.2016, Groningen.
- White, I. (2013), “The more we know, the more we know we don’t know: Reflections on a decade of planning, flood risk management and false prediction”, *Planning Theory & Practice*, Vol. 14 No. 1, pp. 106–114.
- Wiering, M. and Immink, I. (2006), “When water management meets spatial planning. A policy-arrangements perspective”, *Environment and Planning C: Government and Policy*, Vol. 24 No. 3, pp. 423–438.
- Wong, P., Losada, I., Gattuso, J., Hinkel, J., Khattabi, A., McInnes, K., Saito, Y. and Sallenger, A. (2014), “Coastal systems and low-lying areas”, in Field, C., Barros, V., Dokken, D., Mach, K., Mastrandrea, M., Bilir, T., Chatterjee, M., Ebi, K., Estrada, Y., Genova, R., Girma, B., Kissel, E., Levy, A., Mac Cracken, S., Mastrandrea, P. and White, L. (Eds.), *Climate Change 2014: Impacts, Adaption, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, New York, pp. 361–409.
- WWF (2016), *Interview about policy arrangements in the dike strenghtening project in Husum*, 22.06.2016, Husum.
- Zuidema, C. (2011), *Stimulating local environmental policy: Making sense of decentralization in environmental governance*.

i „Kein Deich, kein Mann, kein Leben“

ii „Als nötig erachten wir das schon, aber wir können es gesetzlich nicht durchdrücken. Es wird aber vermutlich seinen Platz finden im Gesetz [...].“

iii „[...] Wenn es gelänge, die Elementarschadensversicherung als Pflichtversicherung für alle zu etablieren, dann würde man darüber natürlich auch steuern können, wo sich die Menschen ansiedeln.“

iv „[...] das halte ich für sinnvoll, Ich habe das als lehrreich auch empfunden.“

v „Ich glaube nicht, dass es auf Dauer zur Beschleunigung führt. Ich glaube man müsste tatsächlich die Beteiligung vielleicht hinten anstellen.“

vi „[...] ist es vielleicht doch der Trend, dass wir mehr Bürgerbeteiligung im Allgemeinen brauchen, mehr Diskussion. Es ist letztlich auch eine Verlagerung der politischen Diskussion, das ist natürlich die Kehrseite der Medaille. Wir leben in einer repräsentativen Demokratie, das heißt wir haben gewählte Volksvertreter, die für uns Entscheidungen treffen. [...] dann ist das auch ein Stück weit, naja, die Frage [...] passt dieses Beteiligungssystem, Bürgerbeteiligung, passt das überhaupt in diese Form der repräsentativen Demokratie rein.“

vii „Wozu haben wir eine Demokratie, eine repräsentative, wenn der nicht vertraut wird?!“

viii „[...] es fehlt an der Umsetzung und an der Bereitschaft, auch in der Politik [...].“

ix „[...] noch nicht wieder das Wasser an der falschen Stelle gesehen haben.“

x „[...] je erfolgreicher der Küstenschutz, desto mehr geht mir das Bewusstsein für die Gefahr bei den Menschen verloren.“

xi „Denn wenn ich den Menschen da draußen nicht mehr habe [...], der die Nordsee, den Blanken Hans noch eins zu eins empfindet und sich stärker der Gefahr aussetzt, als Menschen 10km von der Deichlinie weg, wenn ich die nicht mehr habe, dann verliere ich auch das Bewusstsein für die Gefahr, denn ich brauche immer die Menschen, die Geschichten erzählen.“

xii „Man merkt aber, dass viele Frage in der Gesellschaft wichtiger sind, als ausgerechnet diese.“

xiii „[...] dass wir das Maß der Sicherheit nicht daran gekoppelt haben, wie viele Menschen hinter dem Deich wohnen.“

Appendix 1 – Interview guide

	Delfzijl
Introduction	Short introduction, who am I, what am I doing etc.
	Name of the Interviewee, Company/Organisation of the Interviewee, Function/position?
Content	<p>Marconi Buitendijks aims at improving the flood defence structures, are there also adjustments of the hinterland (individual houses, infrastructure), which is combined with the restructuring of the city centre?</p> <p>-Yes: How do they look like?</p> <p>-No: Why not?</p> <p>Does spatial planning play a role? How does this role look like?</p> <p>Are there early warning and evacuation systems in case of a flood event in Delfzijl?</p>
	<p>Would you say the Marconi Buitendijks project follows a flood resilience approach? What does the term flood resilience mean in your opinion?</p> <p>-if not used: Do you think it would be a good approach to use? What would need to be changed in that case, what are barriers?</p> <p>If used: Do you think the Marconi project is special, or are projects in the whole country done like this/ is the flood risk management approach of the EU floods directive implemented?</p>
Coalition of actors	<p>I could only identify state authorities as partners in the project (RWS, Province, water boards, municipality). How about market parties (investors etc.) and the community (citizens)?</p> <p>Do different actors cooperate (state, market, community)?</p> <p>How does this cooperation look like?</p> <p>Is the project done in a decentralised way? (involvement of lower level authorities)</p>
	<p>Do you think the way actors work together in this project is innovative?</p> <p>How has it been before?</p>
Power and resources	<p>Who takes the decisions about the project?</p> <p>Are private actors involved?</p> <p>What role do the different actors have?</p> <p>Who are the “key persons” at the round table?</p> <p>Are the actors willing and able to fulfil their tasks? (aware of the problem, enough resources?)</p> <p>-is information exchanged? Is local knowledge used?</p> <p>-how does the financing look like? (incentives, funds)</p> <p>Do you think the project is influenced by the fact that the municipality is shrinking (e.g. less resources)?</p> <p>-Yes: how?</p> <p>-No: Why not?</p>
	<p>How is information about flood risk and necessary behaviour spread? Is it spread at all?</p> <p>Do you think people are aware of this risks? If so, how is this awareness expressed?</p> <p>Do you think the population should take own responsibility? If so, how do you motivate them to do so? How does the individual responsibility look like?</p> <p>Is there a flood insurance system?</p> <p>If not: Do you think such a system would be useful?</p>

	Husum
Einleitung	Kurze Vorstellung, Wer bin ich, was mache ich etc.
	Name des Interview Partners, Firma/Organisation und Funktion/Position des Interview Partners
Inhalt	<p>Das Projekt Deichverstärkung am Dockkoog zielt auf die Verbesserung des Hochwasserschutzes ab – Gibt es Pläne auch das Landesinnere (die Stadt) entsprechend anzupassen (Maßnahmen an Häusern oder entsprechender Infrastruktur, damit im Falle einer Überschwemmung geringerer Schaden entsteht)?</p> <p>-Ja: Wie sehen diese Maßnahmen aus?</p> <p>-Nein: Warum werden keine Maßnahmen umgesetzt/warum sind keine nötig?</p> <p>Spielt Raumplanung in Bezug zu diesem Projekt eine Rolle um den Hochwasserschutz zu verbessern? Inwiefern?</p> <p>Gibt es Frühwarn- und Evakuierungssysteme, die in einem Notfall greifen?</p>
	<p>Würden Sie das Dockkoog Projekt als ein Projekt einstufen, das dem Ansatz von Hochwasser-Resilienz (HWR) gerecht wird?</p> <p>Was bedeutet der Begriff Hochwasser-Resilienz ihrer Meinung nach?</p> <p>-wenn das Projekt HWR nicht gerecht wird: Denken Sie, dass Hochwasser-Resilienz ein sinnvolles Konzept ist? Was müsste in diesem Projekt angepasst werden bzw. welche Hindernisse würde es geben/gibt es?</p> <p>Falls der Ansatz verfolgt wird: Glauben Sie, dass die Vorgehensweise in diesem Projekt besonders ist/ sich von anderen abhebt?</p> <p>Inwiefern wird das Hochwasserrisikomanagement Konzept der Hochwasserrisikomanagement-Richtlinie umgesetzt?</p>
Zusammensetzung der Akteure	<p>Welche Akteure sind an dem Projekt beteiligt?</p> <p>Kooperieren diese Akteure untereinander (Staat, Markt, Bürger)?</p> <p>Wie sieht diese Kooperation aus?</p> <p>Die Bürgerinitiative nimmt an der Projektgruppe zum Entwurf der Varianten teil, gibt es auch später noch eine Möglichkeit für Bürger sich einzubringen?</p> <p>Würden sie sagen, dass das Projekt dezentral durchgeführt wird, da auch niedrigere Behörden beteiligt sind?</p>
	<p>Würden Sie die Konstellation und Zusammenarbeit der Akteure in diesem Projekt als innovativ bezeichnen? Wie sieht die Zusammenarbeit normalerweise aus?</p>
Macht und Ressourcen	<p>Wer fällt die Entscheidungen über das Deichverstärkungsprojekt?</p> <p>Sind die Bürger und der Markt daran beteiligt?</p> <p>Welche Rolle haben die jeweiligen Akteure (Bürger, Investoren, staatliche Behörden)?</p> <p>Sind die Akteure gewillt und in der Lage ihre jeweiligen Aufgaben zu erfüllen (sich über das Problem bewusst, Vorhandensein von ausreichend Ressourcen)</p> <p>-werden Informationen ausgetauscht und wird lokales Wissen genutzt?</p> <p>-Wie wird das Projekt finanziert? (Fördergelder etc.)</p> <p>Glauben Sie, dass das Projekt durch die Tatsache beeinflusst wird, dass Husum immer mehr Einwohner verliert? Stehen dadurch weniger Ressourcen zur Verfügung (finanziell, aber auch in Bezug auf Fachkräfte, Wissen etc.)?</p> <p>-Ja: Inwiefern?</p>

	<p>-Nein: Warum nicht, wie wird das ausgeglichen?</p> <p>Wie werden Informationen über mögliche Hochwassergefahren und angebrachtes Verhalten im Notfall verbreitet? Wird so etwas überhaupt kommuniziert?</p> <p>Glauben Sie, dass die Bevölkerung sich über mögliche Gefahren bewusst ist?</p> <p>Wenn ja, wie drückt sich das aus?</p> <p>Sind Sie der Meinung, die Einwohner sollten auch eigene Verantwortung übernehmen und persönliche Maßnahmen zum Hochwasserschutz treffen?</p> <p>Wie sollten diese aussehen?</p> <p>Gibt es eine Hochwasser-Versicherung?</p> <p>Falls nicht: Glauben Sie, dass so eine Versicherung sinnvoll wäre?</p>
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