

Wadden Sea in times of climate change

How Wadden Sea's Area institutions are coping with climate adaptation.

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Executive Summary

This dissertation is about the Wadden Sea Area in times of change. Conditions that predetermined the very existence of this distinct sea are now threatened by the sea level projected in the forthcoming 50-100 years. Therefore, this puts pressure on the water management to protect the area behind the dikes where people live. The current management paradigm is no longer “fighting water” but “living with water”; however this ideal has not become a practised custom yet.

This dissertation studied how intuitions currently cope with climate adaptation in the Dutch Wadden Sea Area. In particular this thesis studied (i) the status quo on institutional adaptation plans (appendix 6) and (ii) how the revealed adaptation plans interact with the current management of the Wadden Sea Area (table 2). Furthermore, the results of the current situation of adaptation were put into broader contexts of climate change timeline, history of water management in the Netherlands and its most recent developments. Generally, the following was concluded:

- Municipalities, water boards and provinces respectively seem to follow a declining correlation in the number of climate adaptation plans revealed. Here it must be noted that within municipalities no concrete plans were revealed.
- Water boards stick to their former custom “fighting water”.
- Moreover, the water boards seem to neglecting sustainability and national nature objectives as addressed by current management’s criteria.
- On a provincial level, only one of the provinces appears to act as a pioneer in the adaptation and instigates the necessary changes of the local institutions towards the new paradigm “living with water”.
- It is, however, apparent that adaptation needs to be more firmly and adequately addressed by the management in the Wadden Sea Area.

Based on the conclusions, recommendation for Wadden Sea’s management were given for further research in chapter 7.

Attestation

I understand the nature of plagiarism, and I am aware of the University's policy on this of the Fraud Information Sheet (Dutch "Fraudefolder").

I certify that this thesis reports original work by me during my University project except for the quoted work and the work referred to as from [1-39]

Signature

Date 8 June, 2012

Preface

In Dutch language “wadden” or “wad” is the oldest word, dating back to 107 A.D. (Sijs, 2001). “Wise with the “wadden” is the motto of the Dutch Wadden association. This thesis has been written under close guidance of Hans Revier, who works for this association and is the main director of the *WADDEN magazine*. Hans Revier works also for the University’s Knowledge centre NoorderRuimte at the Hanzehogeschool in Groningen (Kenniscentrum NoorderRuimte in Dutch), for which I wrote my thesis project. Working with Hans, I carefully tried to find the right balance between dedicating my time to absorb numerous sources available about the Wadden Sea and yet staying within the time constraints of my thesis project. Frankly, I have spent a great deal of extra time and have discovered countless interesting facts, of which only a fraction have eventually reached the paper in my final report. Nevertheless, I do not regret any extra spent second, as the Wadden Sea Area is a unique nature that touched my heart.

I therefore also want to thank everyone, without exception, who has provided me with this wonderful opportunity including Oda Kok, Godelieve Kodde and Cees Kieboom.

In particular I want to thank Ton who, as Hans, works for the Kenniscentrum NoorderRuimte and I without whom this project would not be possible.

Table of Contents

Executive Summary.....	i
Attestation.....	ii
Preface.....	iii
Table of Contents.....	iv
List of Figures.....	vi
1 Introduction.....	1
1.1 Motivation.....	2
1.2 Background and Context.....	2
1.3 Problem statement.....	6
1.4 General approach.....	7
1.5 Aim and objectives.....	8
1.6 Scope.....	9
1.7 Definitions.....	9
2 Method.....	11
3 Wadden Sea in times of climate change.....	13
3.1 Wadden Sea’s genesis.....	13
3.2 Past relevant climatological changes and their effects.....	14
3.3 “Fighting water”.....	15
3.4 Change in paradigm.....	16
3.5 Global warming.....	17
3.6 Current situation of the Wadden Sea Area vis-à-vis sea level rise.....	19
4 Status quo on adaptation.....	20
4.1 Synopsis.....	20
4.2 Inventory.....	20
4.2.1 Municipalities.....	21
4.2.2 Adaptation in policy.....	21
4.2.3 Vision on climate change challenge.....	23
4.2.4 Adaptation in practice.....	23
4.2.5 Obstacles.....	24
4.2.6 Water boards.....	25
4.2.7 Part-conclusion.....	26
4.3 Interaction with management.....	26
4.3.1 Working on robust and resilient nature.....	27

4.3.2 Working on sustainability	27
4.3.3 Keep an open eye for development	28
4.3.4 Made to measure on several levels	28
4.3.5 Part-conclusion	28
5 Discussion of the results	29
5.1 Reflecting status quo on adaptation	29
6 Conclusions	32
7 Recommendations for the management	35
References	38
Appendix 1 – Wadden Sea Area and nominated property	42
Appendix 2 – Wadden Sea’s Area municipalities (anno 2012).....	43
Appendix 3 – Wadden Sea’s “gas mining” case	44
Appendix 4 – Research area B&O (Wadden Sea Area).....	46
Appendix 5 – Elevation map of the Netherlands.....	48
Appendix 6 – Inventory	49
Appendix 6 – Inventory	50
Appendix 7 a – The Netherlands in 8000 BD – 2000 AD	53
Appendix 7 b – Anthropogenic effects	56
Appendix 8 – Inspectie Leefomgeving en Transport.....	57
Appendix 9 – Applied framework for transitionmanagement	58
Colophon	61

List of Figures

Figure 1.	The International Wadden Sea Area [17].....	1
Figure 2.	Global Climate Change [20].....	3
Figure 3.	Applied framework (graphical representation).....	12
Figure 4.	The global climate history © NCDC	13
Figure 5.	Houses on muds “huisterpen” 800-1250 AD	14
Figure 6.	Subsidence of land and sea level rise over time	15
Figure 7.	Flood of 1953 ©Deltares	16
Figure 8.	Wadden Sea region low-lying areas. © Safecoast, 2008	19
Figure 9.	Boundaries of the PKB area and municipalities. Source: CPSL 2010.....	20



“Custom adapts itself to expediency.”

Cornelius Tacitus (ca. 55-120)

1 Introduction

World climate is changing and affects the Wadden Sea Area. This is however not a novel occurrence (3). The Dutch lived with water for centuries and in the last decades they have adapted by managing the water. There is a saying: *God created the World and the Dutch created Holland*. Adaptation is thus a genuine Dutch custom.

Over the years this custom resulted in civil engineering marvels such as “The Delta Works”, the total length of which is nearly one and half times greater than the total length of the international Wadden Sea Area (fig1). In fact, adaptation developed to the extent that the entire Dutch coast line and much of its inland water must be permanently managed. If not most of Holland will become inundated at least twice a day. As the result of adaptation the nature was conquered, except for the Wadden Sea: *the last pristine milieu in the Netherlands* [30].



Figure 1. The International Wadden Sea

Wadden Sea in times of climate change is a thesis about how public institutions currently cope with the effects of the projected climate change in the Wadden Sea Area. A unique sea at its borders is part of a large international area (fig.1) with a World Heritage designation [35]. The latter is however not the focus of the thesis, but its value cannot be left out as: “*There are no systems in the world that compare to the Wadden Sea*” [11]. The UNESCO’s World Heritage status was awarded in the month of June of

2009 as the Wadden Sea is an intertidal ecosystem with unmatched flora and fauna that is indispensable for migrating birds from around the World [30]. The sea acts as a giant nursery for many fishes of the North Sea. The Wadden Sea international area stretches from Den Helder in the Netherlands to the Blåvandshuk in Denmark. With its coastline of 500 km [11] it sets the precedent as one of the largest contiguous marine ecosystems in Europe. With its surface area of more than 17,500 km² of which 6,294 km² [3] is in the Netherlands, it forms one of the most complex and richest wetland marine environments in the world. Large parts of the sea comprise of the Dutch Wadden Sea Conservation Area [26] and the German Wadden Sea National Parks of Lower Saxony and Schleswig-Holstein (see appendix 1).

1.1 Motivation

This thesis research was initiated by and it is conducted for the Kenniscentrum NoorderRuimte of the Hanze University of Applied Sciences in Groningen. Its mission is described as follows: *"The Centre develops and shares knowledge about spatial issues in the Northern Netherlands from the perspective people-planet-profit. Professors, teachers and students are working together with the multidisciplinary field research based on practical questions."* (Hanze, n.d., "Missie", para.2, translation by the author).

As will appear from the problem statement generated by the Kenniscentrum, the problems in the Wadden Sea Area are complex. Moreover, *"Paradigms for land and water management are on the move."* (Groot & Lenders, 2006). However, the need for a firm adaptation custom in light of paradigm shifts in the Dutch water management, which will be explained further on, has motivated my thesis the most. The following sub-chapters will outline the main arguments and broader context, which also have motivated this research. My motivation is furthermore influenced by a historical review in chapter 3 Wadden Sea in times of climate change.

1.2 Background and Context

The climate is changing (fig.2). The sense of urgency for adaptation to the currently projected climate change on the sea level for the Netherlands in general and for the Wadden Sea Area in particular is instigated in 2008 with the findings and the recommendations of the Committee Veerman. This Committee forms the second Delta Committee (the first was formed in 1955, as a response to the 1953's flood). The main feature is that the current approach taken to coastal defence may no longer be viable in the future and the safety standards need to be scaled-up by factor 10 [6]. Regarding the Wadden Sea Area the second Delta Committee concludes: *"The continued existence of the Wadden Sea Area as we know it at present is by no means assured ... and depends entirely on the actual rate of sea level rise in the next 50 to 100 years"*. This sea level rise is caused as the result of warming and temperature increase [17] as illustrated in figure 2. Even if the concentration of the so-called greenhouse gases (GHGs) will now be reduced, the warming will still be inevitable [14]. This is because of a delay in climate system response, the so-called *thermal inertia* or *time lag*. According to this phenomenon, the climate of the next few decades is already predetermined by the prior amounts of GHGs emissions during the industrial revolution. Consequently, this effect will make certain that the sea level will continue to rise for decades to come *"The feeling is that if things are getting bad, you hit the stop button. But even if you do, the climate continues to change"* [20].

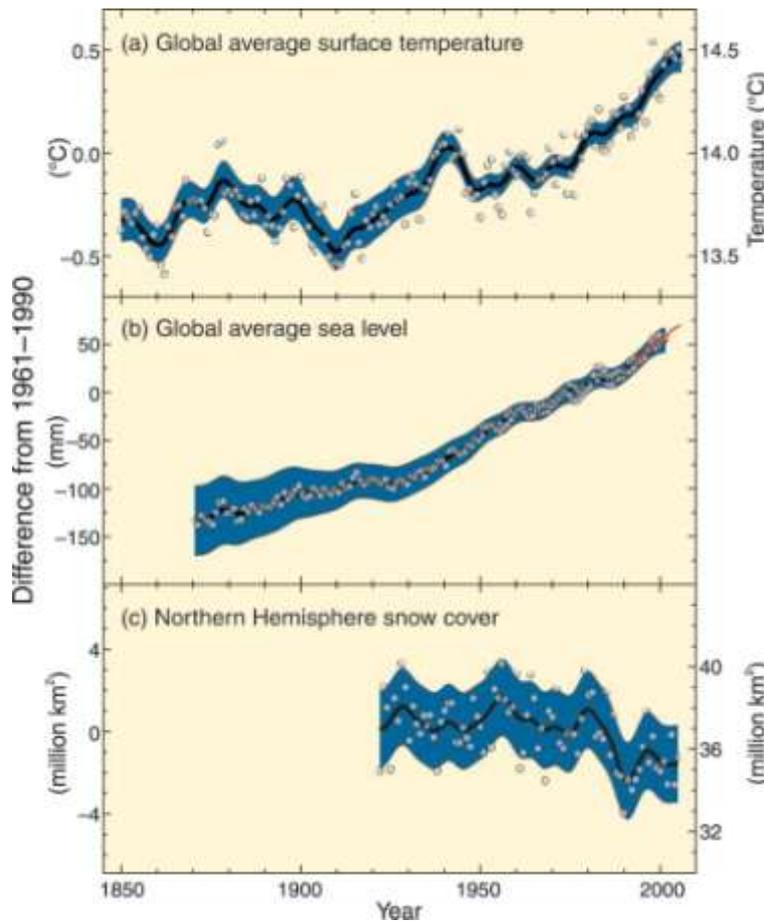


Figure 2: Global Climate Change

This figure is published in the 2007 IPCC Report. Note the gradual increase in global average surface temperature and in the global average sea level, while there is a decrease in the Northern Hemisphere snow cover. These data are a convincing picture of the sea level rise as the result of warming that is taking place relatively fast over the last 50 years.

Figure 2. Global Climate Change [17]

The sea level rise is one of most alarming forecasts of the global warming for the Wadden Sea Area: “About 3.5 million people in the region depend on flood defences, and 16 populated sandy barrier islands will be directly affected by changes in sea level rise and storminess.” [3] The Dutch part of the international Wadden Sea Area is in particular subjected to the currently projected global warming and the consequent sea level rise, as this area is (i) the lowest-lying and (ii) the mostly populated and thus in a high risk zone. In this context risk is defined as: (a) probability of an event (e.g. flooding) which will increase due to climate change and the (b) resultant damage (i.e. impact) [3]. Primarily due to (1) projected sea level rise and (2) soil subsidence the impact of a potentially extreme event will increase. The latter is a result of total amount of casualties, which is comprised of value loss (e.g. lives and economic property loss).

Action is necessary (Diamond, 2005). According to Diamond, current climate change is one of the most serious problems today that humanity faces (Diamond, chapter 16, pp.493, 494, 2005). It now depends on how societies respond to such ubiquitous questions.

As stated in the beginning of this thesis adaptation is not a novel feature for the Dutch (see also an overview in chapter 3). At present, the Delta Act entered in force on 1 January of this year. It is an amendment of the Dutch Water Act and the legal framework for the implementation of the national adaptation strategy, which is currently developed further in a nationwide programme: The Delta Programme. Its aim is: "... maintaining the Netherlands as a safe and attractive country, today and in the future." The main feature of The Delta Programme is contributing to safety by linking the consequences of flooding via spatial planning. It has furthermore appointed nine priority areas; the Wadden Sea Area is one of them. One of those is the part-programme "Waddengebied", which is investigating the appropriate adaptation measures to the expected climate change projections for this area. The main two objectives of the part-programme "Waddengebied" are as follows: "(1) to design an integral approach that will ensure safety of the coastline, the Wadden islands and the main land. It is hereby the goal to integrate water safety with the functions: nature, recreation and sustainable economic activities. (2) To monitor the effects of climate change on the Wadden Sea Area and on its ecosystem" (Deltaprogramma Waddengebied, 2011, p.5, translation by the author).

Recently, however, some very significant institutional changes took place in the Netherlands, e.g. a shift in the adaptation paradigm from "fighting water" to "living with water": *"Ladies and gentlemen, The destructive visit of Hurricane Katrina on the U.S. mainland brought us back to face the facts: the world is getting wetter. Heavy rains, ice and crumbling coastlines disappearing under rising sea levels illustrate the climate of the 21st century. And, in particular, the climate of the low-lying, wet Netherlands. These changes asked - after years of raising levees and pumping of water - to change course. Rightly, therefore, that we - once so successful - strategy of "fighting water" behind us and 'living with water' motto embraced. Space for water is the only way to prevent the water from that area sooner or later, with much violence, self-claims."* (Secretary of State for Transport, Melanie Schultz van Haegen, during the opening of RIONED, on September 8, 2005 in Ede 13.00, translation by google.com)

To be more precise, the motivation for the change in paradigm was instigated by an earlier event in river management: *"Although the rivers from today are far from natural, they retain the ability to surprise, as evidenced by the floods of 1993 and 1995."* (De Boo, 1999, p.17) This instigated the realisation that water essentially needs space. Herewith, the emphasis is that water also makes part of the spatial arrangement and this is where people live in urban areas [11]. "Living with water" implies thus a new custom for institutions related to spatial planning, whereby water management is executed in such a way that it contributes to the robustness, resilience of nature and its adaptive capacity. These were the key criteria of the

national programme for spatial adaptation the “ARK” (2006) in Dutch. Not water management but climate-proof spatial strategy is the main feature.

However, this paradigm shift is one of several shifts in the Dutch public institutions related to adaptation. More specifically, the Dutch Institute for Environmental Studies (IVM in Dutch) has evaluated national adaptation policy and revealed five trends in its evolution, i.e.: (i) a shift from incremental sectoral ad hoc ... integrated policy (ii) a shift ... to prioritising adaptation; (iii) from technological and technocratic approaches to post-modern concepts such as living with water, dynamic coasts etcetera; (iv) a shift from top-down ... to decentralisation and transfer of responsibility to individual residents and (v) from adaptation to building on adaptive capacity.

Moreover, IVM’s assessment of the adaptive capacity of the Wadden Sea exposed that there is no comprehensive approach to dealing with adaptation concludes that few financial resources are allocated [11]. It furthermore concluded that the nature institutions: “...are the weakest in adaptive capacity... “...and the sum total of individual ad hoc efforts combined with a more rigid European and national legislation in this field indicates that this is a neglected area of nature management in the Netherlands, despite the uniqueness of the ecosystem and all that is said and written about the Wadden Sea...The problems include a lack of leadership and a short time focus...”. Their case study on climate adaptation in the Wadden Sea Area also demonstrates that: “few financial resources are allocated to nature development. Rijkswaterstaat (the state) used to take the responsibility for nature management in the Wadden Sea but has begun to focus on its core business. The Ministry responsible for Nature Management does not have a sufficient budget for nature management in the Wadden Sea Area. The Wadden fund (Waddenfonds), Delta fund and WILG are helpful to some extent.”

In light of the current recession and the more neo-liberalistic approach towards the diminishing role of the central government¹, in combination with the previously pointed out institutional changes it leaves the best hope on how adaptation is dealt with locally, in this case in the Wadden Sea Area.

The adaptation actions can take place spontaneously: “But many adaptations to climate change will be spontaneous actions to perceived and actual risks in the environment. Thus institutional and economic parameters determine the underlying vulnerability and adaptive capacity of societies” (John Wiley & Sons, 2001).

¹ As Dutch prime-minister Mark Rutte stated in a personal interview [26]

Indeed, it appears that some adaptation actions already have been adopted. For instance the provincial adaptation plan: *'Programma Klimaatadaptatie Provincie Groningen 2012-2014'* [29]. This can be explained by the fact that in 2009 the Dutch provinces signed an agreement with the state (Klimaat- Energieakkoord tussen Rijk en Provincies, IPO, 2009). One of the features is to streamline climate adaptation into spatial planning by 2015. Today most provinces have written climate adaptation action programmes [9].

Similarly to the provinces, on the local level the Society of the Dutch Municipalities and the Union of Dutch Water Authorities (water boards) have also signed agreements in 2007 and 2010 respectively. The former has already been monitored by the state's watchdog the Inspection department of the ministry VROM in 2009 on how the theme adaptation carried out in municipal spatial plans. It revealed some upsetting results on how adaptation is dealt with: "Due to the lack of unambiguous vision/analysis adaptation is not identifiably embedded in the municipal institution" (VROM Inspectie, 2010, translation by the author). A follow-up study would be performed a year later; however that has not been executed as of yet. A literature review has not identified if any such research has been done so far. It is currently thus still unclear if this situation remains.

Furthermore, borders of 17 Dutch municipalities have their coastline on the Wadden Sea (see appendix 2). According to the new Water Law (2008) municipalities are responsible for the local spatial adaptation actions. In 2010 the CPSL [4] stated however that: "*So far, the land use plans contain no specific spatial planning elements, relating to coastal protection and sea level rise.*" This third report of the Trilateral Working Group of the Wadden Sea Secretariat on Coastal Protection and Sea Level Rise (CPSL) furthermore concluded that: "...spatial planning may present a flexible and sustainable tool to deal with the effects of sea level rise" [4].

In retrospect to the aforementioned, an investigation would be sensible in how the Wadden Sea's Area institutions currently cope with adaptation, in particular at local level. This has motivated firmly my decision to undertake this thesis project for the Kenniscentrum NoorderRuimte.

1.3 Problem statement

According to the Kenniscentrum NoorderRuimte an inventory of all adaptation plans and their assessment is needed. In particular the centre is interested in how they interact with the current management of the area. Their problem statement is as follows: "*...At the same time the national government (Rijksoverheid) concludes that the decision-making cycle has been*

completed (In Winsemius' policy life cycle (Winsemius, 1986) we have reached the management stage) and the implementation of the policy (the management) is now delegated to the provinces in collaboration with the municipalities. Correspondingly to our view, the research needed is: (1) To make an inventory and an analysis of the above mentioned plans (what plans area there, their status a kind of New Map of the Netherlands "Nieuwe Kaart van Nederland" but for the Wadden Sea. (2) To test how these plans address adaptation to the sea level rise scenarios and nature protection objectives as derived from in the Natura 2000 and (3) to conclude what the results mean for the management of the Wadden Sea Area. " (T. van der Maarel, 2011, personal e-mail, 28 November, 2011 translation by the thesis author).

1.4 General approach

The general approach in this thesis is multi-levelled. Considering the context and the scale of all problems in the Wadden Sea Area the approach is broken down into three research lines, fairly in line with the Kenniscentrum NoorderRuimte's own proposition, which are worded as follows:

The thesis's first research line focuses on the inventory of adaptation plans in Wadden Sea's institutions via an investigative desk-research. The second research line tests the revealed adaptation plans. Lastly, the third research line evaluates the prior and the latter and provides conclusions and recommendations in relation to the Wadden Sea's Area management.

Based on the multi-faceted problems and the background and context (1.2) my assumptions/hypotheses at the start of the project are worded as follows:

1. Because of the recent shift in paradigms described by IVM, there is inconsistency between different institutions and within them on how they cope with climate adaptation.
2. Considering that the prior mentioned agreements between the state, regional and local institution are not legally bonding and the shift in government to governance, i.e. from top-down to diminishing role of state, Wadden Sea institutions are consulting their own interests, which can be described as "tragedy of the commons" (Hardin, 1968).
3. Contribution of spontaneous adaptation actions in policy plans, before the Delta part-programme "Waddenzee" will be concluded, could hypothetically play a role in the political paradigms or discourses that influence the management of the area. Similarly to how the nature discourses have influenced the current management discourse in the Wadden Sea Area in the "gas mining" case, which is described in detail in appendix 3.

1.5 Aim and objectives

The thesis's aim is expressed with one central and three guiding sub-questions.

Central:

-What are the effects of how the Wadden Sea's Area institutions cope with adaptation?

Guiding:

-What is the status quo on climate adaptation plans among Wadden Sea's Area institutions?

-How do Wadden Sea's area institutions address currently climate adaptation in their policy in relation to how it is currently addressed in Wadden Sea's management policy?

-What are the effects of climate adaptation plans on Wadden Sea's Area management?

The reason why there are three research questions is that there were three research lines defined. The following guiding research objectives are categorised accordingly, as follows:

Research line 1:

- Objective 1: Give a literature overview on climate adaptation in the Wadden Sea Area.
- Objective 2: Design a research method to reveal climate adaptation plans.
- Objective 3: Create and complete an inventory of spontaneous climate adaptation plans of the Wadden Sea's Area institutions.
- Objective 4: Give a part-conclusion on the status quo of climate adaptation among Wadden Sea's Area institutions.

Research line 2:

- Objective 5: Define criteria and design a qualitative framework to analyse how adaptation plans address the current management criteria of the Wadden Sea Area.
- Objective 6: Test the interaction of the revealed plans/policies with the current management of the Wadden Sea Area.
- Objective 7: Give a part-conclusion on the empirical evidence of the adaptation plans with the current management of the Wadden Sea Area.

Research line 3:

- Objective 8: Discuss the results of the two prior research lines and find any correlations in retrospect to the previous literature overview in 1.2 and history overview in 3.
- Objective 9: Conclude what the results of this research (prior research lines) mean for the management of the Wadden Sea Area and confirm or withdraw hypostatises.
- Objective 10: Give recommendations for further research based on the findings of this thesis project.

An additional objective and an ambition was expressed by the Kenniscentrum NoorderRuimte and worded as follows: "...The research need not necessarily be limited to the Dutch Wadden

Sea. If time allows, a comparison with Germany and Denmark can be made. Such research fits well with the ambition of our Knowledge Centre.” (H.Revier & T.van der Maarel, personal interview, November 5, 2012).

1.6 Scope

The scope of this thesis project, is to analyse adaptation plans within the following three public Wadden Sea’s institutions², i.e. (i) the provinces (Groningen, Fryslân, and Noord-Holland), (ii) the water boards (Hollands Noorderkwartier, Noordezijlvest, Hunze en Aa’s and Fryslân) and (iii) all 17 municipalities (attachment 1). Their interaction and how they address criteria of Wadden Sea’s Area management will be assessed based on the criteria on the policy plan for the Wadden Sea Area: ‘Beheer- en ontwikkelingsplan Waddengebied’ (B&O). Thus, the area of B&O also frames the thesis’ research area (attachment 4). This choice is motivated not only because it is THE main management plan for the area, but mainly by the fact that the plan integrates different policies for nature protection (e.g. EU Natura 2000” and the Dutch “de Natuurwet”) and it addresses climate adaptation too, which are cemented in its framework’s criteria. Testing the interaction of adaptation plans according to the criteria in its framework will reveal not only their interaction with the management of the area, moreover, it will also tell how the plans addressed mandatory nature protection objectives in relation to their proposed adaptation measures. In addition, B&O appreciates and addresses the economic development within ecological limits of this important area as designated by the UNESCO’s World Heritage eminent status, which is in fact is not legally binding. This integration of policies in a single plan can be explained by the fact that B&O was developed in collaboration with all governments that have their stake in the Wadden Sea Area, coordinated by the RCW³. Hence, plan’s framework is based on “PKB”, which is the state’s spatial planning act that draws the overall objectives of conservation, management and use of the Wadden Sea. Hereby, testing the interaction of plans with this B&O underwrites the consistency with the national objectives.

1.7 Definitions

- Discourse: Verbal exchange; conversation. [7]
- Governance: Governance is the sum of the ways individuals and institutions, public and private manage their common affairs” [35]

² In this context an institution is i.e. municipality, water board, and province in general. An individual water board as for instance Fryslân is not an institution but an organisation.

- Institution: An established organization or foundation, especially one dedicated to education, public service, or culture. [17]
- Paradigm: A set of assumptions, concepts, values, and practices that constitutes a way of viewing reality for the community that shares them, especially in an intellectual discipline. [27]

³ The RCW is the administrative consultation between regional directors and representatives of the rich Wadden area. In the RCW, all Wadden governments are represented i.e. eighteen municipalities (N.B. now 17, see appendix@), three provinces, four boards and five ministries. (B&O, 2009@)

2 Method

As stated in the Introduction chapter, this research is initiated by and conducted for the Kenniscentrum NoorderRuimte. The research makes part of the thesis project at the Hanze University of Applied Sciences, conducted by the student of the programme Climate and Management of The Hague University of Applied Sciences, in defence his Bachelor of Built Environment degree.

For this thesis project a proposal and a research plan have been constructed, both of which and other additional information can be found on the projects webpage:

<https://waddenseaintimesofclimatechange.wikispaces.com>

The research method can be described empirical and qualitative. The situation on the current adaptation plans among the Wadden Sea institutions are first empirically collected through a desk-research. In particular, the focus is on the spatial adaptation plans public institutions in the area and their interaction with the main management and development plan (B&O). Then this research focuses on understanding the effects of spontaneous climate change adaptation plans on the management of the Wadden Sea Area. The B&O's vision is worded as follows: *"The preservation and development of a robust and resilient nature, where a healthy way of living, working and recreation can be. That is the ambition for the new Management and Development Plan Wadden Sea"*

This vision is in line with the predominant nature discourse (see appendix 3) and B&O reflects the current national view on adaptation and European objective on nature protection (e.g. N2000). It was therefore suggested, that the four criteria framework that is set out in the B&O (B&O, 2009, p.19-22) are appropriate for analysing Wadden Sea institutions' adaptation plans. Namely, if a plan shadows the same guiding principles as the B&O, then it is also in line with the management of the Wadden Sea Area, which as stated, reflects national and European objectives. This has resulted in the matrix, which is found in table 2.

To reveal the current status on the spatial adaptation, this qualitative empirical has been performed according to the applied framework (fig.3). This resulted in an inventory (see appendix 6) of the current status on climate adaptation plans within all the Wadden Sea's municipalities (17), water boards (4) and provinces (3). Hereby, the choice is based on their geographical arrangement, i.e. within the borders of the B&O as illustrated in the appendix 4.

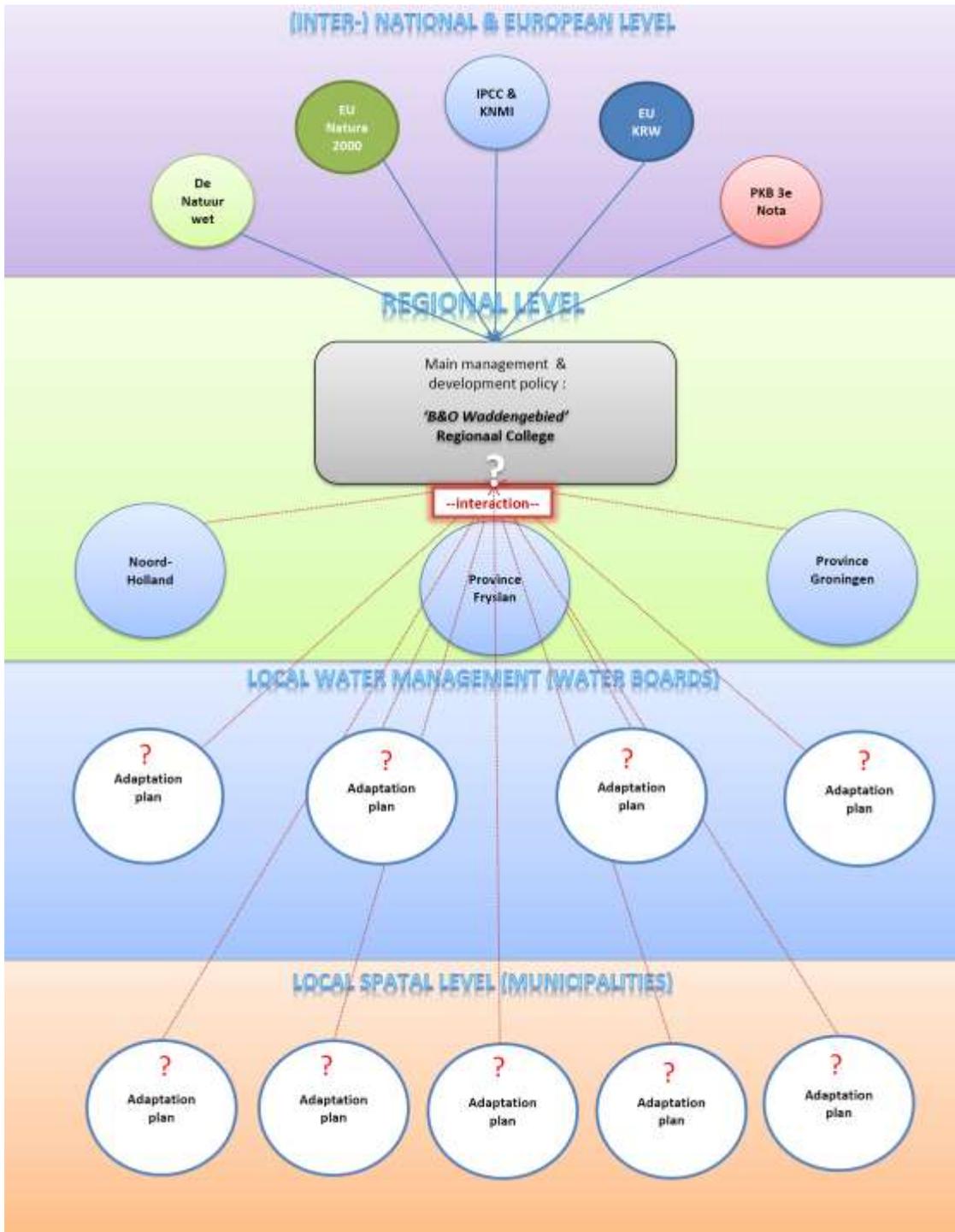


Figure 3. Applied framework (graphical representation)

3 Wadden Sea in times of climate change

Numerous publications are available about the Wadden Sea's Area nature and ecological aspects; much has already been published in scientific and popular literature.

The aim of this chapter is not just to contribute the description of the renowned value of the Wadden Sea Area, but its aim is to describe briefly how it has developed hand in hand with climate change and how it affected its society's response by developing different customs.

3.1 Wadden Sea's genesis

The Wadden Sea (hereafter referred to also as abbreviation WS) is young in geological terms. It was formed in and as a result of climate change [1]; [2]. In particular WS formed as the result of rapid sea level rise - pace of which is illustrated in the 4 (b) below - in the current relatively warm interglacial period (Holocene) that followed straight after the last glacial period (Ice Age): "The most recent cycle culminated in the Last Glacial Maximum (or LGM) some 18,000 years ago, the world especially the northern hemisphere was a very different place than it is today. Ice covered large areas nearly 32% of the Earth's land area, sea level was about 120 meters lower than it is today, and many large, non-extinct mammals such as mammoths roamed the northern lands" [32].

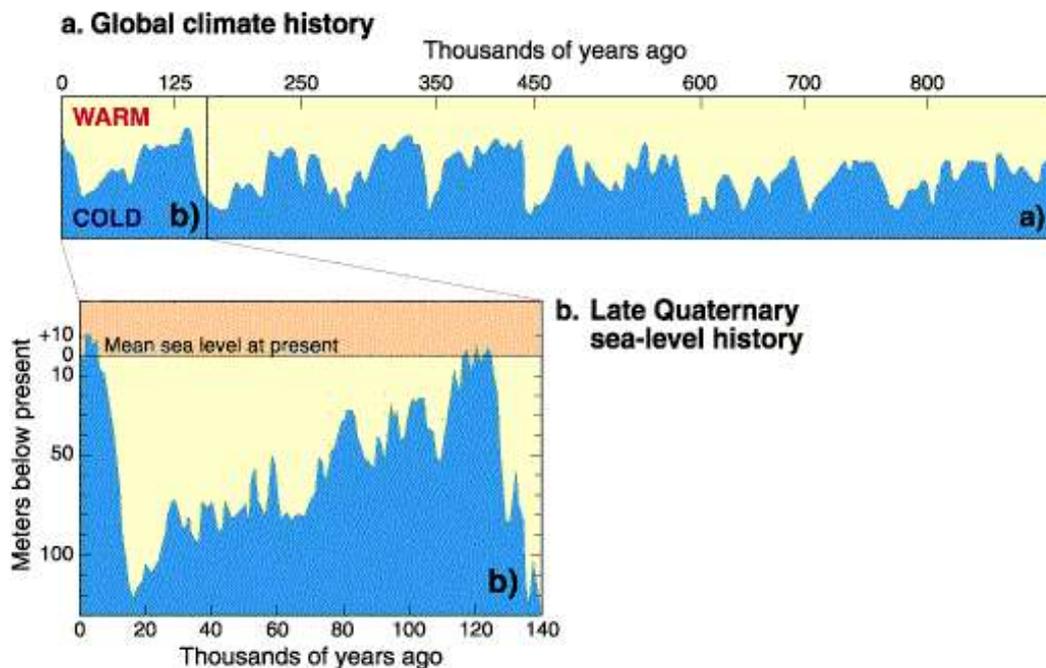


Figure 4. The global climate history © NCDC

The sea level rise after the LGM stabilised at about 20-30 centimetres per century (about the current rate) approximately 7,000 years ago [2] in the mid-Holocene and resulted in the distinctive dynamic wetland marine environment of the Wadden Sea as we know it today. As UNESCO describes it: *“It is a large temperate, relatively flat coastal wetland environment, formed by the intricate interactions between physical and biological factors that have given rise to a multitude of transitional habitats with tidal channels, sandy shoals, sea-grass meadows, mussel beds, sandbars, mudflats, salt marshes, estuaries, beaches and dunes.”* [35]

3.2 Past relevant climatological changes and their effects

Unfortunately, as the Wadden Sea was formed in climate change it is also susceptible to changes. Namely, as the climate change shapes its condition, it can also change them. In attachment 7a one can see how the shape of the Wadden Sea Area gradually have changed in the period 8000 BC – 2000 AD, whilst it was still openly connected to the Zuyderzee and the Lauwerszee. Although the sea level rose, the land changed to grow with the rising water table due to sediment deposits carried by the river’s floods and due to peat formation.

This situation has driven past societies to adapt to the sea level rise. The land users in the past did everything in their power to be secure against water. So they built their houses on mounds “terps” (see figure 5 below). This way when the land surrounding the mounds flooded, their plot of land stayed dry. The users knew their land areas well (“landgoedjes” in Dutch).

Not for nothing are the old houses and churches (mostly built much later than the first instance dikes) in high places.



Figure 5.

Houses on muds “huisterpen” 800-1250 AD

3.3 “Fighting water”

This situation has changed significantly since about 1500 AD (see fig.6). The changes were primarily due to the rising sea level on the one hand⁴ and soil subsidence on the other hand under anthropogenic influence on the land, e.g. building dikes and peat excavation.

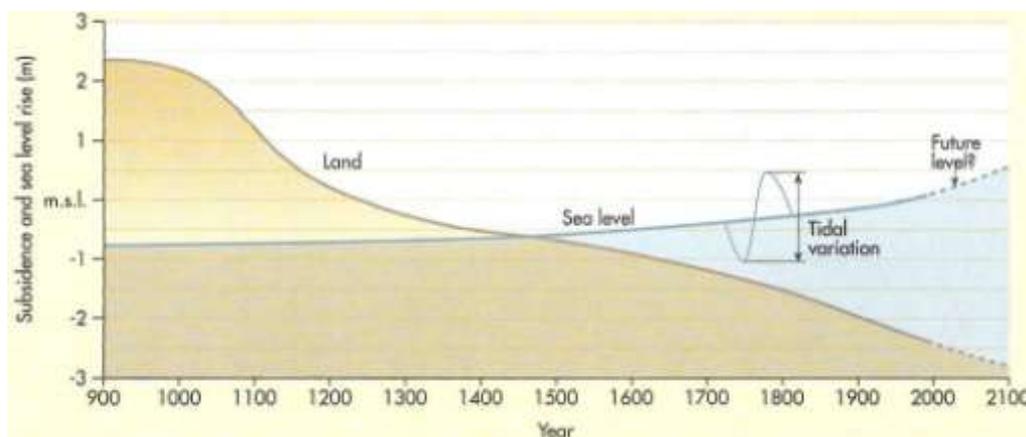


Figure 6. Subsidence of land and sea level rise over time

As far back as 1200 AD farmers organised themselves into water boards. These water boards are still managing the water in the Netherlands successfully by building and maintaining dikes to protect us from flooding. Although, these human activities have also resulted in a vicious circle and limited the natural resilience of the environment. In this context, the vicious circle is the never ending reliance on human intervention via water management and is a direct consequence of what one might call “fighting water”. Furthermore, there is a small geological subsidence that only exacerbates the problem in the current times of warming when sea levels are rising.

However, since 1837, this situation has changed radically. With invention of steam power it became possible to drain a large lake the Haarlem Lake “Haarlemmermeer” and reclaim it for land use (where now the airport Schiphol is situated). Since then the Dutch water management was dominated by a top-down autocratic and technocratic approach, or otherwise put: “testi-

⁴ In present times, the sea level still continues to rise at rate of 20 - 30 centimetres per century [2].

With an increase in increase due to global warming the Wadden Sea can lose its current shape:

“...increase 30 to 60 cm per century, possibly from 2050-2100, it is likely the intertidal zone in the relatively large, most western parts of the Wadden Sea (the first) sea level rise cannot keep up with this rise. This will also happen with the outer dike marshes of the Wadden Islands” [6]

mony of the success of a strictly top-down, autocratic, centralized, rational and yet responsive type of planning and implementation (Jeurgens, 1991)” (quoted in de Groot & Lenders, 2006).

After this period, great human interventions have followed and reached the Wadden Sea Area as both Zuyderzee and the Lauwerszee were closed off in 1932 and 1969 respectively (appendix 7 c). This contributed even more to the vicious circle described above.

Due to this type of water management, categorised as “fighting water” paradigm, the result of the soil subsidence and the sea level rise led to the situation when if things go wrong, is best described in fig 7:



Figure 7. Flood of 1953 ©Deltares

3.4 Change in paradigm

The adaptation strategy described in the subchapter above is characterized by the struggle against the sea, i.e. the paradigm “fighting water” resulting in natural sediment nourishments no longer being deposited by flood events. The permanent drainage of the reclaimed land resulted in its irreversible subsidence and in combination with the geological subsidence; large parts of The Netherlands are now below the sea level (appendix 4). Most of the Northern part of Holland is very low and in addition the place is known for its highest annual subsidence rate of all Holland. In addition, closure of the sea’s tidal variation and land reclamation had affected the unique intertidal ecology permanently. The current projected climate change only adds to the problem.

In 2001, Rijkswaterstaat already concluded that the Wadden Sea is being affected by projected climate change. In 2006, the Royal Netherlands Meteorological Institute (KNMI) defined projections for all of the Netherlands, so that Dutch policy makers can design the national adaptation strategies accordingly.

As was mentioned in the Introduction, the sense of urgency for adaptation to the currently projected climate change on the sea level for the Netherlands in general and for the Wadden Sea

Area in particular was instigated in 2008 by the advice of Dutch Delta Committee *Working with water* (“Samenwerken met Water” in Dutch) [6]. One of their forecasts was that the regional relative sea level rise will be 0.65 to 1.3 m for 2100 and 2 to 4 m for 2200 (the relative soil subsidence was taken into account). Local variations due to mining activities may occur. These are “worst case scenarios” of the Delta Committee. Their advice for the Netherlands in general is to raise the current protection level with factor 10, which is at already very high standard. In fact, level of the Dutch coast protection standards (see appendix 5) is currently the highest in the world. This is however not enough. We clearly reached the breaking point when new solutions are needed.

Thus, currently the adaptation customs are on the move due to shifts in paradigms as described in the introduction, e.g. “living with water”, from top-down ... to decentralisation and transfer of responsibility to individual residents. With this, the response to custom of dealing with the sea level rise changed. In the current water management this custom is integrated in the new term, the so-called “*meerlaagsveiligheid*” (box 1). However, in retrospect to the history of how people coped with water by building “terps” this is not something entirely novel (fig.5).

Box 1 Multi-level safety

The Dutch multi-level safety concept may give us the answers and tools to manage the risks. This concept is in line with the EU Floods Directive and its strategy is to:

1. Maintain robust dike protection
2. Integrate flood risk management and special lay-out
3. Create resilience among citizens and make emergency plans



3.5 Global warming

Anthropogenic climate change is a serious issue that will have long lasting effects. Even if the concentration of the so-called greenhouse gases (GHGs), which are considered to be accountable for the global warming (IPCC, 2007).

BOX 2: Radiative forcing

Much of the sun's energy is reflected by e.g. clouds and ice back into space. About 70 percent gets through to warm our planet, drives water cycles and sustains our biosphere. About 1 percent of that energy generates winds and only 0.1 percent is absorbed by green plants, algae and bacteria in a process called photosynthesis. Most of the energy that made it through eventually radiates out of earth in the form of infrared light, thus creating net energy balance: The sun radiates energy at the rate of 3.9×10^{26} W (J/s) and delivers to Earth on average 343 W per m^2 . The same 343 W per m^2 must leave earth eventually via infrared light to create net energy balance: $343 \text{ W}/m^2 = 343 \text{ W}/m^2$. GHGs regulate this flow and act as earth's thermostat, i.e. more of GHGs and the net energy is ≥ 0 and vice versa. In climate science this is also defined as respectively *positive* and *negative radiative forcing*.

Mitigation is the name given the approach to reverse the effects of the positive radiative forcing. However, because of the *time lag* phenomenon that was described in the introduction, the warming and the consequent sea level rise will be inevitable. Hence, mitigation strategy requires global efforts to limit the GHGs in the atmosphere. These efforts involve the global political agenda of sustainability which is an emerging new western political paradigm. Simultaneously, this concept reflects deep political disputes between various countries, such as developed and developing countries, which undermine the achievability of sustainability. The groundwork the concept of sustainability was laid in the Report of the World Commission on Environment and Development "Our Common Future" (Brundtland report, 1987) that defines sustainable development as: "*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs*".

Since the Brundtland report, sustainable development has been addressed on the global level of politics persistently. However, the 17th COP (Convention on Climate Change) in Durban, South Africa failed again to achieve an international consensus on an effective reduction of Green House Gas emissions (Durban, nov. 2011). With this, mitigation has reached the highest political level, although it does not seem as feasible strategy as adaptation to address the projected sea level rise adequately for the Wadden Sea Area now.

3.6 Current situation of the Wadden Sea Area vis-à-vis sea level rise

The current situation of the Wadden Sea Area is worrying due to (i) the anthropological climate change, or ‘global warming’ (0) that only increases the pace of climate change described in 3.1 (see box 2), (ii) the fact that the Wadden Sea Area has not got a chance to grow with the sea level rise and (iii) the soil subsidence described earlier the WS area in general and the Dutch WS area in particular is in risk: “About 3.5 million people in the region depend on flood defences, and 16 populated sandy barrier islands will be directly affected by changes in sea level rise and storminess.” [3]

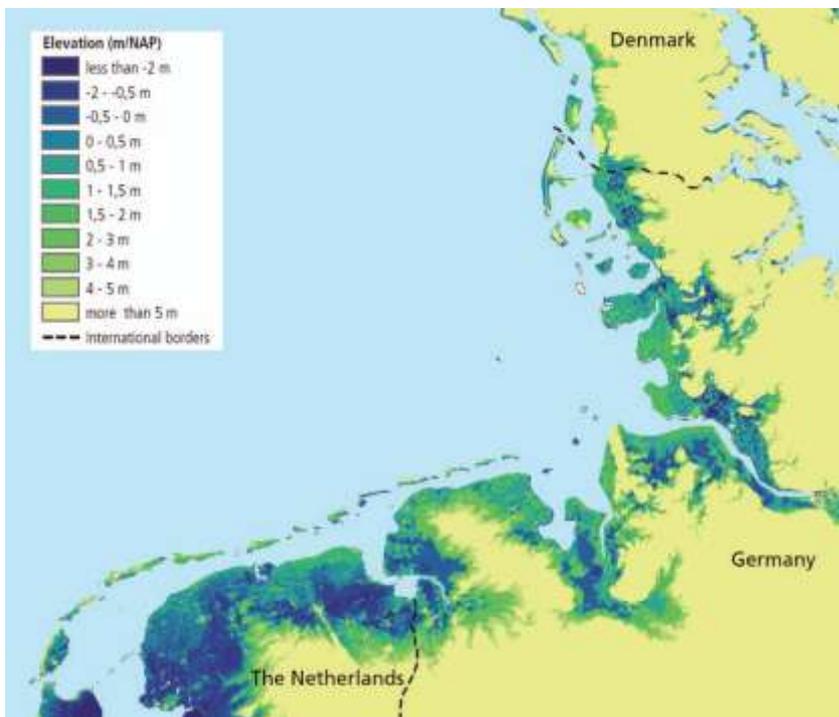


Figure 8. Wadden Sea region low-lying areas. © Safecoast, 2008

Table 1: Surface area and inhabitants [3]

	Area (km ²)	Inhabitants
Denmark	600	100,000
Schleswig-Holstein	3,404	250,000
Hamburg	270	180,000
Bremen	360	550,000
Niedersachsen	6,600	1,200,000
The Netherlands	6,294	1,250,000
Sum	17,528	3,530,000

The Dutch WS area is as one of the lowest-lying and most densely populated areas (table 1 & fig.8) and thus in high risk zone. In this context risk is defined as: probability of an event (e.g. land loss flooding) which will increase due to climate change and the resultant damage (i.e. impact) [3]. The latter is a result of total amount of casualties, which is comprised of value loss (people, economic property, infrastructures). *Action is necessary* (Diamond, 2005).

held in cases where no adaptation plans had been found. The differences in approach to reveal the full picture accentuate the inconstancy of how this topic is dealt with, within these authorities. During this investigation Rijkswaterstaat was also contacted to compare their knowledge of the situation of climate adaptation within the Wadden Sea's area institution. Their answer is enclosed in the appendix 8.

The guiding line for the findings in this subchapter follows the structure of this questionnaire:

- a) Policy
 - Is there a concrete climate adaptation plan?
 - (If no plan): How climate adaptation policy is formulated and what are the goals?

- b) Vision on the local climate change challenge
 - (If no plan): Have effects of climate change been envisioned and what measures are designed?

- c) Adaptation in practice
 - (If no plan): How is climate adaptation embedded in the spatial development of your area?

- d) Obstacles
 - (If no plan): Are there any obstacles that your organisation encounters regarding adaptation?

4.2.1 Municipalities

The investigative research has not revealed any concrete municipal spatial adaptation plan within all of 17 municipalities in the Wadden Sea Area⁵.

As a result, all 17 municipalities were contacted; some more than once, with the main question of how their climate adaptation policy is formulated and what are the goals. Out of 11 responses, nine were unable to answer to question firmly. The reactions were diverse, however one feature pertained to all of them: that there is no one concrete formulation of the climate adaptation policy or goals within the municipal policy. In the boxes below some examples are illustrated.

4.2.2 Adaptation in policy

None out of 17 municipalities indicated to have a firm climate adaptation policy on paper.

Box 3

"We hebben geen beleid hiervoor. We zijn niet in staat om klimaat te veranderen. Ik snap u niet. Waarom stel u nog vragen. We doen hier niks mee. Provincie en rijk maken hierover afspraken. We gaan hier niks mee doen. VNG maakt idd input voor klimaatadaptatie. Belt u dus daarmee."

Box 4

"Wij houden ons vooral bezig met het terugdringen van de CO2 uitstoot en niet zozeer met het aanpassen aan de klimaatverandering. Ik heb ook het idee dat dat niet zozeer een gemeentelijke aangelegenheid is. Bij onze plannen in Lauwersoog wordt wel rekening gehouden met de stijgende zeespiegel, Maar dit komt niet direct voort uit gemeentelijk beleid."

Box 5

"We hebben het thema klimaat beschreven in milieubeleidsplan alleen. Niet direct uitgewerkt naar een klimaatplan. Het gaat meer in op de energiebesparing. We kijken niet naar de weersomstandigheden etc. Wel naar CO2 uitstoot bij bestaande bouwprojecten, mobiliteit etc."

Out of 17 municipalities, only two have indicated other plans that are set out in collaboration with the provinces and water boards, which do reflect their climate adaptation goals and policies. Both however are in a concept phase, only one of which was open for public purchase Remarkably, one of these plans states the following:

Box 6

"It appears that in particular the water boards and municipalities through their ongoing activities largely give substance to the climate-proofing of the region. For example, by sorting out the seawalls, construction of water storages and the modernization of urban water" (quoted in "Integrale klimaatadaptatie Eemdelta" p.3, 2012, translation by the author)

This quote suggests that there is no problem within the regional municipalities and water boards (in my study these are: gem.Delfzijl and Waterschappen Noorderzijlvest en Hunze & Aa's). Even though there are no municipal spatial adaptation plans, further investigation has confirmed that these authorities (quoted) are indeed active in the adaptation projects (pilots). It is, however, important that this quote should not be extrapolated to the whole region of the investigation. Further results will point out that this assumption is highly deceptive.

⁵ In fig.9 there are 18 municipalities depicted, however due several fusions, there are now 17 in total.

4.2.3 Vision on climate change challenge

Despite the fact that adaptation seems to be poorly addressed in the municipal policies, around half of the interviewed policy makers appeared to be familiar with the reports on adaptation of KNMI and Delta Committee. See an example in box 7. However, after some critical follow-up questions, only few actually knew their projections on local implications sea level rise.

Box 7

“De gemeente zelf heeft die effecten niet in beeld gebracht, maar is zich wel bewust van de klimaatmodellen zoals het KNMI en de Deltacommissie die hanteren.”

Note: Mostly the conversation was about the CO2 and the municipalities' vision on its reduction. It was not included in this overview as it was not the question of my research. To view all responses see <https://waddenseaintimesofclimatechange.wikispaces.com>

4.2.4 Adaptation in practice

An interesting feature is that mitigation measures appeared to be frequently misinterpreted with adaptation. In some cases respondents were even totally unfamiliar with the term adaptation. Therefore often the goals were named for mitigation, aimed at CO2 reduction projects.

Box 9

“We gebruiken niet de term 'klimaatadaptatie', maar hebben wel een zeer ambitieus beleid op het gebied van duurzaamheid: Texel wil in 2020 op het eiland net zoveel duurzame energie zelf opwekken ...”

Hence, after detailed follow-up questions using examples, respondents did acknowledge in a few cases that measures are being undertaken, such as disconnecting sewage systems from the rain water as a response to increasing rainfall, which stresses sewage systems capacities.

Box 10

“Voor het riool rekenen we met zwaardere buien voor vervangen en nieuwe aanleg. In het vGRP dat we dit jaar klaar hebben gaan we daar ook van uit. Bij nieuwbouw wordt altijd een gescheiden stelsel aangelegd. Er zijn overigens geen grote problemen met wateroverlast. Het doel zou, optimaliseren en toekomstige problemen voorkomen, kunnen zijn...”

Only one municipality indicated that there are projects that are aimed on coastal protection:

Box 11

“Daarnaast wordt ook op andere terreinen bekeken in hoeverre het mogelijk is om meer duurzaam te werk te gaan, bijvoorbeeld bij de dijkversterking... Bij dijkversterking wordt een duurzame, natuurlijker variant ingebracht. Bovendien zijn er projecten gaande op het gebied van de zoetwatervoorziening.”

4.2.5 Obstacles

Some municipalities did indicate obstacles. However, no major similarities were found. Mostly there is a concern with some local issues. An example of such local issue is provided in the box below:

Box 12

“Voor de zeedijk is door provincie en waterschap een reserveringszone ingevoerd voor eventuele dijksverhogingen. Wij vinden dat een eventuele dijksverhoging beter alleen aan de zeezijde kan. Buitendijks hebben we ook nog een deel van de gemeente liggen dit is natuurgebied wat begraaasd wordt door It Fryske gea. Hier slibt het land wel met de zeespiegel mee op. De begrazing en veeveiligheid is wel een aandachtspunt.”

In few cases, the small size of the municipality is used as an obstacle (or an excuse) of not taking any adaptation measures at all:

Box 13

*“dit is te moeilijk voor ons als kleine gemeente.
Ik verwijs u naar het deltaprogramma. Dat programma heeft volgens mij te maken met de stijging van de waterspiegel.”*

4.2.6 Water boards

As previously stated, there are four water boards in the Wadden Sea Area. The desk-research revealed only one concrete adaptation plan (water board Hollands Kroon).

In the other three, many different policy makers have been contacted with the questionnaire. As a result this quest revealed two other concrete plans. Only one water board did not indicate that there was a plan on paper, it responded as follows:

Box 14

“ Binnen de Unie van Waterschappen zijn diverse richtlijnen hoe rekening te houden met klimaatverandering. We gaan uit van de KNMI-scenario's, en binnen het Deltaprogramma van de deltasceario's, die een combinatie van de KNMI-scenario's zijn en een sociaal-economische prognose van het CBL. In de analyses van ons watersysteem nemen we dus de klimaatverandering op die wijze mee. Voornamelijk gericht op kwantiteit, maar voorzover kennis groeit, ook van kwaliteit. ”

From its response, there is a correlation with the national climate adaptation objectives; however it does not indicate any concrete plan of its own. Surprisingly, as was previously stated, this water board is active in the adaptation projects (pilots). The following response conforms this:

Box 15

“ De "Stedelijke wateropgave" wordt samen met de gemeenten in kaart gebracht tegen het licht van klimaatverandering. Niettemin is de provincie Groningen meer actief in analyse in dit thema : "Visie Eemsdelta" en "Klimaatadaptatie Eemsdelta". Deze hebben momenteel nog het karakter van globale visie en opsomming van een palet van oplossingsrichtingen. Provincie Drenthe heeft een grondwatervisie ontwikkeld. ”

However, it also suggests that the province acts as pioneer in these kinds of projects, which is in fact opposing to the prior quote (Box 15). It seems that the activities are instigated, or at least in the case above, by Groningen. See also the following statement (box 16):

Box 16

“ ...Niettemin is de provincie Groningen meer actief in analyse in dit thema: "Visie Eemsdelta" en "Klimaatadaptatie Eemsdelta" ... ”

Two of four water boards indicate similar obstacles, that there is not enough actual space or finance for their activities:

Box 17

*“ ... Veel maatregelen kosten ruimte en zijn daarmee alleen op lange termijn te realiseren. ”
“Moeilijkheden : schaarste aan ruimte en financiële middelen...”*

4.2.7 Part-conclusion

None out of 17 municipalities have climate adaptation plans. Some indicate to be working on such; however those are provincial plans, whereby the province acts as the pioneer. Regarding the water boards, it was however uneasy to establish, nonetheless, if all have adaptation plans.

4.3 Interaction with management

As previously stated, in this chapter the revealed adaptation plans are tested. The aim of the analysis is to test the interaction of the revealed plans/policies with the current management of the Wadden Sea Area. As stated in chapter Method, it can be achieved via criteria found in the B&O (part A, p.19). These criteria are as follows:

1. Working on robust and resilient nature
2. Working on sustainability
3. Keep an open eye for development
4. Made to measure on several levels

The B&O is speaking of these criteria as a mind-set. The summary it provides is as follows:

“Recovering of robustness and resilience, working with nature and landscape as basis for equally ecological and economical functioning, as also for the community; Stimulating sustainable economic development, within ecological limits, on large and small scale specialized zones in the valuable agricultural cultural landscapes. Specialisation, strengthening of the characteristics and the strength of the respective zones are the starting point; Robust and healthy nature can take more of a battering and is the basis of a good living and experiencing and therewith also a stimulus for economic activities.” (B&O Part A, p.19, 2009, translation by the author, 2012)

Table2 An overview of the criteria test results	Criterion 1	Criterion 2	Criterion 3	Criterion 4
Plan 1: Een Deltavisie (CONCEPT) (province Hollands Noorderkwartier)	n.c.	n.c.	x	n.c.
Plan 2: Nota duurzaamheid (concept) (water board Hunze en Aa's)	x	x	n.c.	n.c.
Plan 3: Veiligheidsplan (Watterskip Fryslân)	n.c.	n.c.		
Plan 4: Waterbeheersplan 2010-2015 (Watterskip Fryslân)	n.c.	n.c.	n.c.	n.c.
Plan 5: Uitvoeringskader Klimaatadapatatie (province Groningen)	x	x	x	x
Plan 6: Actieplan programma adaptatie (province Groningen)	x	x	x	x
Plan 7: Ontwerpprojecten van Atelier Fryslân (province Fryslân)	x	n.c.	n.c.	n.c.
Plan 8: Actieprogramma klimaat 2007-2011 (province Noord-Holland)	n.c.	x		n.c.

All eight documents that have been revealed by the inventory in the prior subchapter were subjected to the accordance of these four criteria. From the table 2 below it appears however that not all plans passed the criteria test successfully. This will be clarified in the following subchapters, starting with the first and finishing with the last criterion.

4.3.1 Working on robust and resilient nature

Four out of eight plans have addressed this criterion. The other four do mention some related measures, however they remained too inconsequential and therefore are categorised as n.c. (not concrete), see table above. Mostly, they lacked concrete measures on how to make nature more robust and resilient. In some cases the focus was purely technological, aimed on protection from the effects of climate change, namely within the water boards.

4.3.2 Working on sustainability

For this criterion the scores are also even-handed. Likewise, four plans complied with the description and four are categorised as n.c. However, this time one of the provinces scored slightly better (Noord-Holland) and one of them slightly worse (Fryslân) see table 2 above. Interestingly, one feature was common to all plans that scored n.c. Namely, these did not address sustainability specifically enough, which is the main requirement of the B&O regarding this criterion. Majority of the plans addressed only CO2 reduction as the main focus and not the sustainability in a broader meaning, e.g. “Triple Bottom Line” or “People, Planet, Profit”, Elkington (1997). Some did include sustainability, however did it not specify and the text did not provide clues.

4.3.3 Keep an open eye for development

As many as three out of eight plans complied with this criterion. Yet, this time two out of four plans did not receive any score at all, as there was not any evidence to suggest contrariety. In other words these plans did not address the criterion of contributing to the economic development of the region it is aimed on at all. The remaining three were not concrete “n.c.”. This is however is an important issue, since this region is known for its low economic development.

4.3.4 Made to measure on several levels

For this criterion, the score is the lowest: only one-fourth of all plans are in agreement. This was although quite tough to establish. For that purpose, all plans were carefully analysed if/what parties were indicated or mentioned as possible collaborators or contributors. Mostly, the plan needed to be judged as a whole. Some, however, did explicitly name it or even divided a chapter *made to measure*.

4.3.5 Part-conclusion

The revealed climate adaptation plans score quite low, in particular on the last two criteria. The conclusion is therefore that most plans do not address adequately the Wadden Sea’s area management vision and the national and European nature protection’s visions, which are cemented in the framework of the B&O according to the assumptions made earlier in chapter Method.

5 Discussion of the results

The previous chapter revealed: (i) the status quo on how climate adaptation is addressed among the provinces, water boards and municipalities of the Wadden Sea Area and (ii) tested and revealed how their plans on climate adaptation meet the criteria of the main management plan for the area, the B&O. The main aim of this chapter is to interpret the results and, with retrospect to the prior findings and the literature review presented in the introduction, to give a momentum to come up with conclusions and recommendations.

5.1 Reflecting status quo on adaptation

Adaptation seems to be a neglected subject among the public institutions in the Wadden Sea Area, as the inventory of adaptation plans revealed. It is especially so regarding the municipalities. Now how can this be explained? Is there any correlation with for instance the recent developments or the paradigm shifts in water and land-use management in the Netherlands?

By looking back at the results of the inventory, it seems that there is some pattern emerging in how climate adaptation is addressed from top-down (regional to the local level). Namely, it becomes less addressed with each level: (i) on municipalities the results of this research show that none have the plans; (ii) out of all water boards only three-quarters have adaptation plans to cope with climate change; (iii) on the regional level all have designed an adaptation plan.

More complex correlations are furthermore identified. Namely, on the national level we see that, despite many changes and shifts in paradigms, that there is a concrete action to develop measures for adaptation to the projected sea level rise (e.g. Delta Program 2012 and Delta programme “Waddenzee”). Their work and the key decisions will be presented in 2015, in three years’ time. Although the general vision regarding adaptation to the projected climate change should be addressed is best described with the concept “Multi-level safety” (3.4). This concept demands adaptation measures in the spatial lay-out, which is in line with the new paradigm “living with water”. This implies a new type of custom to adopt, in particular by the local institutions (municipalities) that before only had to deal with spatial planning, though now in a relatively short time need to change their practices.

However, in spite of the agreement “Klimaataakkoord Gemeenten en Rijk 2007-2011 - VNG” signed in five years ago, which addressed specifically “climate-proof environment” (art.3.6), in 2010 the Inspection department of the ministry VROM already concluded that: “adaptation is not identifiably embedded in the municipal institution”. Indeed, out of the responses on the questioner the municipalities were unable to identify resolutely how adaptation is embedded within their policy. In contrast, mitigation measures of all kind, e.g. energy reduction in hous-

es, traffic etc. were repeatedly used to illustrate how the organisation deals with climate change. An interesting feature, as it illustrates that the respondents (a) misinterpreted the question regarding adaptation or (b) gave “politically correct” answers. But even after persistently asking follow-up questions and explaining what adaptation measures can be with some examples of “Multi-level safety”, some found it too difficult to comprehend, e.g.: “Ik verwijs u naar het deltaprogramma. Dat programma heeft volgens mij te maken met de stijging van de waterpiegel.” In addition, municipalities often use excuses for NOT addressing adaptation because of their size. In fact, this explains why mitigation is more addressed in the municipalities. Namely, mitigation is largely subsidised and is therefore an incentive for coping with this strategy. This was also stated by the prior investigation of VROM: “It is experienced as a pity that subsidies for mitigation exist (e.g. SLOK), but not for adaptation, which makes that this subject receives less attention.”

Moreover the national objectives require the oldest Dutch institutions the water boards, which already dealt with water for centuries (as was briefly illustrated in the subchapter 3.3), to change their customs radically from what they were used to, namely, to the previous paradigm in water management, “fighting water”. The test revealed, regarding the water boards, that none of the plans addressed the test’s criteria fully. This is though not because the plans do not address adaptation. On the contrary they do, which it is not surprising as earlier was already stated that water boards have managed water in the Netherlands successfully for centuries, it is thus a long held custom by these institutes. Only now, the paradigms has shifted, e.g. from technological and technocratic approaches to post-modern concepts such as “living with water”, “building with nature” etcetera. Apparently the water boards in the Wadden Sea Area have difficulties to adopt these new paradigms of water management. This also explains why they scored low on the first criterion: “working on robust and resilient nature” in the test. It is however odd, that water boards fail to address the new adaptation custom successfully. Namely, Dutch water boards have developed historically with the sea level rise as a first institution in Holland and have therefore advanced a lot of competences by learning how to cope water. Because it was the first government it also incorporated (and still has) a separate system of taxes “de waterschapsbelastingen”. This specific competency enables the water boards to generate sufficient financial resources to cope with new types of adaptation, similar to as they did formerly for maintenance of dykes and other water management infrastructures.

Finally, the test results of how provincial adaptation plans interact with the management plan B&O show discrepancies. To be more precise, firstly, on the regional level we can see already a decline, in terms that one out of three provinces has an out-dated adaptation plan (till 2011) that furthermore does not answer the criteria of the main management plan for the Wadden Sea Area and thus are also not in line with the national ambitions regarding there are reflected in

its framework. The latter applies also to the situation regarding other provincial plans, except for one of the province Groningen. Both plans of the province address the B&O to such an extent, that it seems as if the two were written using the framework of B&O. Hereby, must be mentioned that the province shows it also in practice, with various networks and projects it is involved in, including the national climate research centre programme “Kennis voor klimaat”, where it was one of its “hotspots”. Hence, Groningen works with municipalities and local water board in the region. From the responses, these are the only municipalities that participate in projects regarding climate adaptation. Presumably, through this collaboration and activeness, the province possesses the right qualities of leadership, which appears to be necessary now in the Wadden Sea Area.

6 Conclusions

In retrospect to the discussed correlations between the main results of the inventory, which includes the questionnaire and criteria test results, the following can be stated:

First, from the literature overview it can be concluded that on the national level the new “living with water” paradigm has been embraced firmly. Furthermore there is a concrete programme Delta Committee “Waddenzee” is currently in development to design key-decisions that will be presented in 2015 to the parliament. On the decentralised levels, however, the situation is not clear. Provinces have published their plans, which are relatively easy to find.

Second, a custom methodology was designed to reveal the adaptation plans through a) desk-research and b) questionnaire, which is based on the earlier research by state’s watchdog (VROM Inpectie).

Third, the method used in research line one appeared to be successful in revealing an initial situation on climate adaptation plans. However, a deeper investigation was needed, thus the questionnaire was put together, which revealed an interesting feature. Namely, from the 17 municipalities contacted, most of them were unfamiliar with adaptation to such an extent that often an explanation was needed from my side. Furthermore, the municipalities were frequently falling back on the arguments for numerous actions in mitigation, using it as a cover-up for the fact that adaptation is actually not tackled adequately.

Fourth, the status quo of the revealed adaptation plans among the municipalities, water boards and provinces respectively seem to follow a declining correlation. In particular the municipalities have no any concrete concrete adaptation plans.

Fifth, four criteria had been defined and were included in the matrix to analyse adaptations plans on their interaction with the management plan B&O, which has integrated multiple policies, including European (N2000) and national policies for adequate nature protection, allowing human activities within ecological limits. The latter is the current predominant discourse. Thus, adaptation plans in the area also need to shadow this discourse.

Sixth, the qualitative framework (criteria matrix) created for the test appeared to work well for the assessment of the interaction with the management of the Wadden Sea Area. Further research may point out if it is also applicable to analyse other plans in the area on their consistency with the main management plan.

Seventh, the revealed climate adaptation plans score poorly. In particular the score is low on the vision of the (economic) development in the area and how the plans are made to measure

the adaptation in the region. Thus, most adaptation plans do not conform to the criteria of the B&O.

Eight, the discussion of the results has identified some important correlations, which are pointed out below:

- There is possibly an explanation why municipalities are more concerned with mitigation. It is an alternative strategy to cope with climate change, which is also widely supported by the national government. As the study by VROM indicates, the available subsidies regarding mitigation provide a financial incentive for mitigation.
- The water boards seem to be neglecting sustainability, i.e. people, planet, profit and nature as addressed by the B&O's criteria, which were derived from the national and European objectives (i.e. Natuurwet, N2000). They are clearly still in their old practice of technocratic approach to the water management of "fighting water" paradigm.
- The support for the decisions on the national level seems lacking regarding adaptation in the Wadden Sea Area as municipalities and water boards yet did not embrace the new "living with water" paradigm. This could affect their commitment to the coming decisions that the part-programme "Waddenzee" will set out in short future.
- One of the provinces appears to act as a pioneer in the adaptation and instigates the necessary changes of the local institutions, in accordance with management criteria.

Summing up, it is apparent that adaptation needs to be more firmly and adequately addressed in the management in the Wadden Sea Area. In light of the recent shifts in paradigm e.g. from "top-down" management to more decentralised management, it appears that the local institutions lack the necessary motivation, which only in distinct cases is successfully engaged. In these the Province Groningen acts as a role-model, a pioneer in spatial adaptation to projected climate change and the subsequent sea level rise.

At the start of this thesis project, three hypotheses/assumptions were defined. Below, I reflect on these assumptions and identify the lessons learned in this project:

4. Because of the recent shift in paradigms described by IVM, there is inconsistency between different institutions and within them on how they cope with climate adaptation.
 - This assumption is true: considering the conclusions above, some individual organisations have illustrated discrepancies between how they address the topic adaptation within their policies. The differences are also seen within the institutions, e.g. province Groningen differs significantly in dealing with adaptation in line with B&O's criteria, then the other three Wadden provinces.

5. Considering that the prior mentioned agreements between the state, regional and local institution are not legally bonding and the shift in government to governance, i.e. from top-down to diminishing role of state, Wadden Sea institutions are consulting their own interests, which can be described as “tragedy of the commons” (Hardin, 1968).
 - This assumption was correct: there is a certain correlation between how the adaptation is addressed from top level of governance to the lower levels. Hence, the municipalities make no adaptation plans and are more concerned with mitigation, as it appears to have better financial incentives (subsidies). However, how as a Dutch expression says: “Dat zet geen zoden aan de dijk!”.
6. Contribution of spontaneous adaptation actions in policy plans, before the Delta part-programme “Waddenzee” will be concluded, could hypothetically play a role in the political paradigms or discourses that influence the management of the area. Similarly to how the nature discourses have influenced the current management discourse in the Wadden Sea Area in the “gas mining” case, which is described in detail in appendix 3.
 - This hypothesis might be true regarding the example of municipalities; we see that they prioritise mitigation to adaptation. This seemed also as a politically correct answer to give, when questions were asked regarding adaptation. So it can perhaps play a role, but future must show how this will be developed. Furthermore, regarding the water boards this is very likely to be true. Namely, it seems that there the paradigm “fighting nature” is still shadowed. That explains why water boards scored badly in the nature protection criterion. Thus there is interference between the paradigm water boards are in and the current nature objective of the Wadden Sea’s Area management, which is reflected in the first B&O criterion, i.e. “working on robust and resilient nature”.

Unfortunately, due to time constraints an additional could not be met. The objective can be a topic of future research, which is worded as follows: “...The research need not necessarily be limited to the Dutch Wadden Sea. If time allows, a comparison with Germany and Denmark can be made. Such research fits well with the ambition of our Knowledge Centre.” (H.Revier & T.van der Maarel, personal interview, November 5, 2012).

7 Recommendations for the management

Regarding to the Wadden Sea's management the following can be concluded and recommended:

First, the discrepancies pointed out in the conclusions on how adaptation to climate change is addressed among the institutions in this area indicate that there is no comprehensive approach to dealing with adaptation in the Wadden Sea Area. This confirms the finding of IVM mentioned earlier in the introduction. The management should therefore be focussed on how to eradicate this situation. Consequently the agreements signed with the lower governments, as mentioned in the introduction, have not been evaluated yet. Therefore they need to be evaluated more often to have a correct and up-to-date picture on their status.

Second, it is clear that most municipalities do not address adequately new tasks of adaptation which the inventory has revealed as the current situation. A further research could actualise if any new plans emerged and if so, it could focus on analysing how these plans address the concept of "Multi-level safety". The concept is essential to provide local spatial robustness to the effects of the projected sea level rise. However, it must be noted that this concept is not entirely novel (see 3.2). This can be used as motivation to recreate such areas for tourism, as it is currently underdeveloped and according to one of criteria of Wadden Sea's management: "*keep an open eye for development*".

Third, regarding the focus of municipalities on mitigation (due to subsidies for e.g. energy efficiency projects aimed at CO₂ reduction) rather than adaptation, a research can be done to analyse exactly what is the drive for mitigation and if there any other incentives. Possibly this can contribute to the knowledge of how this can be applied for making adaptation more attractive for municipalities to cope with.

Fourth, to prioritise climate adaptation, spread knowledge about the new adaptation paradigm; create incentives and creative ways to gain resources for the institutions to cope with climate change adaptation.

Fifth, provinces seem to show discrepancies towards how they cope with climate adaptation. One plan of the province Noord-Holland is dated (2011) and contains an interesting feature; that province of Groningen distinguishes itself from the rest by being proactive in this field and it is considered to possess the right kind of leadership that the Wadden Sea Area needs. In accordance with the IVM's statement their assessment of the Wadden Sea adaptive capacity: "The problems include *a lack of leadership and a short time focus...*" Nowadays, not only water management paradigms are shifting, but also in management general. See in the box 18

below the comment on this by prof. John Kotter [19], who gives master classes in leadership. Groningen can be used in this respect as a role-model for this type of leadership and broaden the support for institutional changes as it seems that the current decentralised management lacks this type of leadership.

Box 18

Management is a set of processes that can keep a complicated system of people and technology running smoothly. The most important aspects of management include planning, budgeting, organizing, staffing, controlling, and problem solving. Leadership is a set of processes that creates organizations in the first place or adapts them to significantly changing circumstances. Leadership defines what the future should look like, aligns people with that vision, and inspires them to make it happen despite the obstacles (Kotter, 1996, p. 38)

Sixth, the national nature objectives as reflected by the criterion “working on robust and resilient nature” is poorly addressed by the water boards’ adaptation plans and it seems as if they still practice their renowned custom of “fighting water”. The management should therefore pay closer attention to eradicating this feature, in particularly in light of the coming key-decisions by the part Delta Committee “Waddenzee”. This will potentially save time for transition of these decisions to the lower level institutions. To achieve this more effectively, the concept of transition management should be applied. This concept can be the topic of a future study to be applied as a whole to how the stimulate shift in paradigms. An applied tool is suggested in the appendix 8.

Seventh, if the financial incentives and transition management will not be successful, climate adaptation needs to be made mandatory. A possible policy instrument to achieve this is *specific instructions from provincial and central government* “aanwijzingen” in Dutch [11] . It is empowered under the new Water Law to regulate the contents of for instance the municipal spatial plan. Consequently, if there will still be no solid change or they are not in line with the concept, this issue should be addressed urgently, preferably before 2015 when the part-programme “Waddengebied” will be concluded.

Last, the literature review pointed out that nature institutions: “...are the weakest in adaptive capacity... “...and the sum total of individual ad hoc efforts combined with a more rigid European and national legislation in this field indicates that this is a neglected area of nature management in the Netherlands, despite the uniqueness of the ecosystem and all that is said and written about the Wadden Sea...The problems include a lack of leadership and a short time focus...”. This was however not explicitly addressed in this thesis. Although, judging from the adaptation point of view “fighting water” this paradigm is currently still predominant. Further research can focus on how an incentive can be created from assessing the nature value of the

Wadden Sea Area. To evaluate the value of nature a concept called “ecosystem services” can be applied (which the province of Groningen already investigated in the project “Ecosysteemdiensten Veenkoloniën”). However one should be aware, when investigating it, that there is a lot of critique in the scientific community regarding this topic, e.g. “the new normal”.

In this respect, I would like to refer to the statement at the beginning of this thesis, namely: “*Custom adapts itself to expediency*”. Expediency is a form of opportunism or pragmatism. In the current reality, money seem too often be the nowadays expediency. However, I think that the Wadden Sea institution et al should always take their priorities under good consideration in respect to all of their action taken and relate it to the intrinsic value of the unique Wadden Sea.

**Only when the last tree has died
and the last river been poisoned
and the last fish been caught
will we realise we cannot
eat money.**

(Cree Indian Proverb)

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Appendix 1 – Wadden Sea Area and nominated property

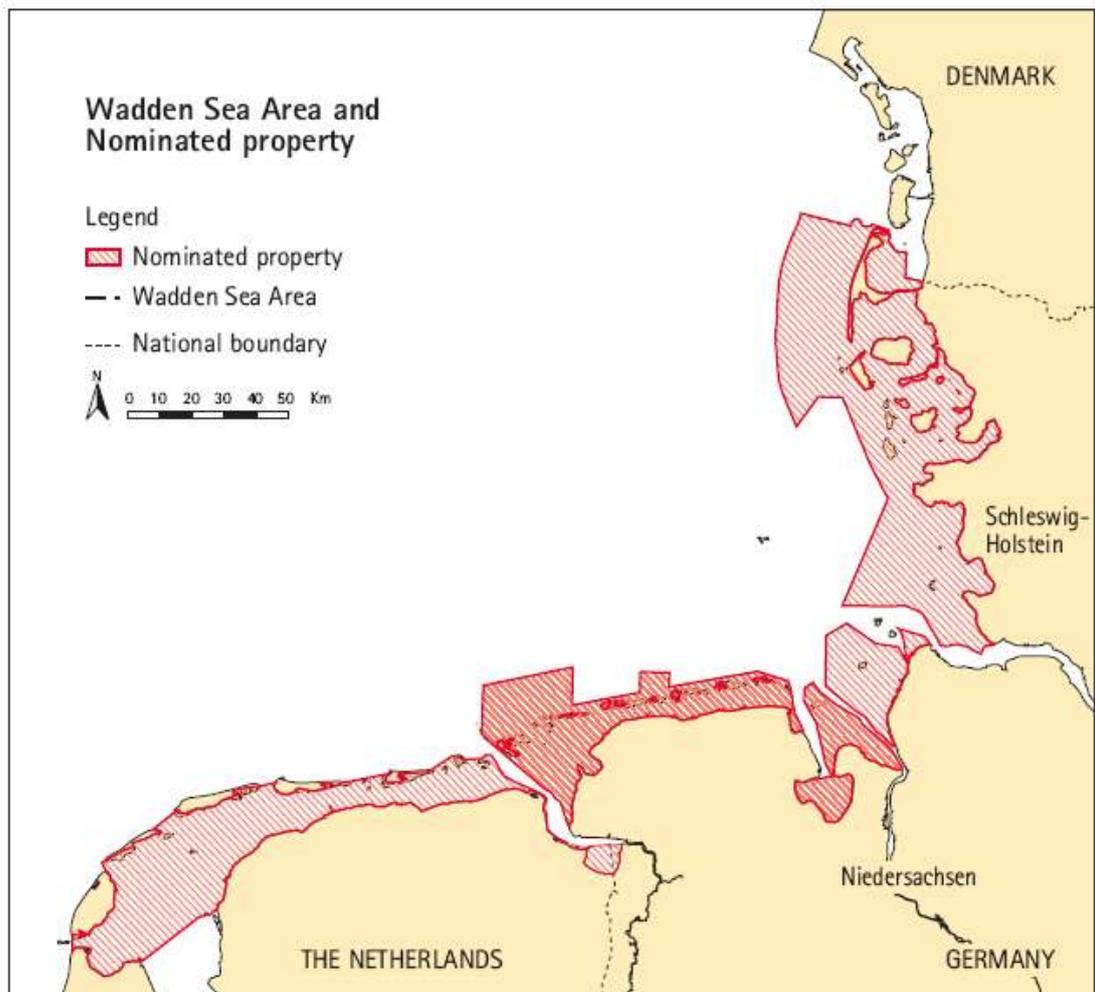


Figure 1: Map showing the boundaries of the nominated property [35]

Appendix 2 – Wadden Sea’s Area municipalities (anno 2012)

Municipality:	Type:
1 Gemeente Ameland	(island)
2 Gemeente Hollands Kroon	(coastal)
3 Gemeente De Marne	(coastal)
4 Gemeente Delfzijl	(coastal)
5 Gemeente Den Helder	(coastal)
6 Gemeente Dongeradeel	(coastal)
7 Gemeente Eemmond	(coastal)
8 Gemeente Ferwerderadiel	(coastal)
9 Gemeente Franekeradeel	(coastal)
10 Gemeente Harlingen	(coastal)
11 Gemeente Het Bildt	(coastal)
12 Gemeente Oldambt	(coastal)
13 Gemeente Schiermonnikoog	(island)
14 Gemeente Súdwest Fryslân	(coastal)
15 Gemeente Terschelling	(island)
16 Gemeente Texel	(island)
17 Gemeente Vlieland	(island)

Appendix 3 – Wadden Sea’s “gas mining” case

The nature protection of the Wadden Sea was not regulated in the Dutch policy until 1965. It was introduced after successful lobbying by the Wadden Association as a protest group against the governmental reclamation plans for the Wadden Sea area (WADDENmagazine, 2012, p40).

In light of this protest, the so-called nature protection discourse emerged: “Hands off the Wadden Sea!” (Runhaar, 2009). “There was a time when every car was stickered with seals, it seemed that the slogan “Be wise with the Wadden Sea” adorned all bags, mugs, and caps” (Huseman, 2004, “Schmierer zet geen zoden aan de dijk” section 1, para. 3). The Dutch economy was then at its strongest and thus, knowing since 1962 about deposits of gas under the Dutch Wadden Sea, the idea of its extraction was abandoned for nearly two decades without any kind of environmental impact assessment. Eventually, the drilling was permitted, although under strict regulation. Consequently, “... environmental knowledge on the effects of (new) economic activities in the Wadden Sea was systematically ignored, as it did not fit the dominant discourse on the use of this nature area.” (Runhaar, 2009, p. 204).

However, in 2004 this was about to change. The Meijer Commission was instigated by the Dutch government to examine the negative effects more closely. Their conclusion was that gas mining will not cause negative effects and, in light of other activities, is irrelevant (Meijer et al., 2004). An environmental assessment of the gas mining has, namely, shown that there are other activities, such as cockle fisheries, which have far worse effects on the Wadden Sea. Subsequently, the soil subsidence due to mining will be countered by the natural sediment transport into the Wadden Sea. The parliament approved this with a majority and a large fund became available in 2006 (“Wadden Fund”)⁶. The Meijer Commission also advised the formulation of a more coherent policy for the Wadden Sea to facilitate future investments in its nature and develop the economy of the Wadden Sea area. A large part of this fund was reserved to tackle these activities. Other (a smaller part) was reserved for climate adaptation and further scientific knowledge development.

With this decision after the “gas mining” case, the prior prevailing discourse, which predominated the management of the Wadden Sea, broke and a new one: “Human activities within ecological limits” prevailed. This would not be possible without persistent attempts of

⁶ This however was submerged into critic about controversy (Schaap, 2004, June 11, *Complot op de Waddenzee*[Television broadcast]. Hilversum: VARA Public Broadcasting Service.)

again, among others, the Wadden Association even though there was a high level of disagreement within the organisation itself, which in essence reflected the clash of the two discourses. Subsequently, the new discourse outweighed the former “Hands off the Wadden Sea”.

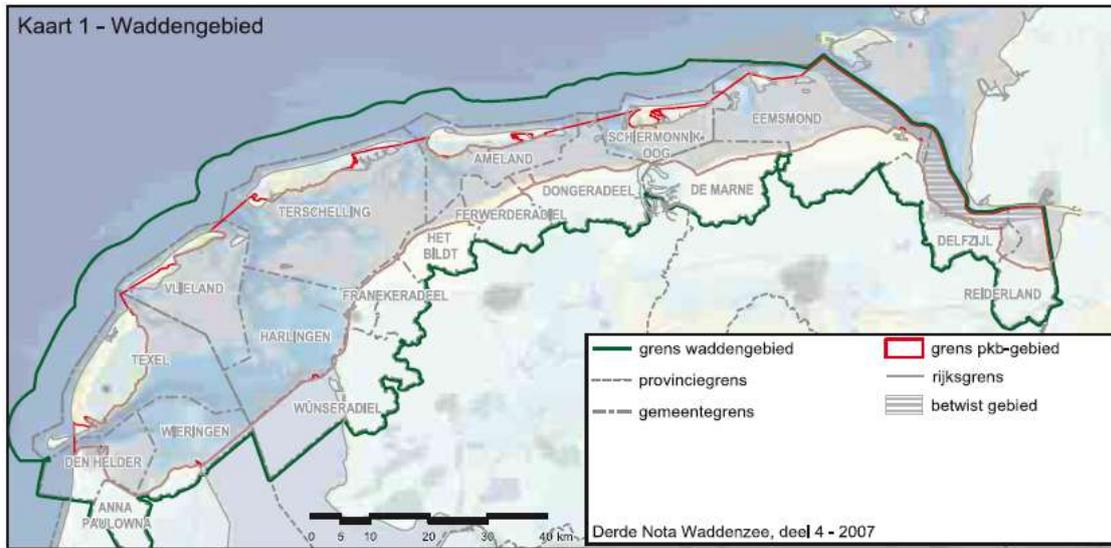
This case demonstrated that the new discourse was based on “ratio” which referred to decision making based on scientific knowledge (e.g. the true effects of mining). Hence, the shift in the hegemony of the “Hands of the Wadden Sea!” discourse would never be possible without a successful lobby, which is based on scientific knowledge of environmental impacts and not on sub-rational feeling or emotions. One such lobbyist⁷, who proclaimed the new discourse, describes the situation that was present at that time as follows:

“Hands off! Let nature have its own way”. This mantra impeded scientific research and even resulted in a degradation of the ecosystem in the area. Together with politicians, scientists and various interest groups we concluded early 2003 that the image of the Wadden as an untouched nature area was not correct and that this image had resulted in deterioration instead of an enrichment of the Wadden nature. An intervention was needed, because the area should be managed. The issue thus was how we could break through this mantra” (Van Dieren, 2007: 74, translation by Runhaar, 2009).

Nowadays, global warming raises new questions: How will the Wadden Sea be managed in times of climate change? Will, for instance new adaptation paradigm “living with water” reinforce the nature discourse “Human activities within ecological limits”, or is still the former adaptation paradigm (i.e. “fighting water”) in force among the Wadden Sea’s Area institutions?

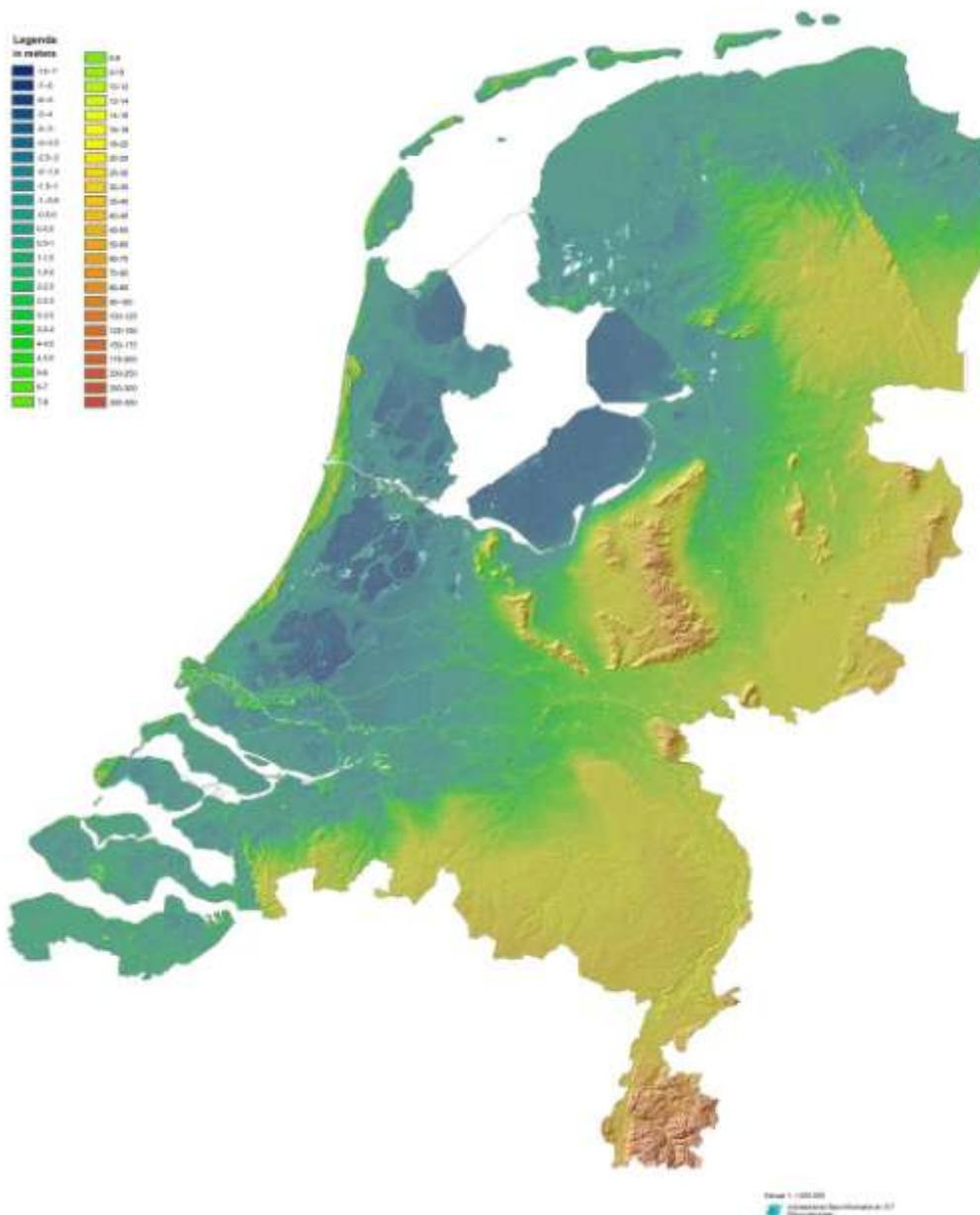
⁷ Wouter van Dieren is (Eindhoven, 15 april 1941) is een Nederlandse ondernemer en milieubeschermer. Hij is directeur van het Instituut voor Milieu- en Systeemanalyse (IMSA), een onafhankelijk adviesbureau en denktank op het gebied van duurzaamheid en innovatie. Daarnaast bekleedt hij wereldwijd ruim veertig functies. Zo is hij lid van de Club van Rome en van de Wereldacademie voor Kunsten en Wetenschappen. Sinds 1968 is Van Dieren betrokken bij wereldwijde milieu-activiteiten op uiteenlopende gebieden als wetenschap, politiek en media. (Source: Wikipedia).

Appendix 4 – Research area B&O (Wadden Sea Area)



Appendix 5 – Elevation map of the Netherlands

Actueel Hoogtebestand Nederland (AHN)
met reliëf-schaduwwerking



Appendix 6 – Inventory

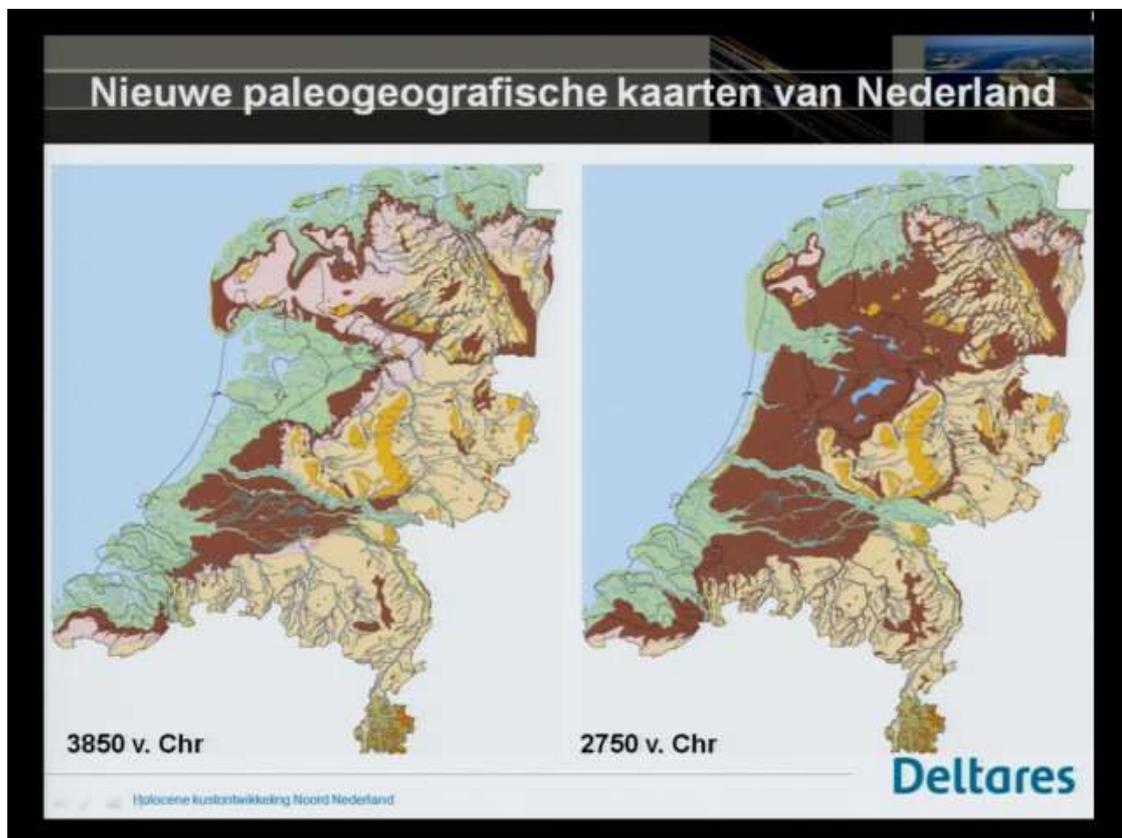
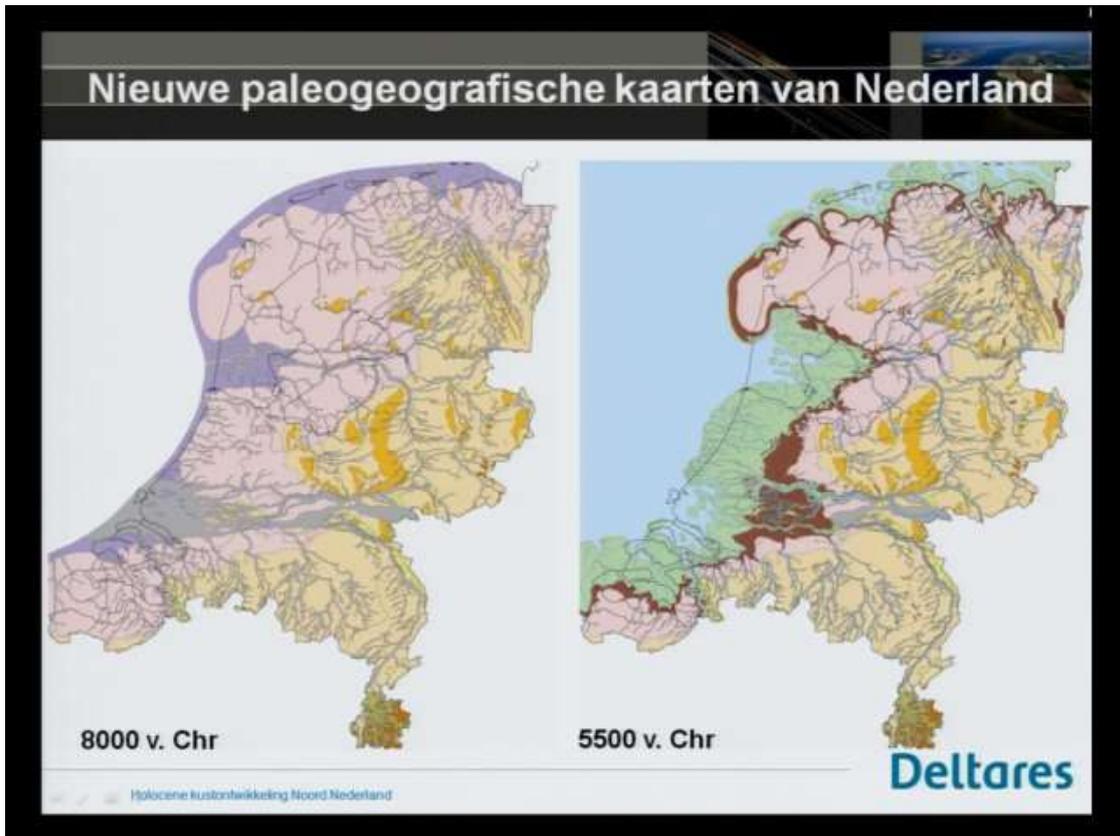
Appendix 6 – Inventory

Gemeente	Schriftelijke reactie	Interview	klimaatadaptatie in beleid (adaptatie plan)	Concreet adaptatieplan	Praktijk voorbeelden	Tel.	E-mail
Gemeente Ameland	nee	18-4-2012 zie verslag op wiki	nee	geen		(0519) 555 555	info@ameland.n
Gemeente Hollands Kroon	nee, 18/4 achteraan gebeld en email aan dhr Westra. 23/4 weer achteraan gebeld	16-4-2012 met de milieudienst, zie wiki	nee	geen		088 32 15 000	-
Gemeente De Marne	ja, 23/4 Rineke van der Wal. Zie mail	18-4-2012 zie verslag op wiki	nee	geen	mogelijk alleen bij Lauwersoog	(0595) 575 500	gemeente@dem
Gemeente Delfzijl	✘ 1/5 mail achteraan; zie mail 19/4		ja, zie samenvatting	nog niet (concept)		140596	gemeente@delf
Gemeente Den Helder	ja, 19/04 telefonisch	19-4-2012 zie verslag op wiki	ja, wel versnippert	geen		14 0223	klantcontactcent
Gemeente Dongeradeel	✘ maar nog niet inhoudelijk, zie mail 27/4		geen definitieve antwoord zie mail 27/4	onbekend		14 0519	gemeente@don
Gemeente Eemsmond	ja, zie mail 19/4		ja, maar nog in ontwikkeling	nog niet (concept)		(0595) 437555	algemeen@eem

Gemeente Ferwerderadiel	ja, 23/4 antwoord, zie mail		nee Zie reactie 23/4	geen		(0518) 41 88 88	info@ferwerderadiel.nl
Gemeente Franekeradeel	✘ 27/4, maar geen inhoudelijke antwoord nee, 23/4 achteraan gebeld en e-mail aan mevrouw. Groenewoud			onbekend		(0517) 380 380	info@franekeradeel.nl
Gemeente Harlingen	✘ zie kopie brief op wiki, maar nog geen inhoudelijke reactie; bellen na 1 mei met mw. Kremer	16-4-2012	nee, zie verslag	onbekend		(0517) 49 22 22	gemeente@harlingen.nl
Gemeente Het Bildt	ja zie 26/4 Gerben Haisma Medewerker Milieu Gemeente het Bildt 0518-409231 g.haisma@hetbildt.nl nee, 23/4 wel mee gebeld en nog een e-mail met vragen gestuurd aan heer Heisma		nee, zie mail	geen		(0518) 40 92 34	info@hetbildt.nl
Gemeente Oldambt	✘ e, 1/5& 23/4 achteraan gebeld en email aan Peter Hoeksema			onbekend		(0597) - 482 000	info@gemeenteoldambt.nl
Gemeente Schiermonnikoog	ja zie mail 18/4		nee	geen		(0519) 535050/ 058-2339050 (Milieuadviesdienst)	postbus20@schiermonnikoog.nl
Gemeente Súdwest Fryslân	27/4 freonlike groetnis		nee, niet concreet, mitigatie/adaptatie worden door elkaar gehaald, zie mail.	geen		(0515) 48 90 00	info@gemeenteswfw.nl

Gemeente Terschelling	✘e, 1/5 weer achteraan gebeld; 23/4 achteraan gebeld met Leo Bouwman, hij zal mijn mail van 18/4 alsnog beantwoorden			onbekend		0562 - 446 244	gemeente@terschelling.nl
Gemeente Texel	ja, zie mail 19/4	19-4-2012	nee	geen		14 0222	gemeente@texel.nl
Gemeente Vlieland	✘e, 1/5 achteraan gebeld, mw Weda is tot 8 mei met vakantie; 23/4 mail achteraan		onbekend	onbekend		0562-452700	info@vlieland.nl

Appendix 7 a – The Netherlands in 8000 BD – 2000 AD



Nieuwe paleogeografische kaarten van Nederland



Deltares

Nieuwe paleogeografische kaarten van Nederland



Deltares

Nieuwe paleogeografische kaarten van Nederland



Holocene kustontwikkeling Noord Nederland

Deltares

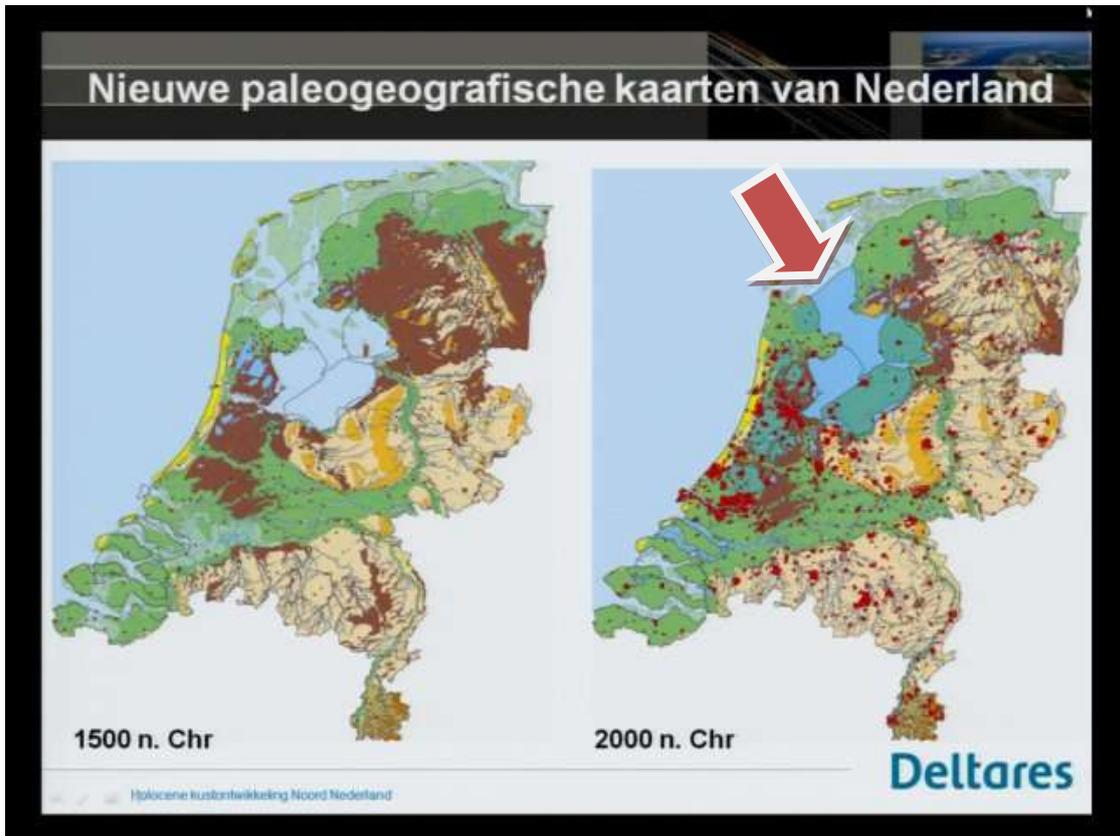
Nieuwe paleogeografische kaarten van Nederland



Holocene kustontwikkeling Noord Nederland

Deltares

Appendix 7 b – Anthropogenic effects



NB. As can be seen on the right, the afsluitdijk created a barrier for the Wadden Sea

Appendix 8 – Inspectie Leefomgeving en Transport



Andrei Fedorovski <andrei.fedorovski@gmail.com>

Klimaatadaptatie [Incident: 120416-000179]

2 berichten

ILT <ilt1@mailuk.custhelp.com>

23 april 2012 09:44

Antwoorden op: ILT <ilt1@mailuk.custhelp.com>

Aan: andrei.fedorovski@gmail.com

Heeft u aanvullende vragen of wilt u informatie toevoegen aan uw vraag?

Beantwoord dan dit bericht.

Onderwerp

Klimaatadaptatie

Discussiethread

Reactie Via e-mail (Inspectie Leefomgeving en Transport)

23/04/2012 09:44 VM

Geachte heer Fedorovski,

Het vervolgonderzoek voor klimaatadaptatie stond inderdaad geprogrammeerd voor 2010. Verandering van prioriteiten heeft ervoor gezorgd dat hier vanaf is gezien. Het vervolgonderzoek is dus niet uitgevoerd.

Heeft u nog vragen? Neemt u dan contact op met ons meld- en informatiecentrum.

Hoogachtend,

Meld- en Informatiecentrum

ILT/Handhavingsbeleid

Inspectie Leefomgeving en Transport

Nieuwe Uitleg 1 | 2514 BP | Den Haag

Postbus 16191 | 2500 BD | Den Haag

088 489 0000 (lokaal tarief)

www.ilent.nl

Klant Via webformulier (Andrei Fedorovski)

16/04/2012 04:27 NM

Geachte heer, mevrouw,

In 2009 heeft VI een studie gedaan "Doorwerking van klimaatadaptatie in ruimtelijke plannen". Volgens het activiteitenplan 2010 zou een vervolgstudie worden uitgevoerd. Mijn vraag is of het inderdaad is gebeurd en of er een rapport van beschikbaar is. Verder ben ik opzoek naar andere gerelateerde onderzoeken mbt dit thema binnen provincies en waterschappen.

Graag kijk ik uit naar uw reactie.

Met vriendelijke groet,

Andrei Fedorovski

(06-16547334)

[—001:001098:42799—]

Appendix 9 – Applied framework for transitionmanagement

1	2	3	4	5	6	
Visie+	Draagvlak+	Kennis+	Voordelen+	Middelen+	Actieplan+	➡Verandering
-	Draagvlak+	Kennis+	Voordelen+	Middelen-	Actieplan-	➡Verwarring
Visie+	-	Kennis+	Voordelen+	Middelen-	Actieplan-	➡Verzet/Sabotage
Visie+	Draagvlak+	-	Voordelen+	Middelen+	Actieplan-	➡Angst/Paniek
Visie+	Draagvlak+	Kennis+	-	Middelen-	Actieplan-	➡Weerstand
Visie+	Draagvlak+	Kennis+	Voordelen+	-	Actieplan-	➡Feliciteit
Visie+	Draagvlak+	Kennis+	Voordelen+	Middelen-	-	➡The Old way

Colophon

For more information about the thesis project, please visit:
waddenseaintimesofclimatechange.wikispaces.com

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