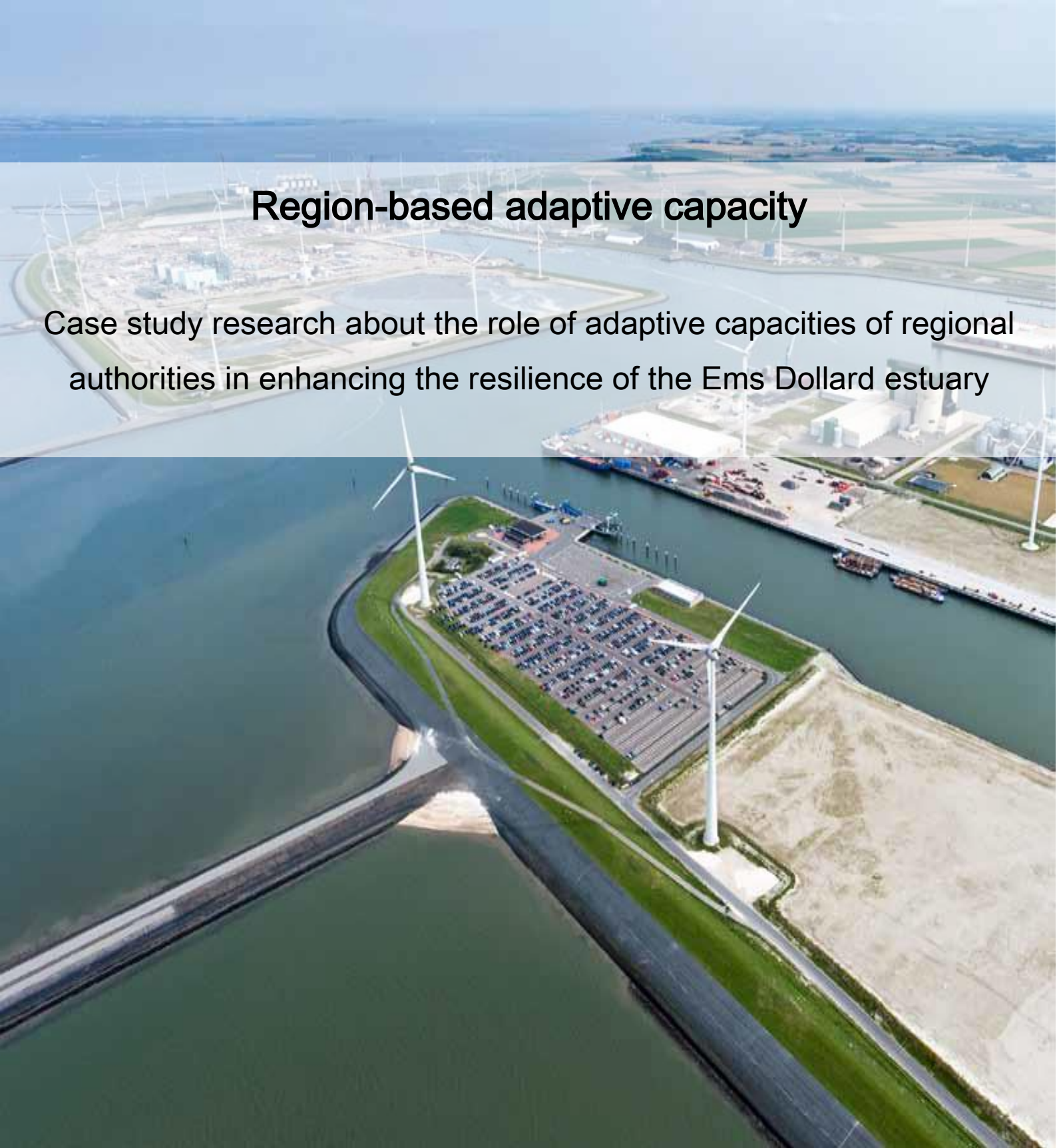# Region-based adaptive capacity

Case study research about the role of adaptive capacities of regional authorities in enhancing the resilience of the Ems Dollard estuary

Mirrijn van Eijk   MSc. Water and Coastal Management   Groningen, 31.07.2015

Title	Region-based adaptive capacity. Case study research about the influence of adaptive capacities of regional authorities in enhancing the resilience of the Ems Dollard estuary *Master thesis*	
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Voorwoord

Beste lezer,

Daar ligt hij dan, mijn masterscriptie, het eindresultaat van vijf jaar studeren. Ik heb de afgelopen jaren een grote persoonlijke ontwikkeling ondergaan waar ik in dit voorwoord graag bij stilsta. Laat ik beginnen bij het begin. Er liggen verschillende beweegredenen ten grondslag aan het afronden van mijn studie water management. Ik vergelijk de ontwikkeling die ik heb doorgemaakt dan ook graag met het verloop van 'mijn' rivier. Eigenlijk werd een studie water management mij bij de geboorte al in de schoot geworpen. Mir – Rijn, gebaseerd op het stroomgebied van de Rijn waarin ik ben opgegroeid. Tussen de natte veengebieden van het Groene Hart werd mijn interesse voor water via mijn ouders al op vroege leeftijd gewekt. Ook de discussies die ik met mijn opa, waterbouwkundig architect, over dit onderwerp (en vele andere onderwerpen!) kon voeren hebben bijgedragen aan de interesse in water. Kortom, de start van mijn carrière in de waterwereld werd gelegd bij de bron; het Tomameer nabij het Zwitserse Oberalppas.

De eerste jaren van mijn middelbare school kunnen getypeerd worden als de snelstromende beek vanuit de bergen naar het laagland. Eenmaal aangekomen in het laagland kon ik via de projectweek water in 5 VWO meer inhoudelijke kennis vergaren over water management op zowel kwantitatief als kwalitatief vlak. Mijn profielwerkstuk over de water kwaliteit voor en na een waterzuiveringsinstallatie vormde de afsluiting van mijn zeven jaar op het Kalsbeek College. Een roerige start kon ik afronden met een aantal rustig 'kabbelende' jaren. De Oberrhein, relatief rustig stromend tussen Basel en Bingen, typeert mijn bachelor opleiding Sociale Geografie en Planologie. Alhoewel het niet in mijn kunnen lag om hydrologie vakken te volgen kon ik mijn interesse voor de bodem en ondergrond toch tijdens een minor Aardwetenschappen verder ontwikkelen. Bij het zien van de machtig mooie afbeeldingen van natuurgeweld, waaronder overstromingen, wist ik zeker dat ik mijn master opleiding wilde gaan richten op watermanagement. Toch bleek het moeilijker dan gedacht om de juiste master opleiding te vinden. Ik stond voor een keuze; in Utrecht blijven waar ik net mijn leventje had opgebouwd of toch het onbekende achterna gaan en mijn buitenland ambities waar maken. Uiteindelijk heb ik voor het laatste gekozen alhoewel de consequenties van deze keuze mij meer hebben gedaan dan vooraf gedacht. Inmiddels is de Rijn aangekomen bij Bingen vanaf waar zij Mittel-Rhein is gaan heten. Alhoewel dit gedeelte van de Rijn vaak als romantisch wordt bestempeld, heb ik voornamelijk het eerste jaar van het Double Degree programma Water and Coastal management zwaar gevonden. Ik had moeite met het Duitse systeem van leren en, eerlijk is eerlijk, ik miste mijn familie, Michiel en vrienden. Toch heeft dit jaar mij ook mijn langgekoesterde wens om als skilerares te kunnen gaan werken mogelijk gemaakt. Op vrije dagen wandelde ik langs de Pillersee met zijn prachtig helder blauwe kleur en wist ik dat ik op de juiste weg zat. Na zes fantastische weken ben ik vol nieuwe energie begonnen aan het tweede semester, eindelijk kon ik het romantische karakter van de Mittel-Rhein omarmen. Uiteindelijk stroomt de Mittel-Rhein over in de Nieder-Rhein, de fase waarin ik mij nu bevind. De Rijn is een brede rivier geworden, nog een aantal lastige obstakels zullen er overwonnen moeten worden maar de delta is in zicht. Zo sta ik ook in dit laatste master jaar. Het besef dat studeren straks echt over is en tegelijkertijd de onzekerheid wat er hierna gaat komen. Toch heb ik door mijn stage bij de Provincie Groningen niet lang kunnen nadenken over dat eerste, ik was het afgelopen jaar druk druk druk. Een stage naast het volgen van vakken op de universiteit bleek veel energie te kosten. Met name de periode Februari – April van dit jaar waren zwaar. Toch heeft de rivier zijn loop hervonden, met een afgeronde master thesis die hier nu voor u ligt.

Dat ik uiteindelijk een scriptie heb geschreven waarmee ik mijn studie kan afsluiten heb ik te danken aan heel veel mensen. Als allereerste wil ik de Provincie Groningen bedanken voor de mogelijkheid die zij mij hebben geboden om ruimte te creëren voor een stageplek. Door deze stageplek heb ik veel respondenten kunnen bereiken via de contacten van collega's en de vele vergaderingen die ik heb kunnen bijwonen. Zo belandde ik van Bad Nieuweschans in Den Haag en van Zwolle in Delfzijl. In het bijzonder wil ik David Kooistra, Peter de Vries en Diederik van Dullemen bedanken. Alle drie hebben zij mij op een andere manier begeleid in mijn denkproces voorafgaand aan het tot stand komen van deze thesis. Daarnaast wil ik alle respondenten bedanken voor hun tijd en deelname aan een interview, in het bijzonder ook omdat velen van jullie bereid zijn geweest naar Groningen te komen zodat ik niet het hele land door hoefde te reizen.

Vanuit de Rijksuniversiteit Groningen heb ik erg goede feedback en begeleiding ontvangen van Elen-Maarja Trell. Waarbij ik in het begin wat onzeker was over het verschil in gebruik van methoden tussen de drie verschillende universiteiten waaraan ik inmiddels gestudeerd heb, heeft zij deze onzekerheid weggenomen door tijd en aandacht te vestigen op voor mij 'nieuwe' werkwijzen. Elen, heel erg bedankt voor je begeleiding en steun in mijn denkproces.

Zoals ik al aangegeven heb, heb ik de afgelopen jaren een enorme ontwikkeling ondergaan. De verhuizing uit Kamerik naar Utrecht, de verhuizing vanuit Utrecht naar Oldenburg en uiteindelijk de verhuizing van Oldenburg naar Groningen. Als ik hierop terug kijk ben ik mijn ouders en zus enorm dankbaar voor de mogelijkheden die zij mij gegeven hebben en dat zij waar ik ook woonde mij steeds weer op zijn komen zoeken. Meerdere malen zijn er snikken en tranen geweest als ik na het weekend weer terug ging van Kamerik naar elders. Toch hebben onder andere deze verhuizingen van de afgelopen jaren mij gemaakt wie ik ben en daar ben ik jullie erg dankbaar voor. Daarnaast wil ik Michiel, mijn vriend, heel erg bedanken voor zijn altijd luisterend oor, de nodige afleiding en zijn continue steun. Het was niet altijd gemakkelijk communiceren met mij het afgelopen halfjaar. Ik ben je daarom heel dankbaar voor je geduld en, al was het af en toe verre van leuk om te horen, de feedback die je op de laatste versies van deze thesis hebt gegeven. Pap, mam, Jorna en Michiel; ik ben jullie een etentje verschuldigd!

De Nieder-Rhein heeft inmiddels haar delta gevonden. Een nieuw moment waarin keuzes en uitdagingen nog openliggen; de Waal? de IJssel? de Lek? De eerste uitdaging heeft zich al voorgedaan. Vanaf 1 september ga ik aan de slag als junior proces en project manager land en water bij P2 projectmanagement. Alhoewel het managen van processen de komende jaren centraal zal staan in mijn werkzaamheden, richt ik mij hier nog even op het behalen van een resultaat. Wat ben ik blij dat ik het resultaat van vijf jaar studeren hier aan u kan presenteren!

Ik wens u veel plezier met het lezen van mijn scriptie.

Mirrijn van Eijk

Groningen, 31 juli 2015

Abstract

This study deals with the adaptive capacities of regional authorities in enhancing the resilience of the Ems Dollard estuary. In order to assess the adaptive capacities of regional authorities in the Ems Dollard estuary a new concept has been developed, region-based adaptive capacity. The relevance of having such a region-based adaptive capacity is influenced by shifts in planning practice. From the 1990s onwards a shift in planning practice can be observed from a technical rationale towards a communicative rationale. At the same time shifts can be observed from government towards governance. Governance gives society the ability to influence- and be part of decision making processes. However this also leads to a multiplicity of actors at different levels involved in decision making processes. Together with this shift, policymakers have acknowledged the fact that there are situations that are unknown unknowns. These uncertainties have to be carefully taken into account in policymaking processes. A concept broadly discussed in literature that takes into account uncertainties, is resilience. In order to say something about resilience the adaptive capacities of authorities can be assessed. However, adaptive capacity is country- and context specific. Therefore the concept of region-based adaptive capacity is developed and conceptualized in this study based on the Ems Dollard estuary. The Ems Dollard estuary is an estuary situated in the northeast of the Netherlands and in the northwest of Germany. The quality of the ecosystem is low and therefore measurements to improve the ecological quality of the ecosystem are necessary. At the same time the estuary needs to be accessible for cargo ships and vessels heading to the harbors of Delfzijl, Ems harbor, Papenburg and Emden. In order to see whether these two interests can go together, this study assesses the adaptive capacities of regional authorities by using a region-based adaptive capacity wheel. The assessment results in a slightly negative region-based adaptive capacity. It turns out that the adaptive capacities of regional authorities influence the resilience of the Ems Dollar estuary. Furthermore the study formulates recommendations based on the assessed weaknesses of region-based adaptive capacity in the Ems Dollard estuary. The best way to make the Ems Dollard estuary more resilient seems to set up an Ems Dollard Commission that has the power and mandate to bend the current weaknesses in adaptive capacities into strengths.

Keywords: Shifts in planning practice, modes of governance, dealing with uncertainties, resilience, region-based adaptive capacity, case study research, Ems Dollard

Samenvatting

In de afgelopen jaren hebben er verschillende verschuivingen plaatsgevonden in het domein van de planologie. Deze verschuivingen hebben betrekking op hoe er wordt omgegaan met het managen van de ruimtelijke omgeving. Het wordt steeds duidelijker dat management niet alleen gebaseerd kan zijn op het aansturen van beleid van hogerop. Een verschuiving kan daarom worden opgemerkt in overheidstaken die voorheen op het nationale niveau werden aangestuurd en nu door provincies en lagere overheden worden uitgevoerd. Dit is ook van toepassing op hoe watermanagement en natuurontwikkeling worden vormgegeven. Waarbij voorheen de nationale overheid belast was met deze taken, spelen provincies hierin nu een grotere rol. Dit is met name het geval bij natuurontwikkelingsprojecten. Waterveiligheid blijft naast een regionale taak ook een taak voor de nationale overheid. Echter, de verschuiving zit hem in het feit dat er nu een grotere samenwerking plaatsvindt tussen nationale-, regionale- en lokale overheden op deze beide beleidsterreinen. (Van Schendelen, 1997; Pahl-Wostl, 2009)

Deze verschuiving in verantwoordelijkheden vraagt om nieuwe manieren van management. Daarnaast krijgen beleidsmakers te maken met onvoorziene situaties. Situaties waarvan tot op heden niet duidelijk is dat een dergelijke situatie kan plaatsvinden Vooral met het oog op klimaatverandering zullen beleidsmakers in hun beleidsvoering rekening moeten houden met onzekerheden. Een veelbelovend concept dat rekening houdt met deze onzekerheden is resilience. Resilience kan worden beschreven als de veerkracht van een gebied en wordt verdeeld in robuustheid, adaptiviteit en de mate waarin een systeem kan veranderen. Een maat om betekenis te geven aan de resilience van een gebied is door de adaptieve capaciteit van een gebied te meten. Daarmee richt adaptieve capaciteit zich op de mate waarin een systeem de mogelijkheid heeft om zich vooraf voor te bereiden op spanningen en veranderingen, zodat het kan reageren op de effecten die een dergelijke spanning of verandering kunnen veroorzaken. (Smit et.al. 2001 as cited by Engle, 2011, p. 647)

In dit onderzoek is gebruik gemaakt van een literatuurstudie, het bijwonen van vergaderingen en interviews om tot een antwoord op de volgende onderzoeksvraag te komen: Wat is de rol van adaptieve capaciteiten van regionale autoriteiten in het nastreven van een veerkrachtig Eems Dollard estuarium en hoe kan een dergelijke regio gebaseerde adaptieve capaciteit gemeten worden? De literatuurstudie is gebruikt om de relevantie van het hebben van een set aan indicatoren voor regio gebaseerde adaptieve capaciteit vorm te geven en te onderzoeken. Vervolgens zijn de bijgewoonde vergaderingen en de eerste twee interviews in het kader van dit onderzoek gebruikt om de indicatoren van regio gebaseerde adaptieve capaciteit vast te stellen. De overige interviews zijn gebruikt om de regio gebaseerde adaptieve capaciteit van het Eems Dollard estuarium te meten en om te kijken hoe er het beste met het resultaat van deze meting omgegaan kan worden. Het is belangrijk te vermelden dat deze studie zich alleen heeft gericht op de regionale adaptieve capaciteit van Nederlandse autoriteiten in het Eems Dollar gebied. Duitse autoriteiten zijn dus niet meegenomen in het onderzoek.

Uit de interviews kan worden geconcludeerd dat de regionale adaptieve capaciteit van het Eems Dollar gebied laag is. Het Eems Dollard estuarium heeft te kampen met een moeizaam besluitvormingsproces omdat het niet voldoende duidelijk is welke organisatie er voor welke activiteit verantwoordelijk is. Dit leidt ertoe dat er niet voldoende financiële middelen aan het gebied worden toegekend zodat echt grote maatregelen om de kwaliteit van het ecosysteem te verbeteren ontbreken. Tegelijkertijd zorgt deze mozaïek in verantwoordelijkheden ervoor dat verschillende organisaties steeds opnieuw hun eigen visie over het gebied opschrijven zodat visies niet aan elkaar gekoppeld zijn en de concretisering van plannen achterloopt. Tevens zorgt dit ervoor dat er weinig lering

wordt getrokken uit eerdere beleidsvormingsprocessen met betrekking tot het Eems Dollard gebied. Daarnaast is er aan de respondenten gevraagd hoe zij tegen verschillen in werkcultuur aankijken tussen de alle autoriteiten die iets te zeggen hebben in besluitvormingsprocessen in het Eems Dollard estuarium en binnen autoriteiten zelf. Het blijkt dat men goed op de hoogte is van de verschillen in werk cultuur en dat dit niet direct leidt tot miscommunicaties of een verminderde uitwisseling van kennis. Wat echter opvallend is, is dat de respondenten aangeven dat er in veel gevallen nog steeds met name wordt gericht op het eigen belang waardoor rijksbeleid nog steeds zeer sectoraal wordt opgesteld en uitgevoerd.

De adaptieve capaciteiten van regionale autoriteiten in het Eems Dollard gebied beïnvloeden de veerkracht van het Eems Dollard gebied. Om de veerkracht van het gebied te verhogen zal er dus moeten worden gefocust op de indicatoren en meeteenheden die zwak scoren in de beoordeling van de regionale adaptieve capaciteit in het Eems Dollard estuarium. Een mogelijkheid om tegemoet te komen aan de zwak scorende indicatoren en meeteenheden is het oprichten van een Eems Dollard commissie met mandaat en een duidelijk leider. Leiderschap is van groot belang om acties te ondernemen en een visie te ontwikkelen voor de toekomst. Dit zijn op dit moment missende elementen in het gebied. Alhoewel deze studie zich alleen heeft gericht op de regionale adaptieve capaciteiten van autoriteiten aan de Nederlandse zijde van het Eems Dollard estuarium, moge het duidelijk zijn dat wanneer er ingezet wordt op het verhogen van de veerkracht van dit gebied, er ook samengewerkt dient te worden met Duitsland. De Eems Dollard Regio (EDR) zou hierin een verbindende rol kunnen spelen omdat zij de kennis en mogelijkheden hebben om autoriteiten van zowel Nederlandse zijde als Duitse zijde met elkaar te laten communiceren.

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1   Introduction

In the Netherlands the centre-right government under the leadership of Prime Minister Mark Rutte decided in 2011 that, among others, nature conservation and water management responsibilities needed to be transferred to provincial councils. This process took place at the background of an ongoing process of decentralization. The current centre-left government, also under the leadership of Prime Minister Mark Rutte, states that provincial councils and local authorities are better able to coordinate practical policy delivery and hence do more for less money. (coalition agreement, 2012 as cited by De Haan et.al., 2014) These changes in responsibilities of regional authorities very well relate to what is written in literature about shifts in water management and nature conservation practices.

Environmental policy in the late 1960s and 1970s was dominated by the state as the originator of policy and industry. This focus generally shifted towards a second phase in which additional groups such as environmental organizations and media, joined the policy field of environmental issues. During this phase actor groups started to interact with each other. (Jänicke & Jörgens, 2004) The main reason for this is that a traditional 'command and control' approach of governing started to be influenced by a communicative turn in planning practice. (De Roo, 2007) In the 1980s this shift was manifested in the form of protests, while in the 1990s a cooperation between environmental NGOs and big businesses started to develop. This finally resulted by the end of the 1990s in a shift of practice in which environmental policy institutions became also apparent in other policy fields in order to slowly integrate environmental policy into other domains. (Jänicke & Jörgens, 2005) The protection of the environment thus typically evolved from a 'command and control' approach that was mainly focused on a response to specific environmental problems. This reactive response has been very successful when it comes to issues related to air and water pollution because the regulations for environmental improvement were able to address the so-called 'low hanging fruit'. However, more difficult environmental challenges such as cross-boundary water disputes and climate change are much more difficult to deal with from a 'command and control' approach of managing. (Garmestani et.al., 2009) An additional challenge can be found in the fact that most rivers flow throughout different regions and cross border(s), this means that countries situated downstream, or in the delta of different rivers, will face problems with polluters of the river upstream. (Li & Scullion, 2006) This is precisely the case in the Ems Dollard estuary. The Ems Dollard estuary, situated in the northern part of the Netherlands at the border between the Netherlands and Germany, is one of the four biggest estuaries of the Dutch Delta together with the Scheldt, Meuse and Rhine. Geographically seen, the river Ems is German territory whereas the biggest part of the Dollard is Dutch territory. However, the Ems river is the main polluter of the Ems Dollard estuary whereas the Dollard is less polluted than the Ems river.

Since 1980 the Wadden Sea and the surrounding coastline have been formally classified as a nature reserve. This classification resulted in a statutory protection of the region. The main objective of the protection policy is defined as *'the long term protection and development of the Wadden sea as a nature conservation area and the preservation of its unique open landscape'.* (Ministry of Housing, Spatial Planning and the Environment, 1980 as cited by de Haan et.al., 2014) In 2007 the Ems-Dollard estuary was added to the Wadden sea area as a protected Nature 2000 region. Nature 2000 is the name of a European network of nature areas in which valuable plant- and animal species live and interact with each other. (Rijkswaterstaat, 2015) The Wadden Sea as Nature 2000 area is part of this broader European network because of the many nature values it houses. By being part of this network

the Wadden Sea contributes to the preservation of biodiversity on national as well as European level. (Rijkswaterstaat, 2012) The Ems Dollard estuary however receives much attention nowadays. (De Jonge, 1983 & 2000; van der Welle & Meire, 1999; Raad van de Wadden, 2010 as cited by Bos et.al., 2012) Main changes in the estuary are reported in the dynamics of the tide, the turbidity on primary production, impact on the transition from salt- to freshwater, impact on habitats of species and ecosystem services. (Royal Haskoning, 2014) One of the biggest problems for the ecosystem is the deepening of the estuary in order to get good access to the harbours upstream and, as a result, the overload of silt. The Ems forms the entrance to the harbours of Delfszijl with its chemical industry, the fast developing Ems harbour (both situated in the Netherlands) and the harbours of Papenburg and Emden (situated in Germany). These harbours require a good accessibility for cargo ships and vessels. (Dirkx et.al., 2011) The balance between economic development and nature conservation asks for comprehensive management of the estuary. Since 2010 the Ministery of Economic Affairs (Ministerie van Economische Zaken) and the Department of Public Works (Rijkswaterstaat) work together with Germany to develop an Integral Management plan Ems; the Natura 2000 management plan (Natura 2000 beheersplan). The aim of this collaboration is developing a shared vision between the Netherlands and Germany about the future of the Ems Dollard estuary. (Rijkswaterstaat, 2015) The Integral Management Plan aims to take into account the whole estuary including all interests and stakeholders. Measures are described keeping in mind a good balance between ecology and economy. (Dienst Landelijk Gebied, 2012)

It is likely that in the future a further increase in human activity will occur in the Wadden Sea area, including the Ems-Dollard estuary. These activities relate to the expansion of gas production, the construction of offshore wind parks and the extension of the Ems harbor. (De Haan et.al., 2014) However, because of a shift from government to governance, awareness of people about the consequences of economic expansion for nature not only arises, it gives people also the chance to make critical assumptions. (De Roo, 2007; Gerrits et.al., 2012) This discourse from government to governance implies a change in thinking about policy processes. Instead of one single decision making authority with sovereign control over people and the environment, current situations show multi-level, polycentric governance arrangements in which many actors contribute to policy development and the implementation of such policies. (Maynz, 2006 as cited by Pahl-Wostl, 2009) Governance is therefore referred to as regimes that are characterized by self-organization, emergence and diverse leadership. (Pahl-Wostl, 2009) However the situation related to the Wadden Sea area is highly unusual because thirteen separate managing authorities (both central as well as local authorities and private-sector managers) on the Dutch side of the estuary have a task and responsibility in the area. (De Haan et.al., 2014) In 2004 the advice commission Meijer reported that due to the complicated organizational structure of the Wadden Sea area, it is hard to develop measurements to improve the ecological status of Wadden sea region. Van Es, 2012) There are too many directors and there is no integral policy that has formulated a clear vision and step by step approach in which nature conservation and economy are well balanced. The various types of management activities all affect and encroach each other. A clear form of supervision, coordination and cooperation is needed but unfortunately this is precisely what is missing. There is hardly any coordination of management activities. (De Haan et.al., 2014)

The angle of incidence to explore the above described shifts in responsibilities of Dutch authorities and its consequences on policy making, is via the concept of resilience. A common approach to evaluate the resilience of an area is to assess its adaptive capacity. (Engle, 2011) In order to operationalize adaptive capacity, researchers often chose for indicators. The great advantage of indicators is that they provide a relatively simple tool to combine area specific features and developments, and information about the socioeconomic situation of an area. Moreover indicators, when formulated comprehensively, are not difficult to understand which makes it easier to

communicate the results of a study and critically reflect on the specific situation. (Schneider et.al., 2014) Against this background, the aim of this study is twofold. First, the study aims to develop a comprehensive tool to assess region-based adaptive capacity. Second, the developed tool is used to asses region-based adaptive capacity in the Ems Dollard estuary in order to give insights into what the role of adaptive capacities of regional authorities on the Dutch side of the estuary are in enhancing the resilience of the Ems Dollard estuary.

1.1   Problem statement

The ecological status of the Ems Dollard estuary is alarming, while at the same time the Ems Dollard estuary is of great importance for the development of economic activities. These, at first sight, contrasting activities need to be balanced in order to improve the ecological status of the Ems Dollard estuary as intended when the estuary was added to the list of Natura 2000 areas. (Rijkswaterstaat, 2015) However, there are already thirteen managing authorities in the Wadden sea area on the Dutch side of the border that all have an opinion about the future of the Ems Dollard estuary. This has, up till now, not lead to a shared vision in which responsibilities per authority are clearly defined. Furthermore, there is hardly any coordination of management activities in the Ems Dollard estuary. (De Haan, et.al., 2014) By assessing region-based adaptive capacity of the Ems Dollard estuary, insights can be given about the role of adaptive capacities of regional authorities in enhancing the resilience of the area. In this study it is assumed that when regional authorities on the Dutch side of the Ems Dollard estuary collectively have a higher level of adaptive capacity, then the region is more resilient. Being resilient in this study means that regional authorities are able to cope with conflicts between ecology and economy in the Ems Dollard estuary and that they are able to define a step by step approach to achieve the intended balance between ecological and economic activities in the estuary.

1.2   Research objective

This study aims to develop a comprehensive tool to assess region-based adaptive capacity and, then, uses this tool to assess region-based adaptive capacity in the Ems Dollard estuary. Related to this objective, a main research question and sub-questions are formulated.

The main research question is:

What is the role of the adaptive capacities of regional authorities in enhancing the resilience of Ems Dollard estuary and how to assess such region-based adaptive capacity?

1. Why are adaptive capacities necessary for a region?

2. How do adaptive capacities influence or enhance the resilience of a region?

3. How can the adaptive capacity of a region be measured based on available theories?

4. How can region-based adaptive capacity be understood and conceptualized?

5. What is the region-based adaptive capacity of the Ems Dollard estuary?

1.3   Research approach

This study makes use of an adaptive capacity wheel developed in this study to assess region-based adaptive capacity. After setting the framework, the indicators that are defined for region-based adaptive capacity are

assessed. The design and structure of the adaptive capacity wheel (Gupta et.al., 2010) are used to communicate the results to the reader. The indicators for region-based adaptive capacity are formulated after participation in meetings with decision making authorities in the Ems Dollard estuary and interviewing. The indicators for region-based adaptive capacity are then assessed via interviews and are given colours. A big advantage of the adaptive capacity wheel is that the wheel draws the attention to how a set of stakeholders is working in a specific field. (Van den Brink et.al., 2014) In this study, the wheel is used to draw the attention to adaptive capacities of regional authorities in the Ems Dollard estuary.

Furthermore it is important to note that the researcher was part of an organization, namely the Province of Groningen, during the research. A part of the data collected for this research was only accessible because the researcher worked at the department of Rural Affairs and Water, for a period of nine months. Therefore this study concludes with recommendations for the Province of Groningen with regard to managing possibilities for a balance between ecology and economy in the Ems Dollard estuary.

1.4   Relevance

According to Borowski et.al. (2008) multi-level and multi-actor water regimes are particularly complex because of the interaction between newly established organizations, in the realm of the shift to governance, and traditional ones. Such situations prove to be a barrier for the implementation of integrated management approaches and they may lead to unnecessary complex situations. (Borowski et.al., 2008 as cited by Pahl-Wostl, 2009) Due to the growing importance of networks and globalization, from the 1990s onwards shifts in planning practice can be observed. For a long time the national government influenced policies of regional and/or local scale. However, nowadays a shift can be observed into the direction of governance instead of government. This shift resulted in decentralization activities. More and more activities are now performed by regional- and local authorities instead of national governments. In the meantime, an additional complicating factor has occurred. Decision makers face deep uncertainties with regard to future conditions that form the basis against which policies need to be designed. These uncertainties can for example be found in the field of policies that have to take into account climate change, population growth and economic developments. (Haasnoot et.al., 2014) Uncertainties about the future can influence the way authorities react on future policy plans regarding a specific policy field. With the shift from government towards governance, more actors are now involved in policy making processes. When doing research in a specific area, it is nowadays more a fact than an exception that you have to take into account the multi-actor situation. Unfortunately this multi-actor situation often results in a high diversity in views and responsibilities within one and the same area. This could lead to clashes between different authorities because of the differences in interests among them. Therefore it is important to investigate what the relation between region-based adaptive capacity and the resilience of an area is. Investigating region-based adaptive capacity could lead to a set of indicators that can partly be applied in multiple regions when investigating the resilience of such an area. Only partly because adaptive capacity is highly country and context specific. (Tol et.al, 2008)

The Ems Dollard estuary is used in this study because the estuary is a perfect example of a region in which managing authorities are struggling with their position because more and more tasks are transferred to lower governments. Moreover, the estuary deals with ecological problems with regard to its turbidity and the high amount of silt whereas at the same time the harbours in the Ems Dollard estuary continue to grow. Here the multiplicity of actors comes into play. All these various types of management activities and visions affect and encroach each other. However a clear form of supervision, coordination and cooperation is missing whereas this is exactly what the Ems Dollard estuary needs in order to become resilient. (De Haan et.al., 2014)

1.5   Research outline

This study starts in chapter two with a theoretical framework in which the following topics are discussed in more detail; dealing with uncertainties, the link between resilience, vulnerability & adaptive capacity, indicators for adaptive capacity and adaptive governance.

The third chapter consists of the methods used in this study based on a step by step approach for the assessment of adaptive capacity described in chapter two.

In the fourth chapter the results of this study are discussed and communicated to the reader. The first part consists of an explanation of the indicators for region-based adaptive capacity which results in a region-based adaptive capacity wheel. The second part of the chapter communicates the results of the assessment of region-based adaptive capacity in the Ems Dollard estuary.

The fifth and final chapter starts with answering the sub-research questions in order to answer the research question of this study. Furthermore, based on the results recommendations are given related to the results of the assessment. These recommendations very much relate to adaptive governance and how this could be designed in the Ems Dollard estuary. The chapter concludes with a critical reflection on the research done.

For a long time planners have assumed that controlling the physical environment on the basis of technical, instrumental and procedural expertise was the way to go. (Friedman, 1987; Meyerson and Banfield, 1955 as cited by De Roo, 2007) Functionality was the key word. Planners were judged upon their technical, instrumental and procedural expertise. (De Roo & Rauws, 2011 as cited by Gerrits et.al., 2012) However, studies have reported that this absolute control, which is founded on theoretical- and science based grounds, has led to outcomes that are impractical to work with. Moreover, this traditional planning system has forced various actors into a role that is inconvenient for the prevailing institutional system. This situation resulted in a steady rise of actions towards institutional change in the direction of hybrid governance systems in which different governance models were included. These governance models have coordinative, competitive and communicative roots. (De Roo, 2007) This steady shift in planning practice can be dated back towards the 1990s in which the importance of networks and globalization became clear, modes of delivery changed and societal and democratic protests became common practices. The response to these changes was an increased interest in open planning processes. (Gerrits et.al., 2012; Van Ast, 1999) More and more the shift from technical- towards a communicative rationale became apparent. (De Roo, 2007) Together with the shift from a technical towards a communicative rationale, a shift from government towards governance can be observed. Government can be considered as bureaucracy, legislation, financial control, regulation and force. Governance, by contrast, is characterized by a growing use of non-regulatory policy instruments such as new forms of governance. These new forms of governance are developed and proposed by non-state actors. (Jordan et.al., 2005) According to Zito et.al. (2003) there are many 'new' policy instruments which are used by non-state actors. Examples of instruments are benchmarking, co-regulation, voluntary codes of conduct and negotiated agreements. (cited by Jordan et.al., 2005)

The context of this study can thus be found in shifts in planning practice. This shift results in decentralization activities, multi-level & multi-level situations and differences in interests, all within one area. Moreover we have seen in the introduction that policy makers have to deal with more and more uncertainties related to the development of policies. Therefore this chapter starts with an exploration how these uncertainties are conceptualized in literature and ways to deal with these uncertainties. This brings us to the concept of resilience and adaptive capacity. Resilience is discussed here in the framework of this study and is used to develop a concept that can be used to assess adaptive capacities of regional authorities. Such a region-based adaptive capacity concept is of relevance because the indicators for adaptive capacity are not universal and vary among countries and contexts. It is therefore important to identify what the building blocks of region-based adaptive capacity are in order to identify what the barriers and limitations to adaptation in a specific context are. (Adger et.al., 2009 as cited by Engle, 2011) The chapter concludes with a conceptual model, aimed to explain the relations between developments and concepts described in this chapter and to connect them to the case under study; the Ems Dollard estuary.

2.1   Dealing with the unknown-unknown

The notion of uncertainty is an important context factor in defining adaptation problems in the near- or longer future. This has to do with the fact that complex systems that have the capacity to evaluate, always tend to evolve

towards the edge of chaos to operate at a maximum efficiency. (Garmestani et.al., 2009) However, whereas a system itself can already be complex, it becomes even more complex when the problems a system could possibly deal with are unknown. Problems can be categorized as known-unknowns and unknown-unknowns. The first category describes a 'problem' which is familiar to humans but unpredictable when it occurs. The second category relates to 'problems' which are completely unforeseen until they happen. Such 'problems' will always come as a surprise and one needs to be aware of this fact in order to accurately react once it happens (fig. 1). Traditional command and control practices are not effective and can make things even worse when related to these unknown- unknowns. (Termeer & Van den Brink, 2013) Such a 'command and control' approach would mean that policies follow a specific line of reasoning assisted by a step by step approach to achieve an end goal. However, situations that seem predictable at first sight could eventually develop in an unforeseen direction. A policy formulated via a 'command and

Fig. 1 How to deal with the unknown-unknown; a matter of dealing with it?! (Josh Handling, 2010)

control' approach then, does not have a factored space left in the policy aimed at adapting to the unknown situation. In order to be better prepared for unknown-unknowns better forecasting models, advanced risk management tools and adaptive adjustments are needed although they do not suffice. Moreover it is important that, instead of predicting and controlling the environment, a shift takes place into the direction of more realistic commitment approaches to risk and uncertainties. Such a new approach tends to really take surprises seriously. (Termeer & Van den Brink, 2013) Taking surprises seriously means that the hypothesized future(s) are different form that what happens. When a plan is made keeping in mind only hypothesized future(s), the plan itself is likely to fail. In most cases policymakers learn and respond to the new situation by adapting their plans ad hoc. The difference with focusing policy on adaptation is not only determined by what is known or anticipated at present, but also by what is experienced and learned as the future unfolds and by the policy responses to these events. (Haasnoot et.al., 2013) Although policy analysts and strategic planners are aware that they are facing deep uncertainties or unknown unknowns, most of them still develop plans based on the assumption that the future can be predicted.

Before explaining the concept of resilience it must be clarified on what system resilience focuses upon in this study. Although resilience originates from the natural sciences, the concept increasingly includes human contributions to the dynamics of a system. Therefore the focus shifts more and more in the direction of Social Ecological Systems (SES). (Walker et.al., 2006 as cited by Engle, 2011) Ecosystems are of great importance to humanity because the services provided by ecosystems are of great value in the daily rhythms of humans. (Folke et.al., 2002) However the human element in ecosystems is the one which causes most changes, therefore it makes sense to not only focus on the natural resilience of an ecosystem but also on the human component within the resilience of an ecosystem. The environmental- and the human component are put together when studying Social Ecological Systems. Berkes and Folke (1998) were the first using the term social-ecological in order to put an emphasis on the integrating concept of humans within natural ecosystems. By integrating the human- and natural component, Berkes and Folke (1998) could address the fact that the delineation between social and ecological systems is artificial and arbitrary. (Folke et.al., 2005) Social Ecological Systems are in a constant flux.

Normally ecosystems respond to gradual change but sometimes drastic unpredictable changes occur. These changes often refer to the above described (un)known unknowns. It is therefore of particular relevance to find a way to, despite they are unknown-unknown, cope with these uncertainties. This brings us to the concept of adaptation which forms the basis of the resilience concept described in the next paragraph.

2.2   Adaptation, resilience and adaptive capacity

Adaptation receives much attention nowadays when it comes to reinventing spatial planning. This attention relates to the fact that a shift can be observed from government to governance. While at the same time policy makers have agreed upon the fact that that not everything is predictable. (Restemeyer et.al., 2014) The emphasis has thus shifted from mastering uncertainties to accepting uncertainties and adjusting along the way. (Restemeyer et.al., 2014) The awareness with policy makers that uncertainties need to be accepted and adjusted along the way, can be traced back to resilience literature. However, before explaining the concept of resilience it is important to shortly describe what the point of departure of the resilience concept is; adaptation.

2.2.1 What is adaptation?

The roots of the application of the term adaptation to human systems can be traced back to the anthropologist and cultural ecologist Julian Steward. Julian Steward used the word 'cultural adaptation' to relate regional societies to the natural environment. (Smit & Wandel, 2006) In the eyes of anthropologists and archaeologist, adaptation is a consequence of selection which relies on variation through cultural practices (adaptations). From a historical perspective, these adaptations allow a culture to survive. (Smit & Wandel, 2006) Early adaptive plans focused on the ability to change plans based on new experiences and insights whereas nowadays adaptability focuses more on flexibility in terms of keeping options open. Adaptation strategies emphasize the fact that ecosystems evolve in a rather non-linear way. Therefore adaptation strategies need to respond to partly uncertain developments. The notion of uncertainty is therefore an important context factor in defining adaptation problems in the near- or longer future. Moreover adaptability needs to be seen as an indicator to evaluate the robustness of strategies under uncertainty. (Haasnoot et.al., 2013) Adaptation itself needs to be seen as a very broad process. This process can be categorized according to, for example, who or what adapts and the timing of adaptation. (Smit et.al., 2001 as cited by Tol et.al., 2008) This study embraces the following definition of adaptation:

Adaptation refers to a process, action or outcome in a system in order for the system to better cope with, manage or adjust to some changing condition, stress, hazard, risk or opportunity. (Smit & Wandel, 2006, p. 282)

2.2.2 Resilience thinking

Now that a definition for adaptation related to this study is given, a next step can be made by explaining the resilience concept. The basic argument of a resilience approach can be found in the following statement: Each major environmental or social perturbation alters the human-environment relationship that results in the development of a new balance. (Gunderson & Holling, 2002 as cited by Berkes & Turner, 2006) The Social Ecological System (explained in the paragraph 2.2) therefore needs to be seen as an integrated and multi-equilibrium system in which social-ecological relationships are dynamic and cyclical. (Berkes & Turners, 2006) Although resilience has its origins in the ecology it has now widely been used in the realm of social systems and Social Ecological Systems. (Gallopin, 2006) However, resilience is not a concept on its own and links with vulnerability literature and adaptive capacity. These concepts are interpreted differently (see for instance Adger, 2006; Folke, 2006; Smit & Wandel, 2006), therefore Gallopin (2006) made an attempt to link these concepts to

each other. In order to understand were region-based adaptive capacity, the main topic in this study, originates from it is therefore important to describe the link between the concepts.

As with a lot of conceptual frameworks, vulnerability and resilience have different histories and are therefore interpreted and characterized in a different way. However these two concepts are not directly the opposite of each other. (Gallopin, 2006) The concept of vulnerability has its roots in hazards-risk research although it has also been conceptually influenced by geography, poverty and development, food securities and political ecology. When it comes to hazard-risk research, researchers consider vulnerability as a key component of risk. (Engle, 2011) According to Brooks et.al., (2005) risk is a function of a hazard while at the same time it is the probability of that hazard occurring. (cited by Engle, 2011) Because vulnerability has its roots in hazards-risk research it is most often conceptualized by components as exposure to perturbations or external stresses, sensitivity to perturbations and the capacity to adapt to these perturbations. (Adger, 2006 as cited by Gallopin, 2006) However the concept of vulnerability has evaluated and is now also widely used in the social domain. Social vulnerability emphasizes socio-economic, cultural and political characteristics as well as the role of institutions and governance that have the possibility to shape vulnerability. (Adger, 1998; Cutter et.al., 2003 as cited by Engle, 2011)

The resilience concept and especially when it is applied to Social Ecological Systems, as it is the case in this study, relates to three basic assumptions; a) de magnitude of shock that the system can absorb and remain within a given state, b) the degree to which the system is capable of self-organization and c) the degree to which the system can build capacity for learning and adaptation. (Carpenter et.al., 2001; Holling, 2001 as cited by Folke et.al., 2002) Management is therefore a key element when it comes to building resilience or destroying resilience. Social Ecological Systems are integrated and multi-equilibrium systems, building or destroying the resilience of such a system therefore very much focuses on the integration of activities. In the first paragraph of this chapter the shift from a technical- towards a communicative rational has been explained, together with the shift from government tot governance, these shifts relate to more holistic kinds of risk management approaches in which purely sectoral thinking has shifted towards integrated thinking. (Restemeyer et.al., 2015) This shift can also be observed in nature conservation and water management, the policy areas that are most relevant for this study. However, in order to define adaptation problems in the near- or longer future within the field of water management and nature conservation the notion of uncertainty is an important context factor because evaluating systems always tend to evolve towards the edge of chaos to operate at a maximum efficiency. (Garmestani et.al., 2009) The situation that occurs then is that policy makers are trapped; on the hand nature conservation and water management practices ask, in the realm of climate change, for long term planning, while on the other hand they do not know how to plan and what to plan for. (Restemeyer et.al., 2014) According to Davoudi (2012) resilience is therefore widely acknowledged as a new approach in which uncertainty can be incorporated into planning. (cited by Restemeyer et.al., 2014) The central idea of resilience is that social groups or ecosystems can withstand or adapt to stresses without being harmed by perturbations in their functioning. (Restemeyer et.al., 2015) In order to conceptualize resilience the following three pillars are of main importance; robustness, adaptability and transformability. (Galderisi, Ferrara & Ceudech, 2010; Davoudi et.al., 2012; Scott, 2013 as cited by Restemeyer et.al., 2015)

Although the above only describes the key elements of the vulnerability- and resilience concept, the link can now be made with adaptive capacity (see fig. 2). Adaptive capacity needs to be seen as the bridging concept between both concepts. Adaptive capacity means the ability of a system to prepare for stresses and changes in advance, or adjust and respond to the effects caused by stresses. (Smit et.al., 2001 as cited by Engle, 2011) The concept of adaptive capacity originates from ecosystem research in the 1980s (van den Brink et.al., 2014), although earlier works in sociology and organizational
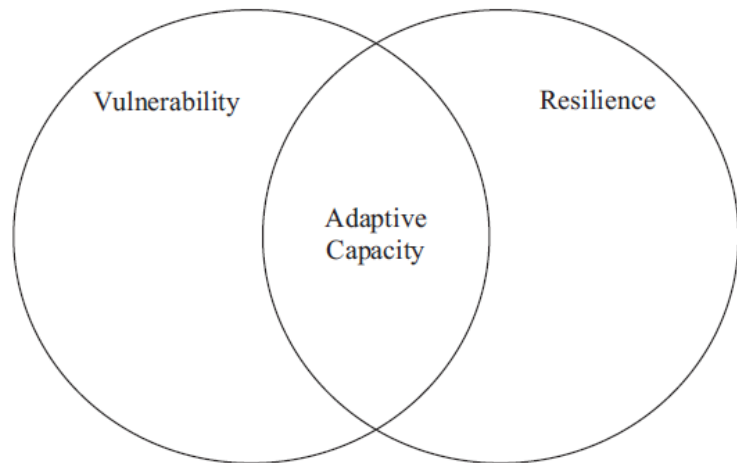

Fig. 2.   Adaptive capacity as the linking concept between vulnerability and resilience (Engle, 2011)

and business management provide the historical basis for adaptive capacity. (Parsons, 1964; Chakravarthy, 1982; Staber & Sydow, 2002 as cited by Engle, 2011) Later on the concept also emerged in the social sciences literature in order to study the abilities of societies to cope with external shocks. Nowadays the concept is widely used in climate studies to define to what extend social groups and institutions can manage the impacts of climate change. (van den Brink et.al., 2014) Basically, adaptive capacity describes the ability to adapt to changing circumstances. (Engle, 2011) Although the definition of adaptive capacity seems straightforward it is not a one-dimensional concept that can easily be measured. This has to do with the fact that adaptive capacity varies among countries, communities, social groups and over time. (Smit & Wandel, 2006) Moreover, in order to measure the adaptive capacity of a region indicators are needed. There are varying indicators used for adaptive capacity. Every situation or area under assessment is different, therefore the indicators for adaptive capacity can differ which makes it hard to define *the* indicators. (Tol et.al., 2008) Furthermore adaptive capacity not only relates to the physical area but also to the characteristics of organisations and the degree to which organisations make space for actors to change the organisation at the same time. (Gupta et.al., 2010)

This study focuses on the role of adaptive capacities of regional authorities in enhancing the resilience of the Ems Dollard estuary. Region-based adaptive capacity is used to measure the role of adaptive capacities. However it is not yet clear what makes (region-based) adaptive capacity so important. The answer can be found in the fact that the adaptive capacity of a system influences the potential for implementing sustainable adaptations. (Engle, 2011) We have seen that policy makers are trapped; on the hand nature conservation and water management practices ask, in the realm of climate change, for long term planning, while on the other hand they do not know how to plan and what to plan for. (Restemeyer et.al., 2014) Uncertainties play a crucial role in the development of policies. Adaptive capacity can be seen as a critical systems' property because it describes the ability to mobilize scarce resources to anticipate or respond to perceived or current stresses. (Engle, 2011) Because adaptive capacity varies among countries and contexts, it is important to identify what the building blocks of adaptive capacity are. In other words it is important to identify what the barriers and limitations to adaptation are. (Adger et.al., 2009 as cited by Engle, 2011) Measuring region-based adaptive capacity in this study ultimately leads to a conclusion about the resilience of the Ems Dollard estuary. The angle of incidence to measure adaptive capacity is thus more from a resilience perspective than from a vulnerability perspective although we have seen that both concepts are

very much related to each other. Resilience is a measure of the amount of disturbance a system can absorb before it turns to another (preferred or not-preferred) systems' state. (Garmestani, 2009) Because of the many management authorities acting in the Ems Dollard estuary, the different interests and responsibilities, the Ems Dollard estuary can be qualified as a complex system. Vulnerability and resilience both treat adaptive capacity in a different way. Adaptive capacity in the vulnerability concept can be translated very well into policy application. However, the disadvantage of approaching adaptive capacity from a vulnerability perspective is the fact that it often leaves out dynamic system components and processes like adaptation, learning and multiple scales. (Engle, 2011) Adaptive capacity in the resilience concept captures more or less the disadvantages of the treatment of adaptive capacity from a vulnerability perspective by focusing on the evolving, nested and polycentric nature of adaptive capacity. However it remains difficult to broadly apply adaptive capacity from a resilience perspective in decision making because, as we have seen in the previous part, adaptive capacity is very much context specific and there are different conceptual interpretation of the term. (Engle, 2011). Because of the context specific nature of adaptive capacity, this study develops and conceptualizes the new concept of region-based adaptive capacity. In this study, the region is conceptualized as all decision making authorities on the Dutch side of the Ems Dollard estuary. Because the indicators for adaptive capacity are context specific, the first aim of this study is to define which region-based indicators for adaptive capacity are of relevance in the Ems Dollard estuary and how such region-based adaptive capacity could be assessed. However, before continuing to the indicators for region-based adaptive capacity as part of the results the next paragraph explains which indicators are currently described in literature related to adaptive capacity in general and how these indicators could be measured.

2.3 Indicators for adaptive capacity

As we have seen from the previous paragraph, determinants (hereafter: indicators) for adaptive capacity are not easy to formulate because adaptive capacity is context specific. (Engle, 2011) However, various authors have formulated directions in which the indicators for adaptive capacity could be found. A possible set of indicators for adaptive capacity are the following: Technological options, resources and their distribution, institutional structure, human capital, social capital, risk spreading and information management. (Tol et.al., 2008) Tol et.al. (2008) argue that when it comes to resources, lower levels of government are more responsive to local needs than higher levels of government. However, local governments also have less resources and access to professionals. There should therefore be a balance between local and higher levels of government in order to promote the adaptive capacity of that region. This directly relates to the responsibility of the different authorities involved. According to Green & Penning-Rowsell (1999) especially coastal area are managed by a mosaic of regional, national and international authorities that all look after specific aspects. A decision made in the one domain directly influences another domain. In such situations it is very hard to make and implement far reaching decisions. (Green & Penning-Rowsell, 1999 as cited by Tol et.al., 2008) Another point raised by Tol et.al. (2008) related to the fact that local authorities are less able to access resources and professional skills than higher authorities, is political support. In order to be adaptive it is essential that politics acknowledge the fact that a region should be adaptive and that adaptation strategies are needed in order to promote compliance. Because such political support could take some time, it might be that short term issues rise to the fore at the expense of long-term strategic adaptation. (Tol et.al., 2008)

Smit & Wandel (2006) also discuss the indicators for adaptive capacity and came to the conclusion that these indicators are not independent of each other. Instead, the indicators for adaptive capacity exist and function differently in different contexts. (Smit & Wandel, 2006) In their article at least two examples are given for the interrelatedness of the indicators for adaptive capacity. When a strong kinship network is present, this network

may increase the adaptive capacity by allowing a greater access to economic resources, increasing managerial ability, supplying supplementary labour and buffering psychological stress. The same line of reasoning can be made for economic resources. Economic resources could facilitate the implementation of new technology and ensure access to training opportunities. In the end this could eventually lead to more political influence. (Smit & Wandel, 2006) The notion of economic resources is also acknowledged by Brooks & Adger (2005). Key components of adaptive capacity according to them are resources that include financial capital, social capital (strong institutions and transparent decision making systems, human resources (knowledge and expertise) and natural resources (land, water, raw materials etc.) What is also interesting is the fact that Brooks & Adger (2005) embrace the fact that adaptation strategies will not be successful when there is no willingness to adapt among those actors affected by the region and the type of appropriate proposed actions. It is an important notion that adaptive capacity depends on the ability of a society to act collectively and to resolve conflicts between its members, factors that are heavily influenced by governance. (Brooks & Adger, 2005)

Governance can influence indicators for adaptive capacity (Brooks & Adger, 2005), continuing this line of reasoning Van Buuren et.al. (2014) reformulated adaptive capacity into governance capacities and distinguishes between five capacities. These capacities are institutional, dealing with the presence of legal provision and decision making procedures; organizational capacities which relates to the allocation of responsible public and/or private organizations and leadership; resources and the availability of resources; collaborative capacities which focus on the ability to ensure collaborative action between actors on different administrative levels and policy domains; and learning which embraces the capacity to monitor, evaluate and improve governance actions. (Van Buuren et.al., 2014) Although formulated from a different perspective, these 'governance capacities' give us more insight into what encourages (and discourages when not available) an adaptive region. Another attempt to formulating indicators for adaptive capacities has been made by Ivey et.al. (2004). Although their angle of incidence is more from the perspective of communities to adapt to climate change-induced water shortages, the selected factors seem also applicable for region-based adaptive capacity. The selected factors thought to be influential are expressed as indicator questions. In these questions the following aspects are highlighted; a clear and consistent division of roles and responsibilities, commitment and support by higher levels of government via financial, political and technical resources for local governments, a sharing of information between all involved actors via clear communication and a coordination of activities, clearly assigned leadership at one or more organizations, sufficient financial- and human resources in the form of knowledge and skills, and the accessibility of technical resources and region specific information. (Ivey et.al., 2004)

Another indicator for adaptive capacity formulated in literature is learning. For a region to be resilient not only different disciplines that collaborate are needed but also citizens and private stakeholders need to be aware of the consequences of a certain hazard in order for them to adjust to the new situation. (Restemeyer et.al., 2015) This notion was already described earlier by McLain & Lee (1996) who claim that under conditions of uncertainty a society must be able to change their behaviour. The reaction of institutions to such a new situation depends on the access to information and the will and capacity of institutions to act according to new information. Learning plays a big role in this process because it enables society and institutions to act according to new information. (McLain & Lee, 1996) Pahl-Wostl et.al., (2010) refer to learning via a learning cycle going from single- to double- and ultimately to triple-loop learning. Single-loop learning refers to an incremental improvement of prevailing action strategies without questioning the underlying assumptions. Double-loop learning goes a step further in arguing that the assumptions made need to be revisited in order to make cause-effect relationships. This process takes place in a value-normative framework. In triple-loop learning it is assumed that members reconsider

underlying values, beliefs and worldviews. This also means that members check whether the assumptions made still fit in with the worldview. It is assumed that this three-stage model of learning reflects societal learning which moves from single-, to double- and eventually to triple-loop learning. (Pahl-Wostl et.al., 2010) Whereas Restemeyer (2015) and McLain & Lee (1996) focus on learning as an important component of adaptive capacity, Folke et.al. (2005) focuses more on the components of flexibility, leadership and trust. In order to govern complex Social Ecological Systems in an adaptive way, managers should be supported by flexible organizations; organizations that are problem-oriented, multi-actor and multi-level of nature. However such flexible organizations could also consist of loosely connected structures. Therefore leadership is needed for collaboration in such governance networks. Leadership is essential in shaping change and reorganization by providing innovation in order to achieve the flexibility needed to deal with the dynamics of Social Ecological Systems. (Folke et.al., 2005) Another important indicator raised by Folke et.al. (2005) is trust. Trust needs to be seen as the basis of all social institutions because it makes it easier for people to work together. Moreover, trust is integral to the idea of social influence as it is easier to communicate your ideas and influence the line of reasoning of other stakeholders when collaboration is based on trust. (Folke et.al. 2005)

Nowadays information is shared between geographically dispersed individuals and organizations. This sharing of information exceeds national and cultural borders. It is therefore of great importance to understand how knowledge can be transferred between organizations and if knowledge is transferred between organizations at all. (Duan et.al., 2010) It has been acknowledged by various authors (see for example Bhagat et.al., 2002) that problems can occur in transferring knowledge between culturally dispersed environments. When the difference in culture between the sender and the recipient becomes greater, it is likely that the information send is interpreted in a different way than expected by the sender. (Björkman et.al., 2007) Moreover, cultural differences are increasingly being recognized as a major barrier to effective knowledge creation, sharing and use. (De Long & Fahey, 2000; Leonard-Barton, 1995; Pan & Scarbrough, 1999 as cited by Ipe, 2003) As stated by for instance Folke et.al. (2005) and Ivey et.al. (2004), the adaptive capacity of a region increases when knowledge is shared among all stakeholders, when this knowledge sharing is based on trust and when learning takes place. Therefore it is important to note that when there are cultural differences between actors involved that lead to ineffective knowledge creation, sharing and use, that the adaptive capacity of the region decreases. Moreover a lack of clarity about the institutional culture of 'the other' could hinder collaboration when related to, for example, the division of responsibilities. (Wismar et.al., 2011)

2.3.1 The adaptive capacity wheel
The previous part focused on available indicators for adaptive capacity in the literature. Although there is a lot of literature available about indicators that could influence the adaptive capacity, in this case of a region, there is less literature available on how to assess the adaptive capacity of such a region. However the article by Gupta et.al. (2010) gives some handles. This group of researchers succeeded in linking existing literature on institutions, governance and management with newer literature on adaptation and adaptive capacity, while at the same time developing a systematic assessment framework in the form of the adaptive capacity wheel. (Van den Brink et.al., 2011) Although the wheel focuses on the adaptive capacity of institutions specifically, it can be used in an adapted form in this study as well. Gupta et.al. (2010) define adaptive capacity as the inherent characteristics of institutions that empower social actors to respond to short and long term impacts either through planned measures or through allowing and encouraging creative responses from society both ex ante and ex post. (Gupta et.al., 2010) Part of the indicators formulated in the previous part are overlapping with the ones described in the adaptive capacity wheel, however also new indicators are added into the wheel. There are six qualities (in this

study indicators) identified for adaptive institutions; three core qualities (variety, learning and room for autonomous change) and three supporting qualities (leadership, resources and fair governance). (van den Brink et.al., 2011) Based on these qualities, adaptive institutions are institutions that a) encourage the involvement of a variety of perspectives, actors and solutions, b) promote continuous learning and improvement of the institution, c) allow and motivate social actors to adjust their behaviour, d) are able to mobilize leadership qualities, e) mobilization of resources for the implementation of adaptation measures and f) support the principles of fair governance. (Gupta et.al., 2010) The six qualities are further divided into twenty-two criteria that form the assessment criteria for the quality described (see fig. 3).

Moreover this group of researchers formulated a protocol that could be used when assessing the criteria for the six qualities of adaptive institutions. The outline of this research protocol forms the basis of this study. However not all steps are elaborated upon in detail and the scope of this study is region-based adaptive capacity instead of adaptive institutions. Therefore part of this study focusses on an assessment method for region-based adaptive capacity within the outline described by Gupta et.al. (2010).

According to Gupta et.al. (2010) the study should start with a *preparation for the research*. This means that the researcher should clearly define the focus of the study and define which qualities and criteria are appropriate for his or her specific research topic. The next step is *the collection of data*. This means that data is collected for each to be assessed criterion. Such a data collection could consist of interviewing, observations and/or (policy)document analysis, depending on the context that is being researched. The next step is the *analysis of the data collected* in order to score each criterion of adaptive capacity. It is important in this step that the researcher works together with other researchers in order to evaluate the independently scored criteria with each other. The differences in opinion could then be discussed which helps to ensure transparency and robust results. Furthermore the researchers should record why they scored a specific criterion the way they scored it in order to make it easier to discuss possible differences in scoring. The next step is *to interpret the data*. Within this step the information that is collected is translated into a story that communicates the strengths and weaknesses of a specific institution. This also contains an explanation of what the result means for the institution and how they could improve such a score. Moreover (inter)dependencies between the criteria and qualities should be made clear as well. The last step consists of *presenting and communicating the results*. Although the criteria are scored now, they do not have a meaning. This meaning could be given to the criteria by using grey shades or colours. Grey shades are non-judgemental and provide a neutral evaluation. However in some cases it is more convenient to communicate the results via a traffic-light system. In such a system red stands for a low (negative) score whereas green stands for a high (positive) score. The researcher should also decide upon how many colours he or she wants to give. In some cases three colours are convenient enough whereas in other cases more colours are needed in order to illustrate that there are differences between low- and high scores. (Gupta et.al., 2010)

Fig. 3. The adaptive capacity wheel by Gupta et.al. (2010) with indicators and measurement criteria aiming to assess the adaptive capacity of institutions

2.4   Adaptive management

The shift in planning practice from a government perspective to a governance perspective implies a change in thinking about policy processes. The notion of government focusing on one single decision making authority with sovereign control has widened by the notion of governance which highlights the importance of having multi-level, polycentric governance systems in which many actors contribute to policy making processes. Governance embraces the fact that non-state actors, private corporate actors and networks should also be incorporated in policy making processes. (Pahl-Wostl, 2009) Furthermore, Social Ecological Systems have become increasingly complex, they are not easily dealt with using conventional science and management. Rather, such systems ask for alternative management approaches such as adaptive management and resilience thinking. (Folke et.al., 2002 as cited by Berkes & Turner, 2006) Moreover, Social Ecological Systems tend to be self-organizing and the associated management systems seem to cause a growing uncertainty over time. Management should therefore be continuously updated and adjusted, and each management action should be viewed as an opportunity to further learn how to adapt to changing circumstances. (Folke et.al., 2005) One method to integrate uncertainties and risks in Social Ecological Systems in order to achieve a resilient region is adaptive management. (Tol et.al., 2008) Because this study deals, among others, with the resilience of the Ems Dollard estuary the concept of adaptive management is shortly explained here.

Adaptive management is based on the three pillars: *learning by doing*, *learning by experimenting* and *learning while managing*. (Berkes et.al., 2003; Kato & Ahern, 2008; Lee, 1999; Sendzimir et.al., 2006 in Voβ & Bornemann, 2011) The focus of the approach can be found in the objective that management practices have the ability to change according to new experiences and insights. Therefore adaptive management can be categorized as a systematic process in which management improves itself continuously. (Pahl-Wostl, 2007) This implies that not the decision itself should be the target, but the process is of the same or even more relevance. (Tol et.al., 2008) These processes require the cooperation of different stakeholders in different institutions meaning that not only state actors but also non-state actors, private corporate actors and networks are involved in policy making processes. (Pahl-Wostl, 2009) Another important element is the fact that the institutions involved need to be willing to learn, also when at first sight a situation looks like a mistake in the process. Although most stakeholders are not very familiar with continuous monitoring, this is a fundamental element of adaptive management. Monitoring is needed in order to learn and evaluate the previous steps in the planning process. (Tol et.al., 2008) Therefore learning, knowledge integration and experiments can be qualified is the key concepts of an adaptive management approach. (Gunderson & Light, 2006, in Voβ & Bornemann, 2011) However, in order to be adaptive management must occur at the appropriate scale. According to Garmestani et.al. (2009), this means that environmental issues in Social Ecological Systems must best be dealt with via a nested set of institutions in which a diversity in scope and size can be seen. In such a nested set of institutions, the link between national and local governments is extremely important because local governments often operate at smaller scales in Social Ecological Systems and are therefore more nimble and reactive to the opinion of the public. National governments on the other side are important because, in many cases, they have access to more supporting resources than local governments. Adaptive capacity in Social Ecological Systems is characterized by past history and local knowledge, as well as open and frequent lines of communication between institutions at multiple scales. (Garmestani et.al., 2009) In order to meet the prerequisites for adaptive management in Social Ecological Systems it is important to have a bridging organization that organizes the cooperation between the multiplicity of stakeholders at different scales. These bridging organizations can be established in the form of a) assessment teams, b) non-governmental organizations or c) the scientific community. Their daily task is to formulate strategies, coordinate joint action, address uncertainty and link the diversity of actors in a world with increasing complexity. (Brown, 1998 as cited by Garmestani et.al., 2009)

2.4.1 Conceptual model of this study

Now that all theoretical components of this study are explained in the previous paragraphs, a conceptual model can be drawn for this study. The conceptual model explains all linkages between the concepts described in this chapter and connects this to the case under study; the Ems Dollard estuary. The context of this study can be found in shifts in planning practice. These shifts in planning practice have different consequences for the characteristics of a region. Furthermore, policymakers increasingly have to deal with uncertainties that have to be taken into account when developing new policies. In order to deal with these two components region-based adaptive capacity is necessary in order to say something about the resilience of a region. In order to improve the resilience of a region, an adaptive governance strategy could be developed.

Case: Ems Dollard estuary

Context: Shifts in planning practice

Decentralization

Multiplicity of actors

Differences in interests

+

Uncertainty about future developments in Social Ecological Systems

Adaptive governance

Region-based Adaptive capacity

Resilient region
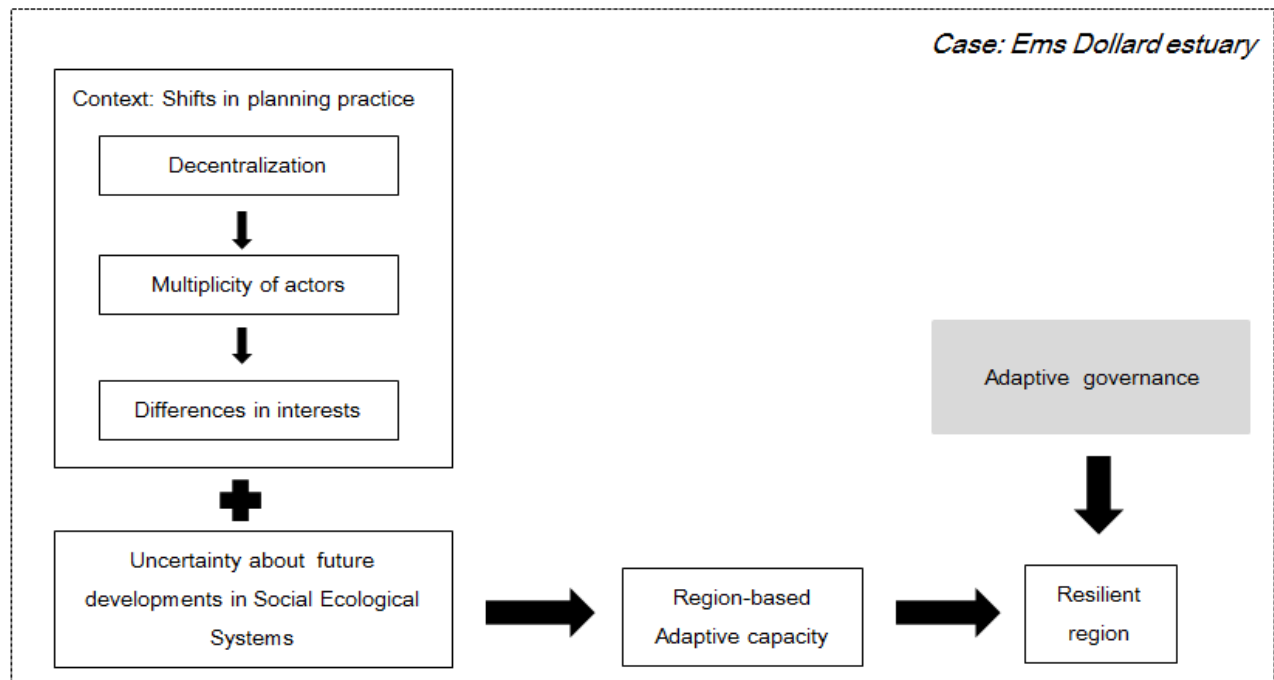
The aim of this research is twofold; describing what region-based adaptive capacity is and how this could be assessed and, second, assess region-based adaptive capacity in the Ems Dollard estuary. In this chapter all the steps taken in this study are explained. The red line in this chapter is the 'five step' protocol for assessing the adaptive capacity of institutions by Gupta et.al. (2010). Furthermore it is important to note that the researcher formed part of an organization, in this case the Province of Groningen department of Rural areas and Water, while doing the research

3.1   Preparing for the research

This step contains the identification of a clear research focus and an understanding of the meaning of the indicators and criteria for adaptive capacity. The focus of this research is on the Ems Dollard estuary situated in the north of the Netherlands at the border between Germany and the Netherlands. By analysing policy documents and participating in meetings (see appendix A) related to decision-making processes in the Ems Dollard estuary, the researcher first came into contact with this region. Participatory observation enables the researcher to move him or herself within an organization to better understand how issues are related to each other. Therefore it was important for the researcher to identify him- or herself with a specific role. These roles are described by Bryman (2008) as complete participant, participant-as-observer, observer-as-participant and complete observer. According to this study, the researcher identified herself with the role of observer-as-participant. The researcher was mainly an interviewer, although there was also some observation. She was thus semi-involved in the discussion. The advantage of this is that she could function fully as a researcher. (Bryman, 2008, p. 410, 413) After analysing policy documents and participation in meetings, the researcher came to the conclusion that because of the bad ecological status of the estuary, the multiplicity of actors involved in decision making processes and different interests among these actors, the Ems Dollard estuary seems an appropriate study area.

This is the point where the researcher started analysing academic literature related to the identified processes in the Ems Dollard estuary described above. According to Bryman (2008) it is important to use existing literature on specific topics because it is a means of developing an argument about the significance of the research and what the research aims for. (Bryman, 2008, p. 81) In this study, uncertainty-, resilience-, and adaptive capacity literature is used to describe the relevance of the research.

3.2   Collecting the data

In the second step data for the research is collected. In general, two categories of research can be distinguished; quantitative- and qualitative research. This study used qualitative research. Qualitative data collection focuses on flexible ways of data collection. The participant is free to add more or other topics during the conversation instead of the topics formulated by the researcher beforehand. (Boeije, 2009, p. 53) However, qualitative data collection has become an umbrella term for a lot of different traditions and trends in this field of research. What they have in common is that the purpose of the research is to describe the experiences, behaviours and products of the actors, and to finally interpret and affirm them. (Boeije, 2009, p. 253)

As mentioned above, there are many ways to collect data within a qualitative data collection approach. Mortelmans (2011) describes four basic principles of qualitative research; a) the qualitative survey with in depth interviews, b) the ethnographic study, c) the case study, d) the qualitative content-analysis. (Mortelmans, 2011, pp. 20-21) This qualitative study focused specifically on the Ems Dollard estuary, it can therefore be categorized as a case study. Case studies are concerned with the complexities and particular nature of the case in question. Common case studies are related to single communities, single schools, a single family, a single organization, a single event or a single person. Case studies are thus linked to a specific location such as the cases described here. The emphasis is therefore on an intensive examination of this particular setting. (Bryman, 2008, p. 53) Furthermore, according to some writers, case studies can be categorized in five types. This study here can be categorized as a representative or typical case. The objective of such a case study is *'to capture the circumstances and conditions of an everyday or commonplace situation'*. (Yin, 2003, p. 31 cited by Bryman, 2008, p. 56) Moreover case study research often includes a longitudinal element. In many cases the researcher is a participant of an organization or member of a community for many months or years. (Bryman, 2008, p. 57) This study has a strong link with the internship the researcher completed at the Province of Groningen. Within a period of nine months, the researcher was able to participate in all meetings related to the Ems Dollard estuary and had access to many formal policy documents. Although the internship is discussed more comprehensively in paragraph 3.6, it can already be said that the internship provided the researcher access to many more formal and informal meetings as well as documents and involved persons in the process.

In order to meet the first aim of this study; describing what region-based adaptive capacity is and how it should be assessed, the researcher made use of participatory observation and interviewing. During the meetings the researcher attended, the researcher took notes that are saved in a diary (because these notes could contain sensitive information, they are published in a separate confidential document). These notes are used to identify problems in the Ems Dollard estuary and to see which authorities are involved in decision making processes. The aim of the documentation was therefore not so much on focussing on the behaviour of the individuals during these meetings, the location where the meeting took place and who the chairman was. Rather the documentation focused on the main issues of concern in the Ems Dollard estuary that, at the same time, relate to the adaptive capacities of this region. In addition to participatory observation, the researcher made use of interviewing to test the identified indicators from the meetings participated for region-based adaptive capacity with experts in the field. After these interviews the assessment criteria for region-based adaptive capacity could be formulated in the form of a wheel based on Gupta et.al. (2010). The next round of interviewing was used to collect the data about region-based adaptive capacity. A region is a certain area in which the borders do not coincide with administrative borders like those of a province, municipality or water board. Furthermore a region can cross the border between two or more countries as is the case with Euro regions. (Nederlandse Encyclopedie, 2015) In this study region referred to all managing authorities on the Dutch side of the border that participate in decision making processes related to the Ems Dollard estuary. With region-based adaptive capacity, the researcher thus means the adaptive capacities of all managing authorities that participate in decision making processes within the Ems Dollard estuary region on the Dutch side of the border.

The way of interviewing in this research can be characterized as semi-structured. Semi-structured interviewing makes it possible for respondents to give answers with a minimal control. The questions are formulated in such a way that the influence of the researcher is as low as possible in order to give the respondent the possibility to answer freely. (Boeije, 2009, pp. 266-267) An action plan for interviews (appendix B) has made beforehand to structure the interview. However, the respondent was free to change the content, duration and going on of the

interview which resulted in a high quality conversation without any pre-justices of the researcher. (Boeije, 2009, pp. 266-267) Due to the sensitivity of some information, the researcher decided to not list the respondents by name (table 1) . Moreover the transcripts made of each interview are published in a separate document. In the result part, some quotes of respondents are used to illustrate the story. Whereas it is not necessary with all quotes to refer to whom the statement made because the statement is shared with more respondents, the quotes that do need a reference are divided into groups; representative ecological authority, representative economic authority and administrative authority. This division of groups is made in order to use the information given by respondents in a confidential way.

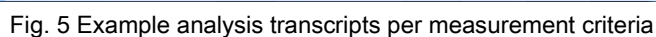| Table 1: Respondents interviews	
First round of interviewing	
Respondent 1	Foundations of Success, European Conservation Coaches Network
Respondent 2	Staff Delta commissioner
Second round of interviewing	
Respondent 3	Groningen Seaports
Respondent 4	Staatsbosbeheer
Respondent 5	Waddenvereniging
Respondent 6	Province of Groningen
Respondent 7	Ministry of Economic Affairs
Respondent 8	Department of Public Works (Rijkswaterstaat)
Respondent 9	Ministry of Economic Affairs
Respondent 10	Ministry of Infrastructure and Environment
Respondent 11	Water board Hunze en Aa's
Respondent 12	Collaborating companies Eems delta
Respondent 13	Water board Noorderzijlvest
Third round of interviewing[1]	
Respondent 14	Wester Scheldt Commission
Respondent 15	Eems Dollard Region (EDR)

3.3   Analysing the data

The interviews are transcribed and subdivided into nodes with the help of NVIVO. The structure of the code-tree (appendix C) relates to the identified indicators and measurement criteria for region-based adaptive capacity. In fig. 4, the identified indicators and measurement criteria can be seen in NVIVO. The data collected related to the indicators and measurement criteria for region-based adaptive capacity has first been punt into the wheel (see Gupta et.al., 2010) before the wheel could be used for the assessment of region-based adaptive capacity in the Ems Dollard estuary.

After drawing the wheel, the data from the second round of interviewing could be analysed via NVIVO. All the transcripts from the second interview round are entered into NVIVO. Every interview was analysed separately and the relevant quotes per indicator or measurement criteria were added to the node (see fig. 5). The quotes were then analysed and put in a category ranging from positive to negative. Because there is a difference between positive and slightly positive, the researcher added two additional categories; slightly positive and slightly

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[1] Further explained in paragraph 3.5; Presenting and communicating the results

negative. Furthermore some quotes were neither positive nor negative, therefore also the category neutral was added. Then, every category was given a value ranging from ++ to - -, this resulted in the following:

- ++   Positive   +   Slightly positive
- 0   Neutral
- -   Slightly negative   - -   Negative

fig. 4 Identified indicators and measurement criteria region based adaptive capacity

Fig. 5 Example analysis transcripts per measurement criteria
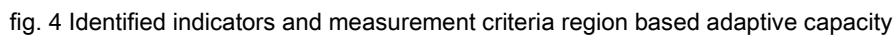
Valuing quotes resulted in one developed method to value all quote in the same way in order to pursue as much transparency as possible within the results. Therefore an indication is given here how the researcher valued the quotes. The words that back up the valuation are underlined and explained.

Positive (++):
Q: Do you have the feeling that this sort of doubts are discussed extensively among all stakeholders?
R: I definitely have the feeling that we are discussing the doubts that actors have among each other.

Explanation: Definitely here describes something that is really present

Slightly positive (+):
R: It is a shock effect, thinking about how we could deal with silt storage in a smart way asks for different approaches. When you want to achieve this 'new' thinking you should also discuss doubts among each other. Whereas in former years this was done insufficiently I have the feeling that this is more and more the case now.

Explanation: The situation is not optimal yet but improvements are visible. Therefore the quote is valued slightly positive instead of positive.

Neutral (0):
R: There are a lot of meetings organized between for example the national government and regional stakeholders but whether this truly lead to more trust among each other, I have no idea.

Explanation: This quote broaches something but in the end it does not say anything, it does not give a value to the topic raised.

Slightly negative (-):
R: Well, I have worked for … twenty years ago, in those days people were also talking about silt measurements in the Ems Dollard estuary. So, continuing that line of reasoning I do not have the feeling that we have made any progress on learning from each other. On the other side you see that the topic just remains very complex and the measures are not so straightforward than expected on forehand.

Explanation: The first part of this quote seems negative, however because of the refutation made the respondent can, to a certain extent, find him or herself in the situation that exists now. Therefore the quote is scored slightly negative instead of negative

Negative (- -):
R: A certain amount of trust is missing. When the national government sends us a policy concept you read such a piece of paper in a different way than is the case when someone from our own organization writes the same sort of paper.

Explanation: This quote illustrates that a certain amount of trust is missing by explicitly stating it and also explaining why this trust is missing. It is very clear for this respondent that the measurement criteria of trust is missing therefore the quote is valued negative.

3.4 Interpreting the data

The next step was the interpretation of the data. Now that all quotes had a value ranging from ++ to - -, a meaning could be given to the value. The researcher chose to connect the categories to figures. This was done as follows:

- ++   Positive   +2
- +   Slightly positive   +1
- +/-   Neutral   0
- -   Slightly negative   -1
- - -   Negative   -2

However, it still remained unclear what the values meant for the interpretation of the data. Therefore a calculation method was added in order to sufficiently interpret the data. (see appendix D for an overview of the calculation per measurement criteria) For each category a bandwidth was made in which the total sum of all categories could score. This bandwidth was based on the total amount of quotes given per criteria. With every range the researcher asked herself the following question: When all quotes score positive / slightly positive / neutral / slightly negative / negative, what would then be the maximum score. To illustrate the calculation method an example is given here with a measurement criterion that has 15 quotes:

Positive: ++ = +2

Slightly positive: + = +1

Neutral: +/- = 0

Slightly negative: - = -1

Negative: - - = -2

Positive: 2x15 = +30

Slightly positive: 1x15 = +15

Neutral: range from 5 to -5 *

Slightly negative: 1x-15 = -15

Negative: 2x-30 = -30

This results in the following bandwidths

Table 2: Bandwidths				
Negative	Slightly negative	Neutral *	Slightly positive	Positive
-30 up until -16	-15 up until -6	-5 up until +5	+6 up until +15	+16 up until +30

* As an exact score of zero is very unlikely, neutral was provided with an additional bandwidth. One third of the range between neutral and slightly positive or negative is considered as the range for neutral (plus or minus five in this example).

The bandwidths were provided with different colours. Positive outcomes are represented by dark green, slightly positive by lighter green, neutral by yellow, slightly negative by orange and negative by red. This can be seen below.

Colours presenting the degree on which a specific measurement criteria is present
Positive
Slightly positive
Neutral
Slightly negative
Negative

Fig. 6 Colours presenting the degree on which a measurement unit is present. (modified from Gupta et.al., 2008; van den Brink et.al., 20140

After the individual measurement criteria and the indicators for region-based adaptive capacity were scored, the information was translated into a story. In the result chapter, chapter four, this story can be read.

3.5   Presenting and communicating the data

As a last and final step in the research protocol for region-based adaptive capacity, the collected and analysed data should be presented in a comprehensive way. This was done in the form of a wheel, as proposed in the article of Gupta et.al. (2010). The wheel built upon the indicators for region-based adaptive capacity collected in the first part of this research (see chapter four). The inner circle of the wheel relates to region-based adaptive capacity. The outer ring shows the measurement criteria for region-based adaptive capacity related to the indicators for region-based adaptive capacity that are shown in the middle ring. Colours were used to communicate the meaning of the scoring in the previous step (see fig. 6). The colours of the middle circle were derived from the results of the measurement units in the outer ring. Although the use of grey shades is a non-judgemental way of presenting the data, this study used the colours of a traffic light system because this way of presenting proved to be more communicative. (Gupta et.al., 2008; Van den Brink et.al., 2014) In the ultimate region-based adaptive capacity wheel for the Ems Dollard estuary, only colours were shown. The values were left out because they could make it unnecessary complicated for the audience to understand the results. Every indicator had a one fifth interest in region-based adaptive capacity. This meant that every indicator had the same importance in this study because all these indicators needed to be represented in order to say something about region-based adaptive capacity.

Because this study was conducted in the framework of an internship at the Province of Groningen department of Rural Affairs and Water, presenting and communicating the results also meant that the researcher should come up with recommendations for the region. In order to do this in a comprehensive way, the researcher conducted two interviews. The first interview focused on the Wester Scheldt estuary, the other cross-border estuary in the Netherlands, in order to make a comparison between the two estuaries in terms of how management and collaboration is organized. The results of this interview were used in the last interview with an important stakeholder related to collaboration in the Ems Dollard region. Although region-based adaptive capacity in the Ems Dollard estuary focused only on the Dutch side of the border, throughout the research it became clear that when one wants to develop a step by step approach about the future of the estuary, this should be done together with Germany. Therefore the third round of interviewing focused on the international aspect of this particular estuary.

3.6   Methodological responsibility

Doing research means that criteria concerning trustfulness and validity should be met. The methodological responsibility described in this paragraph is based on the four criteria for research by Bryman (2008). These criteria are credibility, transferability, dependability and conformability.

Credibility focuses on the internal validity of the research which means that research was done in the correct way and that scientific rules for research were met. The conclusions made in this study have to be in accordance with the answers given by respondents during the interviews. (Bryman, 2008, p. 377) The conclusions of this study can be verified because a diary was kept of the attended meetings whereas the interviews were recorded and transcripts were made. The transcripts are attached to this study in a separate, confidential document. This report and the names in this separate report are confidential as the respondents asked to not publish their names in the final report. The recordings are available on CD-ROM (on request).

Transferability forms the second criterion for research. The criterion focuses on whether generalizations can be made or not. (Bryman, 2008, p. 378) The research done is based on case study research. All ins and outs of the Ems Dollard estuary were studied and related to region-based adaptive capacity. Although some of the conclusions with regard to indicators and measurement criteria for region-based adaptive capacity could be used in other multi-actor regions as well, one should not overlook region specific characteristics. The assessment region-based adaptive capacity in the Ems Dollard estuary was based on interviews with respondents of managing authorities in the Ems Dollard estuary. These are respondents who were willing to invest their time within the framework of this research. It could well be that the results change when other respondents were spoken. Moreover, part of the results are based on the interpretation of the situation within meetings the researcher attended. These meetings were very specific for the Ems Dollard estuary and can therefore not be generalized.

Dependability deals with the question whether all phases of the study are visible and controllable by others. This chapter attests of this. Moreover all interviews are recorded and afterwards processed which results in transcripts of each interview. There is one interview which is not recorded because it was a telephonic interview. Still, a summary of the interview is available and confirmed by the respondent.

The last criterion is conformability. Conformability focuses on the objectivity of the researcher itself. Especially in this study, where the researcher was part of an organization – the Province of Groningen -, conformability is important. The study was conducted during an internship at the Province of Groningen for nine months, starting in November 2014 until July 2015. Many formal and informal meetings were visited in which the researcher sometimes acted as participant and sometimes as researcher. Because the researcher sometimes actively participated in the meetings, opinions and thoughts were shared with some respondents before the interviews took place. The disadvantage of this is that the researcher could be less objective during the interviews. However, because the questions for the interviews were formulated beforehand and therefore the same for each interview, objectivity could still be met during the interviews. Another point that needs to be taken into account is that cross-reference with other researchers about valuing the quotes could not be done because the researcher acted on her own. However, the researcher tried to pursue as much transparency as possible by not only presenting and communicating the results after all the work was done, but to use the meetings she participated in as occasions in which she shared her results to see how other participants reacted on them.

4 Region-based adaptive capacity and its characteristics

The aim of this study is twofold. First; the study aims to develop a comprehensive tool to assess region-based adaptive capacity. Second, the developed tool is used to assess region-based adaptive capacity in the Ems Dollard estuary in order to give information about what the role of adaptive capacities of regional authorities are in enhancing the resilience of the Ems Dollard estuary. Therefore this chapter starts in paragraph one with an exposition of the indicators for region-based adaptive capacity. Paragraph two describes the results of the assessment of region-based adaptive capacity in the Ems Dollard estuary.

4.1 The indicators and measurement criteria for region-based adaptive capacity

In academic literature several indicators for the assessment of adaptive capacity are proposed (see for instance Folke et.al., 2002; Brooks & Adger, 2005; Van Buuren et.al., 2014). However, in many articles it remains unclear how to assess adaptive capacity. This gap in the literature has also been acknowledged by Gupta et.al. (2010). Because there was little research on assessing institutions on their ability to enhance the adaptive capacity of society (WRR, 2006 as cited by Gupta et.al., 2010) this group of researchers developed a tool, the adaptive capacity wheel, to assess the adaptive capacity of institutions. In the adaptive capacity wheel all information about indicators for adaptive capacity has been brought together (see fig. 3 paragraph 2.4.2). However, the indicators and measurement criteria Gupta et.al. (2010) propose for assessing the adaptive capacity of institutions proved not to be sufficient for assessing region-based adaptive capacity. Because adaptive capacity varies among countries and contexts it is important to investigate region-based indicators for adaptive capacity. This study investigated the indicators and measurement criteria for region-based adaptive capacity in the Ems Dollard estuary via interviews and participatory observation. In the following part, the indicators and measurement criteria are explained in more detail. Because the adaptive capacity wheel by Gupta et.al. (2010) is based on an investigation of available literature concerning this topic, the adaptive capacity wheel is used here to compare the data collected in this study with the indicators and measurement criteria formulated in the wheel.

According to Van den Brink et.al. (2011), there are three core indicators for adaptive capacity; variety, learning and room for autonomous change. Supporting qualities are leadership, resources and fair governance. (van den Brink et.al., 2011) Two of the three core qualities, namely variety and room for autonomous change, proposed by Gupta et.al. (2010) proved not to be of relevance in for region-based adaptive capacity. The reason for this is that variety underlines the fact that the region consist of organizations operational at multiple levels in multiple sectors. Moreover variety is based on a diversity of problem frames and solutions. These measurement criteria are precisely those criteria that hinder decision making processes in the Ems Dollard estuary. Instead of focusing on a pallet of different options it is important that funnelling takes place. Because of decentralization, multi-level and multi-actor situations are no exception anymore. The challenge in such situations can be found in the question; Who is responsible for what? According to Tol et.al. (2008) a clear division of responsibilities is of great importance when formulating adaptation policies keeping in mind all possible uncertainties about the future. Directly related to this is the indicator room for autonomous change. Although access to information proved to be of relevance for region-based adaptive capacity, this has more to do with fair governance than with room for autonomous change. Room for autonomous change is about the capability of actors to improvise during crises at all levels of society and to experiment with everyday contingencies, breakdowns, exceptions, opportunities and

unintended consequences. (Orlikowski, 1996 as cited by Van den Brink et.al., 2011) However, the division of responsibilities in a multi-level and multi-actor region proved to be of more importance. This has to do with the fact that authorities cannot act according to plan when there is no plan agreed upon among all authorities involved in decision making processes in a specific region because of no clarity about responsibilities. Moreover, when there is no agreed plan due to the reason described above, authorities are no longer capable of improvising related to the plan in the case of unexpected crises. Learning is indeed acknowledged as an important indicator for region-based adaptive capacity. Especially the measurement criteria trust seems to be of importance when continuous learning is pursued. According to Folke et.al. (2005) trust needs to be seen as the basis of all social institutions because it makes it easier for people to work together, to communicate ideas and to influence the line of reasoning of other stakeholders. When a situation of trust exists, doubts about possible development directions are more easily dealt with. Therefore the indicator learning for region-based adaptive capacity more or less corresponds with the indicator learning in the adaptive capacity wheel.

The three supporting qualities for adaptive capacity are leadership, resources and fair governance. (van den Brink et.al., 2011) Resources and fair governance proved to be of importance for region-based adaptive capacity as well. Resources are described by, among others, Brooks & Adger (2005) and Ivey et.al. (2004). They emphasize the importance of having financial capital (to get things financed), social capital (strong institutions and transparent decision making systems), human resources (knowledge and expertise) and natural resources (land, water, raw materials etc.). In order for a region to be adaptive it is important that there is enough region specific information available. This information can be found within society as well as within public authorities. Therefore it remains important that there are networks available in the region in which information is shared and discussed in order to generate financial resources to finance those actions that have been discussed. This brings us to the indicator of fair governance. Whereas the adaptive capacity (Gupta et.al., 2010) focuses on the measurement criteria legitimacy, equity, responsiveness and accountability within fair governance, for region-based adaptive capacity transparency and openness, access to information and accountability proved to be of more relevance. This matches with the statement made by Folke et.al. (2005) that in order to govern complex Social Ecological System in an adaptive way, managers should be supported by flexible organizations meaning organizations that are problem-oriented, multi-actor and multi-level of nature. Since most regions nowadays consist of a multiplicity of actors at different levels because of decentralization policies, the importance of accountability comes into play. In many cases there is not only no clarity about responsibilities, the flexible organizations proposed by Folke et.al. (2005) consist of loosely connected structures. In order to meet the disadvantages of flexible organizations, leadership is needed. Leadership is essential in shaping change and reorganization by providing innovation in order to achieve the flexibility needed to deal with the dynamics of Social Ecological Systems. (Folke et.al., 2005 (Folke et.al., 2005) However, for region-based adaptive capacity collaboration turns out to be very important. Although Gupta et.al. (2010) acknowledges this by focusing on collaborative leadership as a measurement criteria within leadership, collaboration in a multi-level and multi-actor region seems to be of such importance that it can be formulated as an indicator for region-based adaptive capacity. Collaboration embraces the importance of leadership which comes to the expression in the measurement criteria visionary leadership and entrepreneurial leadership. Moreover as Brooks & Adger (2005) emphasize, adaptation strategies will not be successful when there is no willingness to adapt among those authorities affected by developments in the region and the type of proposed actions. Adaptive capacity thus depends on the ability of authorities to act collectively and to resolve conflicts between regional authorities. (Brooks & Adger, 2005) Therefore the measurement criteria political will is added to the criteria of collaboration. Other important measurement criteria for collaboration in a region are connecting visions and agreement on priority. When there is no agreement among all regional authorities related to the priority of measurements that need to be undertaken in the region it remains hard to formulate a step by

step approach regarding a vision about the future of the region. This very much relates to the measurement criteria of connecting visions. Having a variety of visions means that no funnelling can take place while that is precisely what is needed in a region with a multiplicity of actors acting at different levels.

In additions to the indicators described above, a fifth indicator is added for region-based adaptive capacity. This indicator is not described in the adaptive capacity wheel by Gupta et.al. (2010). Because nowadays information and knowledge is shared among a different authorities at different levels, the sharing of information exceeds cultural and national borders. It is therefore of great importance to assess to what extend cultures enable or restrict the sharing of knowledge and information. (Duan et.al., 2010) When the difference in culture between the sender and the recipient becomes greater, it is likely that the information send is interpreted in a different way than expected by the sender. (Björkman et.al., 2007) Moreover cultural differences are increasingly being recognized as a major barrier to effective knowledge creation, sharing and use. (De Long & Fahey, 2000; Leonard-Barton, 1995; Pan & Scarbrough, 1999 as cited by Ipe, 2003) In a region a multiplicity of authorities can be observed at different levels and with different backgrounds. Therefore it is important, when testing region-based adaptive capacity, to see whether the sharing of knowledge and information is hindered by institutional cultures. The indicator clarity about institutional culture is added to the wheel in order to test whether these cultural differences lead to hinder in knowledge transfer, communication problems and whether there are indeed operational differences between all regional authorities involved.

All in all, this leads to the following adaptive capacity wheel for region-based adaptive capacity (fig. 7). Note that region-based adaptive capacity is abbreviated in the wheel to adaptive capacity.
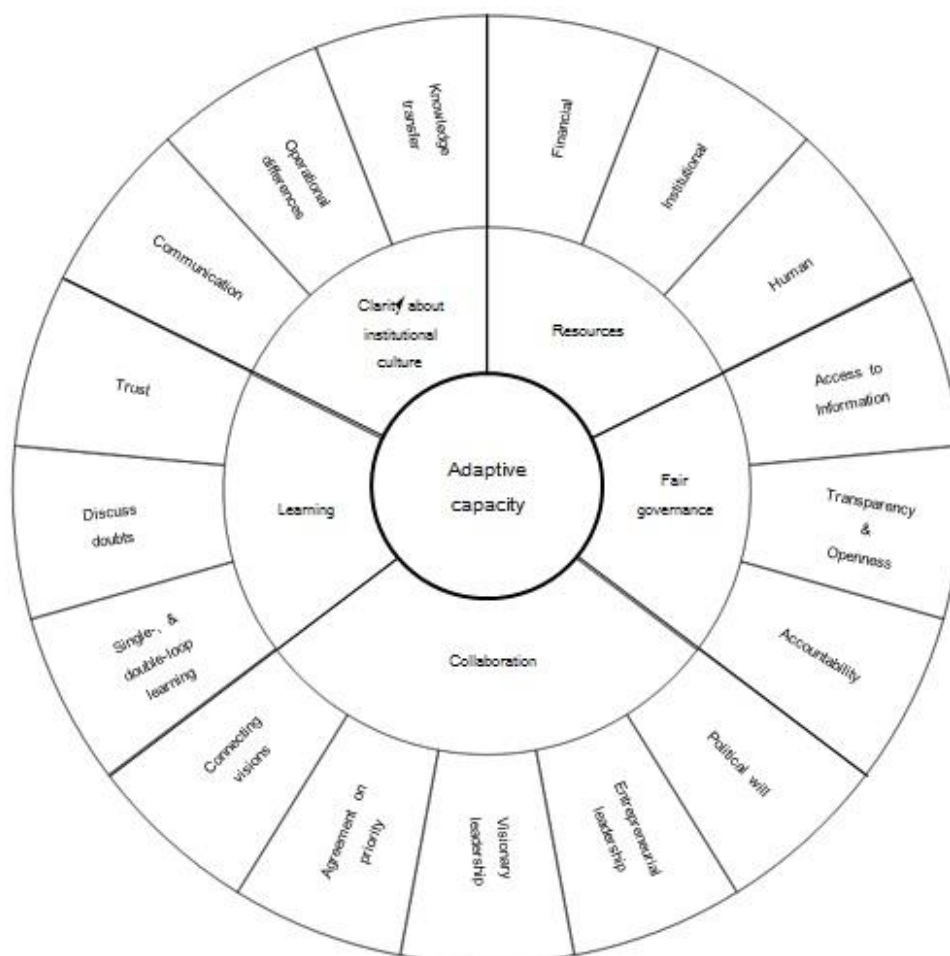

Fig. 7 Region-based adaptive capacity wheel

4.1.1 Operationalization of the indicators for region-based adaptive capacity

Although the indicators for region-based adaptive capacity are clear now, it still remains unclear how the indicators are operationalized. Therefore this sub-paragraph shortly describes the operationalization of the indicators for region-based adaptive capacity before continuing to the results of region-based adaptive capacity in the Ems Dollard estuary. The operationalization of the indicators for region-based adaptive capacity are described in a clock-wise manner referring to the region-based adaptive capacity wheel.

Resources: According to Tol et.al. (2008), Smit & Wandel (2006) and Brooks & Adger (2005), resources are key components of adaptive capacities. According to them resources consists of, among others, financial resources, institutional resources and human resources. Continuing this line of reasoning, a shortage of these resources leads to less region-based adaptive capacity. Therefore, *region-based adaptive capacity is high when sufficient financial, institutional and human resources are available.*

Fair governance: This indicator consists of access to information, transparency & openness, and accountability. Especially coastal areas are managed by a mosaic of regional, national and international authorities that all look after specific aspects. Decisions made in the one domain therefore directly influence the other domain. Therefore in order to be adaptive, accountability should be clear. (Green & Penning-Rowsell, 1999 as cited by Tol et.al., 2008) Moreover region-based adaptive capacity is further enhanced when information is shared and retrievable between all involved authorities. Clear communication and coordination activities are therefore needed. (Ivey et.al., 2004) *Region-based adaptive capacity is high when all authorities have access to available information, when the decision making process is transparent and open, and when it is clear for all authorities involved who is accountable for what.*

Collaboration: It turned out that collaboration is important for region-based adaptive capacity (see paragraph 4.1) However, in order for the indicator collaboration to contribute to region-based adaptive capacity leadership is important to develop a future vision and to get things done. (Gupta et.al., 2010) Moreover, according to Brooks & Adger (2005) adaptation strategies will not be successful when there is no willingness to adapt among those authorities affected by developments in the region and the type of proposed actions. Political will should therefore be high in order to contribute to region-based adaptive capacity. Two other measurement criteria important for region-based adaptive capacity according to the meetings participated by the researcher and the two interviews with experts, are connecting visions and agreement on priority. Therefore*; region-based adaptive capacity is high when visionary and entrepreneurial leadership are present, when there is political will to do something, when all involved authorities reach agreement about priorities for the region and when visions among different authorities are connected to each other in order for funnelling to take place.*

Learning: This indicator for region-based adaptive capacity more or less corresponds with the indicator learning in the adaptive capacity wheel by Gupta et.al. (2010). Especially trust is seen as very important by Folke et.al. (2005) because it forms the basis for learning. Trust makes it easier for people to work together, to communicate ideas and to discuss differences in lines of reasoning between all involved authorities. *In order for learning to positively contribute to region-based adaptive capacity a situation of trust should be present, doubts should be discussed among all involved authorities and single- and double-loop learning should take place.*

Clarity about institutional culture: The last and final indicator for region-based adaptive capacity refers to the sharing of information between geographically dispersed individuals and organizations. This sharing of

information exceeds natural and cultural borders, it is therefore important to assess whether cultural differences lead to miscommunication and less transfer of knowledge. According to Björkman et.al. (2007) it is likely that information that is send between authorities with a different institutional culture is interpreted differently than expected by the sender. Moreover cultural differences are increasingly being recognized as a major barrier to the creation of effective knowledge, the sharing of knowledge and, related to this, how the information is used by the recipient. (De Long & Fahey, 2000; Leonard-Barton, 1995; Pan & Scarbrough, 1999 as cited by Ipe, 2003) Adaptive capacity is high when knowledge is shared among all authorities involved (Folke et.al., 2005), it is therefore important to see, keeping in mind a multi-actor and multi-level situation in the region assessed, whether institutional culture influences region-based adaptive capacity. *Region-based adaptive capacity is high when institutional differences in culture are acknowledged by all involved authorities, when the acknowledgement of possible differences does not lead to communication problems and when, although differences in institutional culture exist, this does not lead to less transfer of knowledge between all authorities involved.*

4.2 Assessing region-based adaptive capacity in the Ems Dollard estuary

The wheel (fig. 8) presents the result of the assessment of region-based adaptive capacity in the Ems Dollard estuary. Most frequent colours are yellow (neutral) and orange (slightly negative), assessed all together this results in a slightly negative region-based adaptive capacity in the Ems Dollard estuary (for an overview of the calculations see appendix D).
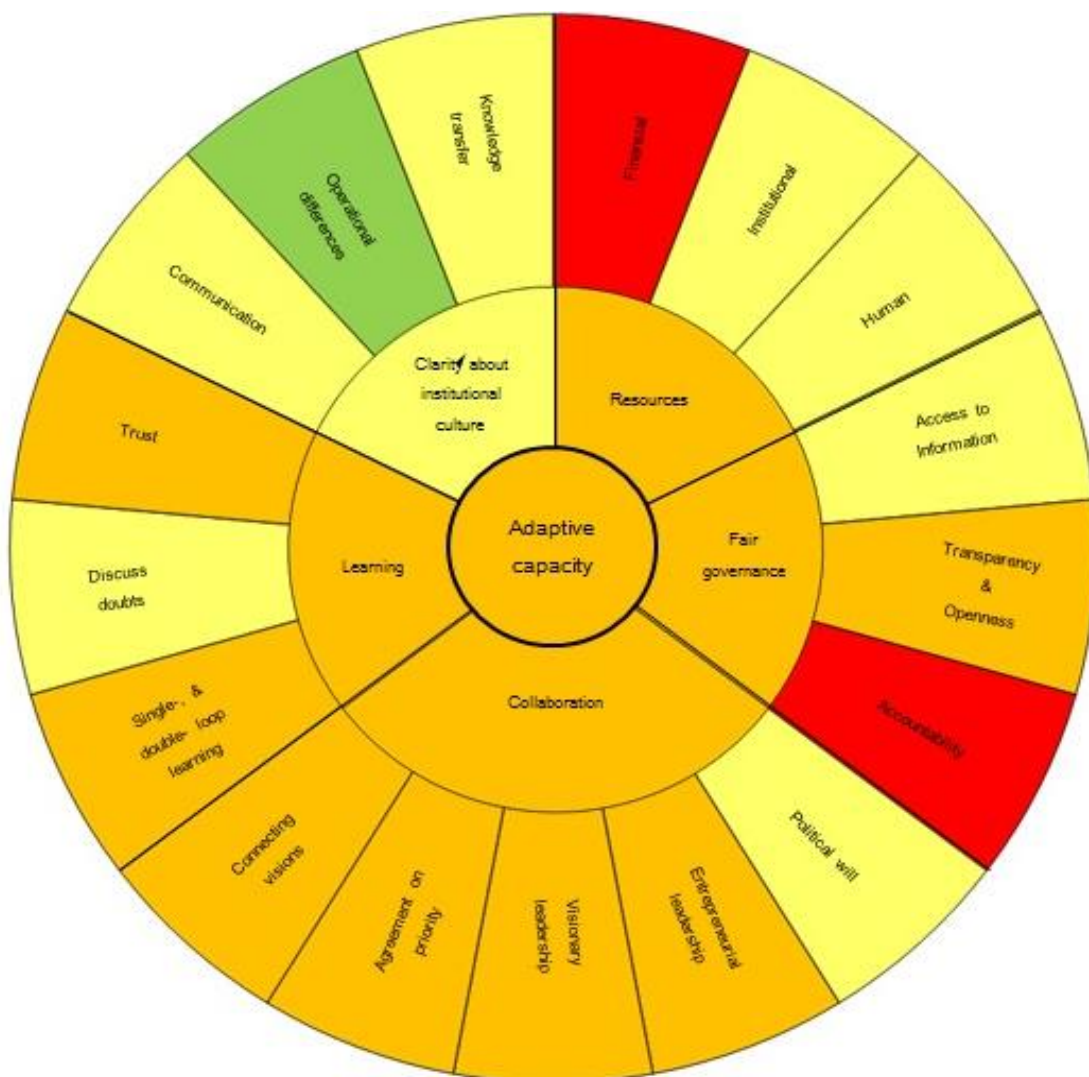

Fig. 8 Assessment of region-based adaptive capacity in the Ems Dollard

The region-based adaptive capacity wheel visualizes the results the assessment of region-based adaptive capacity in the Ems Dollard estuary. At first sight, the outcome of the assessment seems quite negative. Especially the indicators fair governance, collaboration and learning score relatively low. The indicator resources scores relatively well with an exception of the assessment criteria financial resources. It seems that the budget for the Ems Dollard estuary is rather limited. (statement made by 10/11 respondents, Interview, 2015) This leads to a search for the most cost-effective packages of measures which is not beneficial for region-based adaptive capacity in the Ems Dollard estuary. (e.g. Tol et.al., 2008; Smit & Wandel, 2006; Brooks & Adger, 2005) As a result of a relatively limited budget, short and long-term measures are not connected well to each other which is visualized in the wheel by a slightly negative scoring connecting visions and agreement on priority. Positive is the fact that it seems that all regional authorities involved in the decision making process have a clear picture of the differences in institutional culture between the authorities involved. The acknowledgement of operational differences between the regional authorities does not necessary lead to communication problems and difficulties in knowledge transfer. (e.g. Björkman et.al., 2007) For instance, clarity about institutional culture is stimulated by the authorities involved via the organization of several concentration days within the framework of the Economy & Ecology in balance network in the Ems Dollard estuary. At these concentration days all authorities come together in order to present their views about the future of the Ems Dollard estuary from the point of view of their particular organization. These meetings are very well attended by all involved authorities because it gives them the opportunity to get to know each other better and to see how the different authorities deal with the reported ecological problems in the Ems Dollard estuary. Another direct result of these meetings is that it becomes easier for individuals of the authorities involved to access the information available at another authority involved. By having the opportunity to access information available about the Ems Dollard estuary, authorities could more easily discuss doubts. (e.g. Folke et.al., 2005) It could well be that when the information is accessible for all authorities, that there are differences in lines of reasoning between the different authorities involved. Discussing doubts related to documents read, is promotional for the region-based adaptive capacity of the indicator learning. However, the assessment also shows that the degree to which the regional authorities allow for and encourage fair governance is rather low. Here a clear tension can be seen between the authorities involved and the needs for adaptation. Although information is in most cases accessible because collective meetings are very well attended by all involved authorities which gives the authorities the opportunity to ask for and discuss (new) information, it seems that transparency & openness and accountability are only encouraged in a limited manner. (e.g. Van Buuren et.al., 2014) In addition to that, when the involved authorities do not have the feeling that fair governance is encouraged in a right manner it is not surprising that collaboration scores slightly negative as well. Having no clarity about who accounts for what makes the necessity of having a good visionary and entrepreneurial leadership even more important. (e.g. Gupta et.al., 2010) Subsequently, conflicting perceptions about the priority of measurements in the Ems Dollard estuary between ecologically oriented authorities, economy oriented authorities and administrative authorities at different decision making levels hinders the development and implementation of measurements at large scale. All in all the tensions between all involved authorities lead to the fact that every authority itself develops a strategy for the future of the Ems Dollard estuary which does not result in trust and learning that takes place only on the existing institutional path (single-loop learning) rather than reinterpreting and changing existing routines. (e.g. Pahl-Wostl, 2009)

4.2.1 Analysis and discussion

In the previous part, the assessment of region-based adaptive capacity in the Ems Dollard estuary has been explained in relation to the region-based adaptive capacity wheel (adapted from Gupta et.al., 2010). This

paragraph further analyses and discusses the results of the assessment by focusing on the indicators in more detail.

Resources

Attracting resources is highly dependent on the political and public climate. (Van den Brink et.al., 2011) The current centre-left government in the Netherlands under the leadership of Prime Minister Mark Rutte states that provincial councils and local authorities are better able to coordinate practical policy delivery and hence do more for less money. (coalition agreement, 2012 as cited by De Haan et.al., 2014) Because provincial councils and local authorities have less access to resources than the national government has, measurements for the improvement of the ecological status of the Ems Dollard estuary are focused on cost-effective packages of measurements. Moreover budgets for nature conservation practices are always allocated to other more appealing purposes such as public health or education. *'I have the feeling that the urgency of the ecological problem in the Ems Dollard is acknowledged now by all involved authorities. However it always relate also to political urgency and when it comes to political urgency you will always have to win it from topics such as health, housing and education (Interview representative administrative authority, 2015).'* Although attempts have been made by the national government together with the provincial council of the Province of Groningen to generate resources via Interreg A[2] subsidies from Europe it remains to be seen whether these negotiations really lead to more financial resources available for the implementation of large scale measures such as the removal of silt in the Ems Dollard estuary. The problem is thus not so much that resources are not available in the Ems Dollard estuary, the focus is more on how the available resources can be distributed in the most cost-effective way. Perhaps that is also the crux of the whole story in the Ems Dollard estuary. Resources are now not used for 'out of the box' thinking and other measures than usual, instead they take place on the existing institutional path. '*The resources available are already brought into the area, it is only less than you want to have. It is thus not about not having the resources, it is more about resources not granted to the Ems Dollard estuary and resources that are granted but only used for well-known and elaborated upon measures (statement made by 6/11 respondents, Interview, 2015).'*

Fair governance

The nature of how governance is organized in a multi-actor and multi-level region such as the Ems Dollard estuary determines to what extend authorities are able to influence and change institutional thinking. (e.g. Van den Brink et.al., 2011) What you see in the Ems Dollard estuary is that it is not clear which authority is responsible for what. In other words, it is not clear which authority accounts for what. It is a learning process of all involved authorities to see how the responsibilities are divided among the involved authorities especially because the tasks for nature conservation are only recently been transferred to provinces. (coalition agreement, 2012 as cited by De Haan et.al., 2014;) However, transparency and openness also score relatively low which makes it more difficult for all involved authorities to be part of that learning process in order to see how responsibilities between all involved authorities are divided. This situation seems to result in one in which the interest of doing something to improve the ecological quality of the Ems Dollard estuary fades away at some involved authorities. *'What is missing is an integral responsibility of the area. You cannot find anywhere how much money there is available for what and all the money available comes from small projects. This means that the translation of money into bigger projects fails because of, among other things, indistinctness of who accounts for what which leads to less interest of some organizations to be part of the negotiation process at all (statement made by 4/11 respondents, Interview, 2015).'* What is positive is that the involved authorities seem to allow for and encourage access to knowledge

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[2] Interreg is a European subsidy for spatial- and regional development. Different authorities work together in projects subsidised via Interreg. Interreg A is a special subsidy based on collaboration in border regions. (Rijksoverheid, 2015)

although access to information still scores neutral. However this has not so much to do with information being not available, rather it has to do with the basis on which collaboration in the Ems Dollard estuary is based. The ecological status of the Ems Dollard estuary continues to degrade and in order to stay on the list of European Nature 2000 area measures have to be taken. It can thus be said that political urgency of doing something with the estuary is felt. However, what you see is that the multiplicity of actors at multi levels is complex because of different interests in the same region whereas the approach for collaboration does not take the multiplicity of actors at multi levels and their different interests into account. '*It is important to note that from the beginning on the basis of collaboration in the Ems Dollard estuary was not based on integrality and multi-disciplinary, the basis was very unilateral. Not only when you look at the entire estuary but also in my organization. Everything is based on our core tasks. Now you can see the transition towards more integrality but the organization itself, the institutionalization is not on track (statement made by 8/11 respondents, Interview, 2015).*'

Collaboration

Collaboration has proved to be an important indicator for region-based adaptive capacity because regions can be typified as multi-actor and multi-level. Therefore it is unproductive that the indicator collaboration scores slightly negative in the Ems Dollard estuary. There are thirteen different authorities acting on the Dutch side of the estuary but there is no shared vision among them. Although the Economy & Ecology in balance network aims to bring all the authorities together in order to discuss knowledge and come up with a strategy taking into account the future of the Ems Dollard estuary, still no shared vision has been formulated up till now. The reason for this could be that there is no agreement about the priority of measurements that need to be taken given the fact that measurements are very much focused on the most cost-effective option. '*The image that directly comes into my mind when thinking of the Ems Dollard estuary is that there is a lot of bustle going on, mainly administrative. Then you get the feeling that a lot of things just happen again, as if you are in the same situation as years ago. I had hoped that we already passed this stadium but apparently we have not and that has, in my opinion, everything to do with the fact that the priority of some measurements are not acknowledged by all authorities and that, above all, there is no shared vision about the future of the estuary among all authorities that should feel the responsibility of doing something in the Ems Dollard estuary (statement made by 3/11 respondents, Interview, 2015).*' A reason for the absence of a shared vision and no agreement about priority can be found in the fact that there is no leadership in the Ems Dollard estuary. Although it seems that political will to do something in the Ems Dollard estuary increased the last years, it still remains unclear how and by whom measurements are going to be coordinated. Because of a multiplicity of actors at multiple levels and different interests related to the Ems Dollard estuary, leadership is especially important. (e.g. Gupta et.al., 2010) '*What is needed in this area is that the organizations together are going to make choices about what the objectives for the region are and how we are going to work on this. Now it remains gathering knowledge and before you know another study started. In order to achieve this clear coordination is needed, mandate and then it remains just a matter of get down to work! (statement made by 9/11 respondents, Interview, 2015).*' Although it still remains to be seen how leadership in the Ems Dollard estuary evolves, it can be expected that both visionary leadership as well as entrepreneurial leadership lead to an agreement on the priority of measurements that need to be done in this region in order to improve the ecological status of the estuary.

Learning

Although there is a general feeling among all respondents that learning does not take place in the way they would like to see it, it seems that, compared to the past, authorities nowadays feel free to discuss their doubts with others. Whereas in previous years policy processes just took place resulting in a new problem statement,

nowadays policy advisors and directors feel less inhibited to share their doubts. However a footnote needs to be made here, doubts are mainly shared within the authorities themselves instead of among the different authorities because there is simple no occasion to share these doubts. When all authorities come together at a concentration day of the Economy & Ecology in balance network they are there in the first place to see the overall picture of all developments in the region initiated by the different authorities. The concentration days are thus more a sharing of knowledge in one direction instead of a discussion of doubts among authorities. *'The meetings organized by the Economy & Ecology in balance network are visited by almost all authorities involved in the Ems Dollard estuary because it gives you at least one opportunity to see what the different authorities are working on. In this sense the network meetings are in essence still very much sectoral oriented instead of integral (statement made by 6/11 respondents, Interview, 2015).'* Moreover the respondents are very well aware of the fact that gaining knowledge and using this knowledge in policy making processes is very much focused on learning within the existing institutional path (single-loop learning). Learning only takes place on the level of gaining knowledge about the natural circumstances of the estuary by using more comprehensive techniques instead of learning from the process itself in order to avoid repetition of decision making processes. A true reinterpretation and change of existing routines in order to take a new institutional path turns out to be rather difficult for the authorities involved in the Ems Dollard estuary. When it comes to trust in order to learn, it seems that trust is not very high among the involved authorities in the Ems Dollard estuary. In order to trust each other, it is important to create a situation of openness and transparency in which it is clear which organization is accountable for what. Creating such a situation via clear and behave leadership will lead to more trust between the authorities involved in the Ems Dollard estuary which in the end results in more learning moments and eventually a reinterpretation and change of the existing routines, referred to as double-loop learning.

Clarity about institutional culture

Clarity about institutional culture is needed in order to promote effective knowledge transfer between authorities in a multi-actor and multi-level region. (e.g. Bhagat et.al., 2002; Björkman et.al., 2007) In the Ems Dollard estuary it seems that all different authorities involved in the decision making process acknowledge that there are operational differences among them. These operational differences come to the expression at, for instance, concentration days organized in the framework of the Economy & Ecology in balance network. It seems for instance that the national government approaches the Ems Dollard estuary differently than the Province of Groningen. This comes, for example, to the expression in the willingness to share intermediate results of decision making processes. A cause of this could be that the representatives from the national government work for 'their' minister which is less the case for the Province of Groningen. On the other hand representatives of the national government state that they have the feeling that in some cases the Province of Groningen is more secretive than they are. Moreover it seems that there are operational differences between different ministries at the national level as well. Because of the sectoral way of working of Dutch ministries, information could in the end be misinterpreted and less learning takes place in decision making processes. *'The Ems Dollard estuary means taking into account so many different authorities. Which means that you also have to work in an integral way instead of the sectoral oriented collaboration that you see nowadays. However, without having a clear leader I think that in the next upcoming years we will continue muddling through as we have always done in this region (Interview representative economic authority, 2015).'* When it comes to transferring knowledge and communication between the involved authorities in the Ems Dollard estuary, the operational differences described above do not necessarily lead to problems. All respondents agree that, in general, knowledge sharing between authorities in the Ems Dollar estuary is relatively open meaning that the operational differences do not lead to a deficit in sharing knowledge. Because there are differences in operational culture between the authorities involved in the

Ems Dollard estuary it proves to be difficult sometimes to communicate to the other authorities what information you are looking for. It is therefore not so much about the willingness to share knowledge or information it is more about the difficulty to understand what information is needed and how this particular information is stored within the authority in question. *'I do not think that the sharing of knowledge or expertise with other authorities is fed by unwillingness. It has more to do with the structure of organizations being so complicated. It is sometimes for me within [organization where respondent works] already very hard to find the information in our own system. You know the information is available but you have no idea where to find it (Interview representative administrative authority, 2015).'*

In this chapter the contribution of this study to the understanding of planning for a resilient region is further elaborated upon. The chapter starts in the first paragraph with the sub-research questions the study deals with. The answers on the sub-research questions form the basis of the answer on the research question dealt with in paragraph two. Because this study has been performed in the framework of an internship at the Province of Groningen department of rural affairs and water, paragraph three describes recommendations for, among others, the Province of Groningen in order to become more resilient. The final paragraph of this chapter reflects on the study and the choices made by the researcher.

5.1   Answering the sub-research questions

1.   Why are adaptive capacities necessary for a region?

Controlling the physical environment on the basis of technical, instrumental and procedural expertise has for long time be the line of reasoning of planners. (Friedman, 1987; Meyerson and Banfield, 1955 as cited by De Roo, 2007) Within this paradigm functionality was the keyword because planners were judged upon their technical, instrumental and procedural expertise. (De Roo & Rauws, 2011 as cited by Gerrits et.al., 2012) However, due to impractical outcomes of planning processes, slowly a shift can be seen in the prevailing institutional system. Instead of focussing on functionality, the new paradigm focuses more on hybrid governance systems in which different governance models are included. The cause of change dates back towards the 1990s in which the importance of networks and globalization became clear together with changing modes of delivery and a growing involvement of society in planning processes. (Gerrits et.al., 2012; van Ast, 1999) This shift is called the shift from a technical- towards a communicative rationale. (De Roo, 2007) Together with this shift, a shift from government towards governance can be observed. Whereas government can be considered as bureaucracy, legislation, financial control, regulation and force, governance by contrast focuses on the use of non-regulatory policy instruments such as new forms of governance. Such new forms of governance are, among others, benchmarking and co-regulation developed and proposed by non-state actors instead of state-actors. (Zito et.al., 2003) The discourse from government to governance implies a change in thinking about policy processes. Instead of one single decision making authority with sovereign control over people and the environment, current situations show multi-level, polycentric governance arrangements in which many actors contribute to policy development and the implementation of such policies. (Maynz, 2006 as cited by Pahl-Wostl, 2009) Governance is therefore referred to as regimes that are characterized by self-organization, emergence and diverse leadership. (Pahl-Wostl, 2009) However, now that the shift from government towards governance can be seen in our daily lives this does not necessarily mean that 'problems' are more easily dealt with than in previous years. An additional factor to that is the acknowledgement that there are things we do not know that we do not know them. (Termeer & Van den Brink, 2013) This statements means that there is an increase in uncertainty that, when it comes to adaptation measures, influences adaptation problems in the near- or longer future. This has to do with the fact that complex systems that have the capacity to evaluate, always tend to evolve towards the edge of chaos to operate at a maximum efficiency. (Garmestani et.al., 2009) Therefore the notion of uncertainty is an important context factor in defining adaptation problems in the near- or longer future. Moreover, traditional command and control practices (government) are not effective and can make things even worse when related to unknown-unknowns. A policy

formulated via a 'command and control' approach, does not have a factored space left in the policy aimed at adapting to the unknown situation. The shift from government towards governance is thus not only an observation it is also needed to deal with surprises in the future. According to Termeer & Van den Brink (2013) instead of predicting and controlling the environment, more realistic commitment approaches to risk and uncertainties are needed. The difference between command- and control policies and policies that aim to take into account uncertainties is that the latter focusses on adaptation not only determined by what is known or what is anticipated for, it also focuses on what is experienced and learned as the future unfolds. (Haasnoot et.al., 2013)

Ecosystems are of great importance to humanity because the services provided by ecosystems are of great value in the daily rhythms of humans. (Folke et.al., 2002) However, the human element in ecosystems is the one that causes most changes. Therefore the focus nowadays is more and more on Social Ecological Systems, systems that are in a constant flux. Normally ecosystems respond to gradual change but sometimes unpredictable changes occur, the so called unknown-unknowns. Although the shifts are unpredictable it is important to find a way to cope with these changes. In order to adapt to the changes caused by the shift from technical- towards a communicative rational, the shift from government towards governance, and the acknowledgement of uncertainty in planning, it is important to focus on the adaptive capacities of a region. These adaptive capacities are region-based because adaptive capacities differ between countries and contexts. (Smit & Wandel, 2006)

2.   How do adaptive capacities influence or enhance the resilience of a region?

The basic argument of the resilience approach can be found in the statement: Each major environmental or social perturbation alters the human environment relationship that results in the development of a new balance. (Gunderson & Holling, 2002 as cited by Berkes & Turner, 2006) However resilience is not a concept on its own but links to vulnerability literature and adaptive capacity. (Gallopin, 2006) The concept of vulnerability has its roots in hazard-risk research although it has also been conceptually influenced by geography, poverty and development, food securities and political ecology. Within hazard-risk research, researchers consider vulnerability as a key component of risk. (Engle, 2011) The resilience concept focuses not so much on risk but relates to the three basic assumptions; a) de magnitude of shock that the system can absorb and remain within a given state, b) the degree to which the system is capable of self-organization and c) the degree to which the system can build capacity for learning and adaptation. (Carpenter et.al., 2001; Holling, 2001 as cited by Folke et.al., 2002) Management is therefore a key element when it comes to building resilience or destroying resilience. However because of the notion of uncertainty as an important context factor in Social Ecological Systems policy makers are trapped; on the hand nature conservation and water management practices ask, in the realm of climate change, for long term planning, while on the other hand they do not know how to plan and what to plan for. (Restemeyer et.al., 2014) Resilience is therefore widely acknowledged as a new approach in which uncertainty can be incorporated into planning. (Davoudi et.al., 2012 as cited by Restemeyer et.al., 2014) Although the focus in this study is more on resilience than on vulnerability, adaptive capacity can be seen as the bridging concept between the two. Adaptive capacity means the ability of a system to prepare for stresses and changes in advance or adjust and respond to the effects caused by stresses. The adaptive capacity of a region influences the potential for implementing sustainable adaptations. (Smit et.al., 2001 as cited by Engle, 2011; Engle et.al., 2011) Because uncertainties play a crucial role in the development of policies nowadays and the characteristics of regions differ throughout the world, region-based adaptive capacity can be seen as a critical property that a system should have in order to be or become a resilient region. This has to do with the fact that region-based adaptive capacity describes the ability to mobilize scarce resources to anticipate or respond to perceived or current stresses in a region. (Engle, 2011)

3. How can the adaptive capacity of a region be measured based on available theories?

In order to measure the adaptive capacity of a region, indicators are needed. However there are varying indicators used when authors refer to the indicators for adaptive capacity. Moreover every situation or area under assessment is different which makes it difficult to come up with one set of universal applicable indicators. (Tol et.al., 2008) Another additional fact is that adaptive capacity relates not only to the physical environment but also to the characteristics of organizations and the degree to which these organizations allow for or make space for actors to change the organization at the same time (Gupta et.al., 2010) Several attempts have been made by authors to define indicators for adaptive capacity. A literature review of all these indicators for adaptive capacity by Gupta et.al. (2010) resulted in a method to assess the adaptive capacity of institutions. However, as noted here, the adaptive capacity of institutions does not necessarily mean the same as region-based adaptive capacity. Although some of the indicators for adaptive capacity related to institutions and the adaptive capacity wheel itself can also be used for region-based adaptive capacity, the literature does not mention region-based adaptive capacity. Therefore it can be argued that region-based adaptive capacity is a new concept, developed and evaluated upon in this study. No universal rules for region-based adaptive capacity are yet available in academic literature.

4. How can region-based adaptive capacity be understood and conceptualized?

Region-based adaptive capacity is a new developed concept in this thesis. The concept focuses on the basic assumption of adaptive capacity; adaptive capacity describes the ability of a system to adapt to changing circumstances. (Engle, 2011) Because of the fact that adaptive capacity varies among countries and contexts (see Smit & Wandel, 2006), the focus of this study is not on developing universal indicators to assess adaptive capacity rather the study develops a set of indicators that are applicable for region-based adaptive capacity in the Ems Dollard estuary. Region-based means that the assessed adaptive capacity is based on those authorities that have decision making responsibilities in the Ems Dollard estuary. Although the Ems Dollard estuary is a shared estuary with Germany, region-based focuses only on the Dutch side of the border. Region-based adaptive capacity thus means the ability of decision making authorities in a specific region to be adaptive in case developments take place of which we do not know that we do not know them (the unknown-unknown, see Termeer & Van den Brink, 2013). In other words, the capacity to improvise when the situation asks for it. In addition to the definition of region-based adaptive capacity it is important to know what the indicators for region-based adaptive capacity are in order to assess region-based adaptive. The indicators for region-based adaptive capacity are based on a review of the available literature about indicators for adaptive capacity, participatory observation and interviews. Although Gupta et.al. (2010) formulated all indicators and measurement criteria for the adaptive capacity of institutions, it seems that region-based adaptive capacity is different and asks for region specific indicators and measurement criteria. The indicators for region-based adaptive capacity based on this study are; Resources, Fair governance, Collaboration, Learning and Clarity about institutional culture. These indicators are further subdivided into 17 measurement criteria. The basis of the assessment of the measurement criteria for region-based adaptive capacity very much relates to the five-step approach proposed by Gupta et.al. (2010). This approach consists of the following steps; 1) preparing for the research, 2) collecting the data, 3) analysing the data, 4) interpreting the data, 5) communicating and presenting the data. However some additional content related information is added to the steps. The biggest contribution can be found in the fact that this study added a calculation method in order to calculate what the ranges are per category (positive, slightly positive, neutral, slightly negative, negative), per measurement criteria. This gives a researcher more handhold while assessing region-based adaptive capacity. Moreover, the study uses step five (communicating and presenting the results) not only at the end of the assessment but also throughout assessment because it gives a individually

working researcher the opportunity to communicate preliminary results in order to enhance the transparency of the research.

5. What is the region-based adaptive capacity of the Ems Dollard estuary?

The region-based adaptive capacity of the Ems Dollard estuary is slightly negative. Especially the indicators fair governance, collaboration and learning contribute to this end result. There is a clear tension between the authorities involved and the needs for adaptation. Although information is in most cases accessible, it seems that transparency & openness, and accountability are only encouraged in a limited matter. In addition, when fair governance scores slightly negative it is not surprising that collaboration scores slightly negative as well because collaboration very much benefits from fair governance. Having no clarity about who accounts for what makes the necessity of having a good visionary and entrepreneurial leadership even more important. (e.g. Gupta et.al., 2010) These are two assessment criteria that score slightly negative because of the fact that there is no appointed leadership in the Ems Dollard estuary. Subsequently, conflicting perceptions about the priority of measurements in the Ems Dollard estuary between ecologically oriented authorities, economy oriented authorities and administrative authorities at different decision making levels hinders the development and implementation of measurements at large scale. This results in the fact that there is less trust among the authorities involved in the Ems Dollard estuary in order to discuss doubts that truly focus on learning moments. What you see now is that learning only takes place on the existing institutional path (single-loop learning) rather than interpreting and changing existing routines. (see Pahl-Wostl, 2009)

However, although the outcome of the assessment seems quite negative at first sight there are also some positive points to report. Especially the indicator clarity about institutional culture scores relatively positive. It seems that all involved authorities acknowledge the fact that there are operational differences among them. These operational differences do not necessarily lead to miscommunication and/or less knowledge transfer. Furthermore it seems that, with an exception of the assessment criteria financial resources, respondents have the feeling that knowledge and expertise is presented well into region and that the networks available function well. However, a footnote to this statement is that respondents indicate that they do not know whether the available knowledge and expertise is sufficient enough and that the networks available, especially the important Economy & Ecology in balance network, needs some improvement when related to integrality.

5.2   Answering the research question

The central question in this study is; What is the role of the adaptive capacities of regional authorities in enhancing the resilience of the Ems Dollard estuary and how to assess such region-based adaptive capacity? The answer to this question is twofold. Based on literature review, participatory observation and interviews the study first focused on the conceptualization of region-based adaptive capacity and the relevance of assessing region-based adaptive capacity. Then, the indicators and measurement criteria for region-based adaptive capacity in the Ems Dollard estuary could be used to assess the region-based adaptive capacity of the Ems Dollard estuary.

The study started with a conceptual model in which the contextual factors for region-based adaptive capacity are expressed. These contextual factors are; a) shifts in planning practice, b) decentralization, c) multiplicity of actors, d) uncertainty about future developments in Social Ecological Systems. Because of the shift in planning practice from functional planning towards more integrated planning, in other words from a technical- towards a communicative rationale (see De Roo, 2007), together with a transfer of activities from the central government to authorities at lower decision making levels, the amount of actors involved in decision making processes

increased. In the meantime, policy makers more and more acknowledge the fact that not everything can be planned upon because there will be future situations of which we do not know that we do not know them. (Termeer & Van den Brink, 2013) There is thus and increased amount of uncertainty that planners need to take into account while planning. Because social systems and ecological systems are more and more interwoven with each other, together with the fact that the social component in Social Ecological Systems is the one that causes most changes, this study has focused on the capacities of the management side of such Social Ecological Systems. In an ideal situation, planned activities can be adapted to the new circumstances. However, in order to formulate adaptation policies it should be clear for a system what capacities are needed in order to formulate such adaptation policies. Because of the differences in adaptive capacities throughout a variety of systems, adaptive capacity is very much context-specific. (Tol et.al., 2008) This is where the relevance of the concept of region-based adaptive capacity comes into play.

Region-based adaptive capacity in this study focuses specifically on the Ems Dollard estuary meaning that the indicators for region-based adaptive capacity are also formulated for this region in specific. The assessment of the region-based adaptive capacity of the Ems Dollard estuary focuses on those authorities on the Dutch side of the border that have decision making responsibilities in the estuary, these authorities are referred to in this study as regional authorities. Adaptive capacity itself needs to be seen as a bridging concept between vulnerability literature and resilience literature. (Engle, 2011) Whereas vulnerability has its roots in hazard-risk management, resilience focuses more on the following three basic assumptions; a) de magnitude of shock that the system can absorb and remain within a given state, b) the degree to which the system is capable of self-organization and c) the degree to which the system can build capacity for learning and adaptation. (Carpenter et.al., 2001; Holling, 2001 as cited by Folke et.al., 2002) Appropriate management is a key element when it comes to building resilience or destroying resilience. Furthermore, policy makers need to incorporate uncertainty while planning for the future. Resilience aims to take into account these uncertainties and is therefore widely acknowledged as a new approach in which uncertainty can be incorporated into planning. (Davoudi et.al., 2012 as cited by Restemeyer et.al., 2014) Now that the concepts of region-based adaptive capacity and resilience are clear, the connection can be made with the Ems Dollard estuary. The result of the assessment of region-based adaptive capacity in the Ems Dollard estuary is slightly negative. Answers given to the interview questions by representatives of the regional authorities lead to the conclusion that the adaptive capacities of all these authorities together is not sufficient in enhancing the resilience of the Ems Dollard estuary. Main arguments for this relate to the indicators fair governance, collaboration and learning. It is not clear in the Ems Dollard estuary who is accountable for what resulting also in less transparency & openness. When fair governance scores relatively negative, it is not surprising that collaboration between all involved authorities remains hard to establish. Furthermore there is no clear leadership function established while visionary- and entrepreneurial leadership are very important in enhancing the adaptive capacity of system. Leadership is essential in shaping change and reorganization by providing innovation in order to achieve the flexibility needed to deal with the dynamics of Social Ecological Systems. (Folke et.al., 2005) Moreover, when collaboration does not deliver smooth cooperation it is not surprising that authorities in the Ems Dollard estuary state that learning only takes place on the level of the existing institutional path (single-loop learning) rather than interpreting and changing existing routines. (Pahl-Wostl, 2009) According to the assessment of region-based adaptive capacity in the Ems Dollard estuary, it can thus be concluded that the adaptive capacities of regional authorities in the Ems Dollard estuary influence the resilience of the area.

The above conclusion could only be made by first investigating what region-based adaptive capacity is, why it is relevant to develop such a concept and how to assess region-based adaptive capacity. The first two components of the enumeration here are already answered, however the last component asks for an additional explanation. Region-based adaptive capacity is assessed through a set of five indicators (resources, fair governance, collaboration, learning and clarity about institutional culture) and 17 measurement criteria. These indicators and measurement criteria are together put into a wheel (based on the adaptive capacity wheel by Gupta et.al., 2010) in order to make it easy for the reader to understand how the indicators and measurement criteria relate to each other. Via a five step method starting with a good preparation of the research, followed by the collection of data, then the analysis of the data takes place resulting in an interpretation of the data and finally all data can be communicated and presented to those who have a direct relation to the results and/or those who are interested in the results of the research. Furthermore a calculation method has been developed in order to make it easier to classify the results in a particular category (positive, slightly positive, neutral, slightly negative, negative), together with a footnote that when the researcher is on his or her own the last step in which the data is communicated and presented also needs to take place throughout the research in order to meet transparency of the research.

5.3   Recommendations

The results of this study together with the discussion described in the previous paragraph, give reason to make some recommendations in this paragraph. The recommendations focus on the whole governmental system in the Ems Dollard estuary which directly relate to the position of the Province of Groningen within the area.

Up till now it is unclear at a national level what exactly should be done in the Ems Dollard estuary in order to improve the ecological quality. Because there is a lack of agreement about the content, different organizations make promises to organizations whereas others have no idea that these promises are made. This has also to do with the fact that the purpose of planning in the Ems Dollard estuary is not clear. If all organizations agree upon the purpose of ecological restoration then the end of the negotiation process is already 'visible'. But what you see here is that the line of thinking of the one organization is ecological restoration whereas other organization focusses on expansion of activities. What is lacking is a negotiation platform on which these tensions are discussed among organizations. Economy & Ecology in balance portrays itself as being such a negotiation platform, however the ideas behind this network should then change more in the direction of *towards* economy and ecology in balance. There is simply no balance between the two at this moment. What is needed is a core team that focuses on what the leading principle is in this area. To establish such a core team it is advisable for the Province of Groningen to look at how collaboration within the Wester Scheldt estuary is organized. Via organizations such as Deltares, knowledge is now shared between the two estuaries. However this does not relate to how collaboration between the Flemish and the Dutch is organized. A meeting could therefore be organized with representatives of the Province of Zeeland about their role in the Wester Scheldt estuary and how responsibilities are shared among the different organizations.

The second recommendation relates to the one described above. It would be advisable to establish an Ems Dollard Commission with its own executive secretary and a building in which different organizations meet. All authorities on the Dutch side of the estuary admit that there are differences in culture between authorities and within authorities. These cultural differences are accepted and do not necessarily lead to miscommunication or no knowledge transfer. The first step towards such a Commission is thus already on track. What is lacking though, is that the problem(s) should be shared from within content instead of process because only then commitment can occur. However when it comes to management, the collaboration with Germany should also be taken into

account. A good example of differences between the Netherlands and Germany in the Ems Dollard estuary is the way both countries deal with Nature 2000 policy. In the Netherlands, the Ministry of Economic Affairs develops targets on which the analysis is based whereas in Germany one first looks at what developments take place in the area and what is our target concerning nature that we want to reach in the future. What you see here is that in fact the opposite takes place in both countries. There is a difference in methodology and when you do not talk about this difference you will always talk past one and another. You should therefore look how you want talk with each, how you stay in contact and how both methodologies could be merged. In the Wester Scheldt estuary this is organized via a Commission in which the content is coordinated at the highest administrative level by focusing on the three pillars safety, nature and accessibility. These pillars are divided into working divisions with a project leader from both the Netherlands and Flanders (in the Ems Dollard case that would be the Netherlands and Germany). The commission has the responsibility to formulate a long term vision for the estuary and to do a five year evaluation of which the results are discussed in the Lower chamber (in Dutch: Tweede Kamer). Such a Commission could place the Ems Dollard estuary on the political agenda which means that there will be a constant interest in what developments take place in the area. In order to establish such a Commission it is advisable to get a closer look at the Eems Dollard Regio (EDR) because this organization already has the contacts with neighboring municipalities on the German side of the border. Although the organization itself is small, they could facilitate collaboration between both countries. This has to do with the fact that half of the employees is German and half of the employees is Dutch. But, the Province of Groningen should get in touch with the EDR by themselves because the EDR is not constantly going to offer their divers services.

It is also advisable to follow suit when it comes to the capacity of the harbours in the Ems Dollard estuary to become world harbours. The harbours are situated in the periphery between Antwerp, Rotterdam and Hamburg. Seen from an ecological point of view the estuary is very rosaceous, it has the chance to be improved. However this means that you should have the boldness to admit that the whole economy is also situated in the periphery. An example is Moerdijk, this harbour keeps positioning itself as if it is very much something (according to some respondents spoken). A continuous lobby takes place at this level. What you should do however is admitting that all harbours between Antwerp, Rotterdam and Hamburg are situated in the periphery which asks for a different approach. Then you could look more into nature inclusive actions instead. For nature inclusive actions to take place, room for experimenting is needed. This could be met by forgetting about the rules and laws, the border and the disputed area in order to create a zone which is rule free. Such a zone could be used to see which actions and developments could then take place and influence the ecological status of the estuary in a positive manner.

5.4 Reflection

For the Ems Dollar estuary to prepare adaptation policies it is necessary to stimulate fair governance, collaboration and learning more than that is done nowadays. In particular the capacity of having clear leadership that focuses, among others, on who is accountable for what makes it easier for all involved regional authorities to collaborate with- and learn from each other. This is at the moment done insufficiently. The region-based adaptive capacity wheel proved to be a useful method to gain insight into the adaptive capacities of regional authorities in the Ems Dollard estuary. Moreover the wheel proves to be useful to communicate the current weaknesses in adaptive capacities for regional authorities in the Ems Dollard estuary. In addition to this, as proposed by van den Brink et.al. (2011) as well, the wheel proves to be an efficient method to compress a large amount of information in a concise and communicative overview.

However the region-based adaptive capacity wheel developed in this study also asks for some additional points at which attention should be paid before using the wheel in other studies. The wheel shows a heterogeneity of indicators and measurement criteria. The complexity of the Ems Dollard estuary, related to the different tasks and responsibilities of all involved authorities, made it very demanding to score the measurement criteria and indicators. For example trust is seen as a measurement criteria for learning whereas answers given by the respondents related to trust in some cases not referred to learning but more to the measurement criteria transparency & openness. This example shows the interrelatedness of the indicators and measurement criteria. It is therefore advisable to discuss the indicators and measurement units identified for region-based adaptive capacity in future studies with an expert in the region or the field of research. In this study the researcher choses to test the indicators and measurement criteria with two experts in the field of nature conservation practice and water management. Although these experts were able to identify some missing measurement criteria they are not stationed in the Ems Dollard estuary itself which made it hard for them to really understand the complexity in this region.

The region-based adaptive capacity wheel communicates and represents the results via a scoring system. Although a grey-shade scoring system is non-judgmental and provides a neutral evaluation of the criteria (see Gupta et.al., 2010), the researcher choses to use a traffic light system ranging from red to green. Because not all statements made by the respondents fit into a three category model, the researcher choses to add additional categories (light green for slightly positive and orange for slightly negative). However the colours are strong messengers and suggest priorities of action. In any specific case where the region-based adaptive capacity wheel is going to be used it is therefore important to explain why the colours scored the way they scored which leaves the option open for policymakers to decide what measurement criteria needs priority. Moreover because of the interrelatedness of the measurement criteria it could well be that while giving priority to one measurement criteria immediately results in an improvement of another measurement criteria. A clear understanding of the relatedness of indicators and measurement criteria in the region-based adaptive capacity wheel is therefore needed in future research.

Assessing region-based adaptive capacity very much relates to specific characteristics of a region. Therefore the region-based adaptive capacity wheel proposed in this study is not universally applicable in all regions. Whereas there are some general principles that are suitable for most regional situations such as trust, transparency & openness and leadership, some of the measurement criteria defined in this study definitely need some adaptation. Moreover it is necessary to identify what is meant with regional authorities and region itself. A clear delineation of the research is advisable because the study should not leave any space open, when it comes to the key principles of the study, for the own interpretation of the reader.

Besides the challenges of the region-based adaptive capacity wheel developed and used in this study some other reflections about this study can be made. First of all questions could be raised why this study focuses only on Dutch regional authorities in the Ems Dollard estuary whereas the estuary is shared with Germany. This question can easily be answered; although the researcher has made several attempts to speak with German authorities in the Ems Dollard estuary it proved to be difficult to get in touch with these authorities. The initial idea of this study was to assess collective region-based adaptive capacity in the Ems Dollar estuary. Because only Dutch authorities could be reached, the researcher decided to not focus on collective region-based adaptive capacity anymore. However, because the estuary is shared with Germany some of the recommendations made in this study should also take into account authorities on the German side of the border. This implies that not all of the

conclusions based on this study are applicable for the entire Ems Dollar estuary and that, for a clear picture of the entire area also an assessment of region-based adaptive capacity of German regional authorities is needed.

When it comes to the reliability of data, it must be stated that participatory observation influenced the results. The researcher attended several meetings and was sometimes asked to participate in the discussion as well. Although the researcher took her objectivity into consideration carefully, the opinions of representatives from the different organization partly influenced which respondents were asked for an interview. Moreover, some statements in this research are based on observations and general feelings of the researcher during meetings, a reference of these statements is therefore not always present. In addition to this it must be said that cross-referencing about the results of this study was impossible because the researcher acted on her own. Although she tried to meet as much transparency with the analysis of the data collected by communicating preliminary results within the meetings she attended, the research would have been more transparent when the results of the scoring could have been compared with the interpretation of the results by other researchers.

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Appendix A: List of meetings participated by the researcher

This appendix gives an overview of the meetings in which the researcher was either involved or participated. The list shown is ordered chronologically by the date of the meeting.

- Meeting: Representative Staghouwer Province of Groningen

    Kick-off. Getting to know each other and explaining the research objective in relation to the IMP and MIRT process.

- Meeting: IMP

    Regular two weeks meeting of the 'Stuurgroep'. Informing and discussing the status of the IMP process.

- Meeting: EZ

    Designation of the Ems-Dollard estuary with status 'Behoud'.

- Meeting: Waddensea Forum

    Discussing the status, ongoing processes and stakeholder intervention in the Wadden sea region. (trilateral cooperation between the Netherlands, Germany and Danmark)

- Meeting: Representative Staghouwer Province of Groningen

    Discussing the current status of the IMP and ongoing processes. Also the collaboration with Germany and the representatives on the German side of the estuary are being discussed.

- Meeting: Measurement papers IMP

    Combining information about the estuary with practical application of measurements. A collaboration between the Province of Groningen, Rijkswaterstaat and Royal Haskoning.

- Meeting: MIRT

    Defining a cooperation strategy with Germany, the results of the process and the bottlenecks in cooperation. In general: defining the different steps and tracks in the MIRT process. Facilitated by P2 Project agency.

- Meeting: IMP

    Regular two weeks meeting of the 'Stuurgroep'. Informing and discussing the status of the IMP process.

- Meeting: Representative Staghouwer Province of Groningen

    Explaining and reporting the progress in the IMP and MIRT process. Main focus on collaboration and governance strategies.

- Meeting: IMP

    Meeting with the 'Stuurgroep'. Informing and discussion of the status of the IMP document and the writing progress of the chapters.

- Meeting: MIRT

    Explaining and reporting progress in the 'MIRT onderzoek'. Discussing the main
    targets of the program and defining what the collaboration strategy with all relevant stakeholders
    should be.

- Meeting: Program 'Dubbele dijken en Rijke dijken'

    Explaining the concept of, and the spatial development of two new dike initiatives in order to
    promote innovation in the agricultural sector, water safety and nature development.

- Meeting: Department of Rural Affairs and Water

    Discussing the future direction of nature policy, how this is going to be filled in and who the
    responsible institutions/organizations are.

- Meeting: Program 'Naar een Rijke Waddenzee, Economy & Ecology in balance

    Information day with all stakeholders involved in the Ems Dollard estuary about policy
    processes/products and the involvement of the national governmental. Also discussion platform
    about processes going on at the moment.

- Meeting: MIRT- risk analysis

    Explaining and reporting the progress in the 'MIRT onderzoek'. Discussing the main targets of
    the program and definining what the collaboration strategy between all relevant stakeholders
    should be. Facilitated by P2 Project agency.

- Meeting: MIRT integration

    Presentation of the data collected by Deltares in the framework of pillar number one (problem
    description) After this presentation, integration of all pillars (problem description, governance,
    finance and economy) in order to formulate how to continue from now on to the end of the year.
    (BO MIRT end of October 2015)

- Meeting: IMP

    Launching the IMP document and collecting the first internal reactions on the document

- Meeting: IMP

    Discussing the external reactions on the documents to see how the document could be
    improved

- Meeting: MIRT

    Explaining and reporting progress in the 'MIRT research'. Discussing the main
    targets of the program and defining the (ecological) problems in the area

- Meeting: Application European subsidies

    Discussing and defining whether INTERREG A could be used in the Ems Dollard estuary in
    order to transform the area into a resilient estuary.

Appendix B: Action plan for interviews

The interviews started with an explanation of the research, the purpose of the research and the status of the research. After this explanation the respondent was asked to take a closer look at the adaptive capacity wheel designed for this study and room was made for questions about the wheel.

As mentioned in the methodology, paragraph 4.2.4, the interviews can be characterized as semi-structured. However the researcher made sure that all predefined questions were answered by the respondents, the rest of the time was used for open questions or by questions. Therefore the questions in the table below only served as a guideline, by questions are not formulated in this table.

The interview rounds

As mentioned in the methodology, the interviews are subdivided into three rounds. The first round of interviews aims to get information about region-based adaptive capacity and its indicators. The second round of interviewing aims to assess region-based adaptive capacity in the Ems Dollard. The third round of interviewing is meant to make a parallel with the Wester Scheldt estuary in order to make recommendation related to the assessed region-based adaptive capacity in the Ems Dollard estuary. The main purpose of these interviews was to see how difficulties in collaboration are dealt with in the Wester Scheldt estuary and which parties in the Ems Dollard can deal with the difficulties related to the assessment of region-based adaptive capacity in the Ems Dollard estuary.

Interview questions first round of interviews:
- What is, according to you, adaptive management?
- Are there specific elements that need to be taken into account when taking adaptive management into consideration?
- What is difference between traditional management and adaptive management?
- How would you define adaptive capacity?
- How do you think adaptive management will manifest itself in the future?
- What is adaptive delta management?
- How would you approach an adaptive management strategy for the Ems Dollard estuary?

Interview questions third round of interviews:
- Could you tell me something about collaboration in the Wester Scheldt estuary? How is this formally arranged between organizations/
- What were the challenges and difficulties when it comes to collaboration in the Wester Scheldt estuary?
- How do you deal with institutional differences in culture between organizations on both sides of the border?
- What is the advantage of having a Wester Scheldt Commission?
- Do you think the Wester Scheldt model is applicable in the Ems Dollard estuary?
- Which challenges and difficulties would you define for the Ems Dollard estuary when it comes to collaboration?
- How is the national government involved in policy processes in the Wester Scheldt estuary?
- How are financial resources of the national government attracted in the Wester Scheldt estuary?
- Could the current organization of measurements in the Wester Scheldt estuary be defined as adaptive?
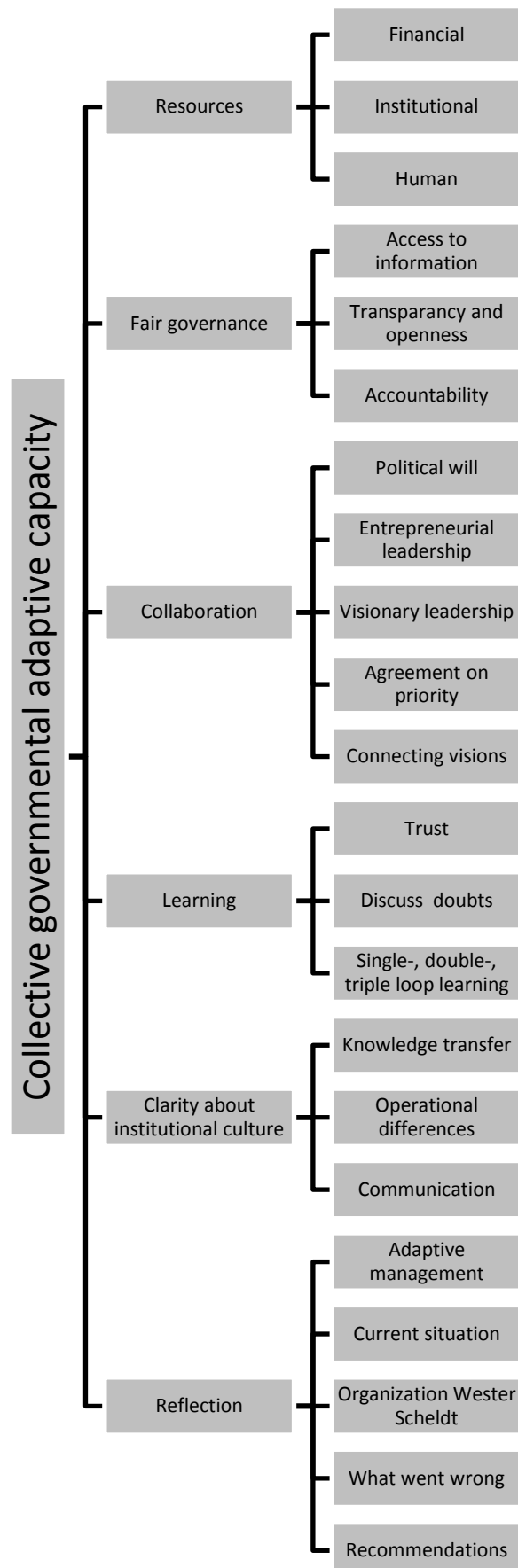
Interview questions second round of interviewing:

Resources	Are there enough resources available in the Ems Dollard estuary in order to develop a management strategy? - think of financial resources, people and knowledge, formal and informal networks that promote collective action. - are there resources missing? Could you think of a reason for that?
Fair governance	How would you describe the way management is currently organized in the Ems Dollard estuary? - Is information shared between all organizations? - would you define management in this area as legitimate, open, transparent? Why? Dilemma's?
Collaboration	How would you define the optimum collaboration between the Netherlands and Germany? And between the organizations in the Netherlands? - do you have the feeling that the published visions in policy documents connect to each other? - are short- and long term matched? Do all organizations work towards one future vision? - how concrete are the plans? - how would you describe the priority of the Ems Dollard estuary at the political agenda? - are there clear defined moments defined on which decision making takes place?
Learning	Do you have the feeling that you relive situations? - could you tell something about how collaboration takes place between the organizations at the moment? Is there mutual trust? Are doubts discussed? - are routines and methods throughout the process of coming to an integral plan improved and re-interpreted? Are they tested against the background of new visions?
Clarity about institutional culture	Do you have the feeling that there are differences in institutional culture between the organizations in the Ems Dollard estuary? Is this also the case when it comes to the Netherlands and Germany? - Do you have the feeling that because of these differences less knowledge transfer takes place? - Do these differences hinder collaboration between organizations? Is the ground for that communication? - What is, according to you the biggest dilemma in collaboration between the Netherlands and Germany? And between the organizations?
Reflection	- When you reflect on all policy documents that are delivered in the past years, what do you define as a milestone? - When you could change one thing in the Ems Dollard estuary, what would that be? - How do you think about the future of the Ems Dollard estuary?

Interview process

All respondents gave permission to record the interview. These interviews are recorded via smartphone and accessible per cd rom (on request). After the interview, the researcher made a transcript of the conversation and send this transcript to the respondent. The respondent was able to change, add or remove statements in the transcript. Then, the transcript was send back to the researcher and the respondent confirmed that the transcript could be used for this study. As the information given by the respondents contains confidential information, the researcher decided to not publish the names of the respondents in the study. Furthermore, some respondents asked to not publish the transcript within the final report. Therefore the researcher decided to publish the transcripts in a separate document only available for inquiry by the Universities at which the researcher completed the Master program.

Collective governmental adaptive capacity

- Resources
  - Financial
  - Institutional
  - Human
- Fair governance
  - Access to information
  - Transparancy and openness
  - Accountability
- Collaboration
  - Political will
  - Entrepreneurial leadership
  - Visionary leadership
  - Agreement on priority
  - Connecting visions
- Learning
  - Trust
  - Discuss doubts
  - Single-, double-, triple loop learning
- Clarity about institutional culture
  - Knowledge transfer
  - Operational differences
  - Communication
- Reflection
  - Adaptive management
  - Current situation
  - Organization Wester Scheldt
  - What went wrong
  - Recommendations

Appendix D: Explanation results region based adaptive capacity

Example calculation with 15 quotes

Dark green: ++ = +2

Green: + = +1

Yellow: +/- = 0

Orange: - = -1

Red: - - = -2

Dark green: 2x15 = +30

Green: 1x15 = +15

Yellow: range from 5 to -5 *

Orange: 1x-15 = -15

Red: 2x-30 = -30

* Yellow (neutral) is always one third above zero and one third below zero otherwise it is very unlikely that a measurement unit could score neutral. The researcher choses for one third because than the ranges in green (slightly positive), yellow (neutral) and orange (slightly negative) then all have the same size.

Results calculation measurement criteria

Resources	Total quotes: 56

Institutional (27 quotes)

++ = 28 – 54

+ = 10 – 27

O = 9 – -9

- = -10 – -27

-- = -28 – -54

++ = 2 → 4

+ = 6 → 6

O = 6 → 0

- = 10 → -10

-- = 3 → 6

Answer: -6, *neutral* (9 - -9)

Financial (12 quotes)

++ = 13 – 24

+ = 5 – 12

O = 4 – -4

- = -5   – -12

-- = -13 – -24

++ = 0 → 0

+ = 0 → 0

O = 1 → 0

- = 7 → -7

-- = 4 → -8

Answer: -15, *negative* (-13 - -24)

Human (17 quotes)

++ = 18 – 34

+ = 7 – 17

O = 6 – -6

- = -8 – -17

-- = -18 – -34

++ = 0 → 0

+ = 4 → 4

O = 5 → 0

- = 6 → -6

-- = 2 → -4

Answer: -6, *neutral* (6 - -6)

          Total quotes: 74

Access to information (27 quotes)

++ = 28 – 54   ++ = 2 → 4

+ = 10 – 27   + = 7 → 7

O = 9 – -9   O = 10 → 0

- = -10 – -27   - = 7 → -7

– = -28 – -54   -- = 1 → -2

                                       Answer: 2, *neutral* (9 - -9)

Accountability (13 quotes)

++ = 14 – 26   ++ = 0 → 0

+ = 4.35 – 13   + = 2 → 2

O = 4.34 – -4.34   O = 5 → 0

- = -4.35 – -13   - = 5 → -5

– = -14 – -26   -- = → -10

                                       Answer: -14, *negative* (-14 - -26)

& Openness (34 quotes)

++ = 35 - 68   ++ = 2 → 4

+ = 11.35 – 34   + = 4 → 4

O = 11.34 – -11.34   O = 10 → 0

- = -11.35 – -34   - = 13 → -13

– = -35 – -68   -- = 5 → -10

                                       Answer: -28, *slightly negative* (-11.35 - -34)

Collaboration   Total quotes: 163

Agreement on priority (31 quotes)

++ = 32 – 62   ++ =1 → 2

+ = 10.34 – 31   + = 6 → 6

O = 10.33 – -10.33   O = 8 → 0

- = -10.34 – -31   - = 7 → -7

– = -32 – -62   -- = 9 → -18

                                       Answer: -17, *slightly negative* (-10.34 - -31)

Connecting visions (64 quotes)

++ = 65 – 128   ++ = 0 → 0

+ = 21.35 – 64   + = 10 → 10

O = 21.33 – -21.33   O = 4 → 0

- = -21.34 – -64   - = 35 → -35

– = -65 – -128   -- = 15 → -30

                                       Answer: -55, *slightly negative* (-21.34 - -64)

Entrepreneurial leadership (28 quotes)

++ = 29 – 56

+ = 9.34 – 29

O = 9.33 – -9.33

- = -9.34 – -28

-- = -29 – -56

++ = 1 → 2

+ = 4 → 4

O = 5 → 0

- = 6 → -6

-- = 12 → -24

Answer: -24, *slightly negative* (-9.35 - -28)

Political will (25 quotes)

++ = 26 – 50

+ = 8.34 – 25

O = 8.33 – -8.33

- = -8.34 – -25

-- = -26 – -50

++ = 0 → 0

+ = 10 → 10

O = 8 → 0

- = 5 → -5

-- = 2 → -4

Answer: 1, *neutral* (8.33 - -8.33)

Visionary leadership (15 quotes)

++ = 16 – 30

+ = 6 – 15

O = 5 – -5

- = -6 – -15

-- = -16 – -30

++ = 0 → 0

+ = 2 → 2

O = 4 → 0

- = 4 → -4

-- = 5 → -10

Answer: -12, *slightly negative* (-6 - -15)

Learning	Total quotes: 51

Discuss doubts (8 quotes)

++ = 9 – 16

+ = 2.67 – 8

O = 2.66 – -2.66

- = -2.67 – -8

-- = -9 – -16

++ =2 → 4

+ = 1 → 1

O = 0 → 0

- = 4 → -4

-- = 1 → -2

Answer: -1, *neutral* (2.66 - -2.66)

Single-, Double-, Triple-loop learning (33 quotes)

++ = 34 – 56

+ = 12 – 33

O = 11 – -11

- = -12 – -33

-- = -34 – -66

++ = 0 → 0

+ = 5 → 5

O → 4 → 0

- = 12 → -12

-- = 12 → -24

Answer: -31, *slightly negative* (-12 - -33)

Trust (10 quotes)

++ = 11 – 20   ++ = 0 → 0

+ = 3.34 – 10   + = 0 → 0

O = 3.33 – -3.33   O = 4 → 0

- = -3.34 – -10   - = 4 → -4

-- = -11 – -20   -- = 2 → -4

                                                   Answer: -8, *slightly negative* (-3.34 - -10)

Clarity about institutional culture	Total quotes: 54

Communication (14 quotes)

++ = 15 – 28   ++ = 0 → 0

+ = 4.67 – 14   + = 4 → 4

O = 4.66 – -4.66   O = 4 → 0

- = -4.67 – -14   - = 6 → -6

-- = -15 – -28   -- = 0 → 0

                                                   Answer: -2, *neutral* (4.66 - -4.66)

Knowledge transfer (12 quotes)

++ = 13 – 24   ++ = 0 → 0

+ = 5 – 12   + = 4 → 4

O = 4 – -4   O =2 → 0

- = -5 – -12   - = 4 → -4

-- = -13 – -24   -- = 2 → -4

                                                   Answer: -4, *neutral* (4 - -4)

Operational differences (28 quotes)

++ = 29 – 56   ++ = 7 → 14

+ = 9.34 – 28   + = 9 → 9

O = 9.33 – -9.33   O = 6 → 0

- = -9.34 – -28   - = 5 → -5

-- = -29 – -56   -- = 1 → -2

                                                   Answer: 16, *slightly positive* (9.34 – 28)