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Adaptive Governance in Practice: Towards Climate Resilient Water Management in Dutch Coastal Agriculture

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Abstract
This study investigates the practical merits and limitations of adaptive governance, an approach aimed at guiding the intricacies of climate adaptation in complex socio-technical ecological systems. Despite its recognition as a key strategy, questions persist regarding the potential of adaptive governance as a vehicle for meaningful adaptive change. To address this gap, this paper investigates the governance context of the water-adaptation process to drought and salinity in The Netherlands, with a focus on coastal agriculture in the northern Netherlands. Using an interpretative science approach, the study delves into the experiences and subjectivities of stakeholders engaged in adaptation initiatives combating water-related challenges through semi-structured and conversational interviews. The study presents an exploration of central adaptive governance elements (polycentricity; knowledge and learning; leadership; flexibility and variety; and communication) in theory and relates these to the reality of involved actors. The findings reveal how the aspired polycentric and flexible nature of adaptive governance negatively affects the other elements in practice by affecting collaboration and motivation for adaptation, and observes that (perceived) central leadership is much less influential than expected. The findings contribute to our understanding of the governance of lasting adaptivity, highlighting that the adaptive governance paradigm, although it remains useful, must be re-evaluated for contemporary use. Opportunities for the field are discussed.

Keywords: Adaptive governance, sustainable change, environmental governance, transformation, coastal water systems, water adaptation, interpretative

1. Introduction

Climate adaptation has become a societal process that cannot be viewed as a singular and persistent technological obstacle to be solved, but must be seen as a new undertaking, something that includes the social collaboration, management, and meaning-making processes present in society (Dunlap 2015; Klinenberg et al., 2020). Various authors in the fields of public administration and sociology therefore argue in their work on environmental sustainability that we have a duty to step away from the conventional technocratic governing, aimed at 'fixing' climate-affected arenas (Plummer & Armitage, 2010; Chaffin et al., 2016; Partelow et al., 2020). Sectors such as agriculture, water management, and infrastructure require changing how we approach and view governance in order to bring about meaningful adaptive change (Pahl-Wostl et al., 2013; Gupta et al., 2013; Van Buuren et al., 2014; Dunlap, 2015). However, there is currently insufficient understanding in how to go about this (Fedele et al., 2019; Visseren-Hamakers et al., 2021).

One governance theorem that emerged to cope with these changing circumstances is Adaptive Governance. Adaptive Governance is an approach to managing the inherent complexity and uncertainty of socio-ecological-(technical-)systems. It concerns itself with the decision-making surrounding environmental topics by recognizing adaptability, flexibility, and interconnectivity in governance (Van Buuren et al., 2014; Munaretto et al., 2014; Sharma-Wallace, 2018). It is furthermore characterized by continual rapid strategic adjustments based on monitoring, experimentation, and learning (Chaffin et al., 2014; Schultz et al., 2015; Janssen & Van der Voort, 2016). Adaptive governance has emerged as a trusted strategy for combatting climate change (Paauw et al., 2022), as it gives support to governments, organizations, and communities on how to effectively strive, both independently and together, toward a more sustainable relationship with the environment (Folke et al., 2005; Lange et al., 2013; Chaffin et al., 2014; Partelow et al., 2020).

In recent years however, it has been called into question how (and if) the ambitions of adaptive governance present in the real world. Or in other words: if the key elements of Adaptive Governance truly manifest and support adaptive change (Marshall, 2015; Schultz et al., 2015; Valman et al., 2015; Fournier et al., 2016). Others have investigated if adaptive governance may even cause lacunae, and how this may affect involved actors (Hurlbert & Gupta, 2015; Cleaver & Whaley, 2018). Up till now, discussions aimed to discover if adaptive governance allows for fundamental change in systems (Ostrom, 2014; Eshuis & Gerrits, 2021), or if it merely causes shifts or reinforces the existing status quo (Chaffin et al., 2016; Termeer et al., 2017). Partly as a result of this, it has been debated what the concrete power of adaptive governance is as a vehicle for meaningful adaptation (Chaffin et al., 2016; Biddle & Baehler, 2019; Eshuis & Gerrits, 2021). Regardless of these criticisms, it is yet a highly popular governance paradigm when pursuing change (Mees et al., 2014; Paauw et al., 2022), calling for continued research into how far we are from the ideal manifestations of adaptive governance in practice. It is therefore imperative that an investigation takes place on which adaptive governance elements can be recognized in climate adaptation, and, following this, how adaptive governance presents itself in the real-world of water adaptation.

We do this in the context of adaptation projects in the northern areas of the Netherlands aimed at the long-term sustainability of water-use in agriculture. Focussing on The Netherlands is interesting as the country has a long history of agriculture and water management adaptations and innovation (Karel, 2013; Cultural Heritage Agency, 2018), both at the national level, as well as the more grounded local and regional levels, which we will look at. Furthermore, adaptive governance as a governance strategy is widely prevalent, especially in the context of water adaptation projects (Huitema et al., 2009; Van Buuren, 2014; Molenveld & Van Buuren, 2019). Currently, there are many projects that are a source for sharing experiences, learning, and community empowerment (LTO Netherlands, 2023), particularly in relation to drought and salinization of groundwater.

We aim to increase understanding on the real-world application of adaptive governance, engaging in the ongoing debate on the influence and legitimacy of the governance strategy (Schultz et al., 2015; Chaffin et al., 2016; Eshuis & Gerrits, 2021). Furthermore, as this paper will use an interpretative science approach (Yanow & Shea, 2015), focussing on the transdisciplinary experiences of local and regional actors, we are

able to garner valuable empirical insights into their day-to-day realities working in a climate-affected region. In order to present this, the paper keeps the following structure: after this introduction, the theoretical background of the topic is outlined, which is followed by presenting the case and research design. We then showcase the data we obtained and discuss our findings. This feeds into the conclusion where we identify possibilities for the field as well as the practical implications of the study.

2. Theoretical background

In order to investigate what governance elements aid or hamper adaptive change , it is imperative to first delineate what we understand adaptive governance to be, and what the key elements of adaptive governance are.

2.1 Governance for adaptation

Over the years, adaptive governance has emerged as an important way of confronting environmental problems in socio-ecological systems. It is concerned with changing governance regimes to be more adaptive by connecting the social, technological, institutional, economic, and cultural aspects of environmental governance in order to facilitate sustainability (Chaffin et al., 2014), either by supporting rapid responses to stresses or stacking 'small-wins' longer term (Termeer & Dewulf, 2019). It originates out of ideas stemming from the long history of adaptive management (Walters, 1986; Walters & Holling, 1990; Gunderson, 1999; Allen & Garmestani; 2015), and later adaptive socio-ecological-systems literature (Dietz et al. 2003; Folke, et al., 2005; Ostrom, 2009; Folke et al., 2010).

Where adaptive management helps to maintain critical resources and social-ecological system functions in response to change, adaptive governance is concerned with the rules, institutions and relationships that enable or constrain the adaptive management ability of actors in a social-ecological system (cf. Walker et al., 2004; Huitema et al., 2009). Starting from the 2000's, it has grown tremendously as a paradigm within the field of environmental governance, encompassing elements such as collaboration, learning, communication, capacity-building, inclusion, and agency (Pahl-Wostl et al., 2012; Chaffin et al., 2014; Cleaver & Whaley, 2018; Sharma-Wallace et al., 2018; Partelow et al., 2020).

We view adaptive governance as an approach concerning itself with the decision-making in socio-ecological-technical systems by recognizing adaptability, uncertainty, flexibility, and interconnectivity in governance (Van Buuren et al., 2014; Munaretto et al., 2014; Sharma-Wallace, 2018). It is characterized by continual strategic adjustments based on communication, monitoring, experimentation, and learning in order to deal with complexity (Cosens & Williams, 2012; Chaffin et al., 2014; Munaretto, et al., 2014; Fournier et al., 2016; Janssen & Van der Voort, 2020). Adaptive Governance seeks to enhance resiliency, sustainability, and adaptive capacity, and through this achieve adaptability and even transformability (Folke et al., 2010; Chaffin et al., 2014; Schultz et al., 2015).

2.2 Key characteristics of adaptive governance: a framework for analysis

In our review of adaptive governance literature, we uncovered a wide array of relevant and interconnected characteristics that would allow for effective adaptive governance. Our list of elements is not necessarily exhaustive, but the result of what we observed as central themes in our search, and combining these with our supplementary review of research from the environmental governance, socio-ecological-systems, adaptive capacity, and adaptive governance fields (for an overview, see table 1). Our list of key elements overlaps with previous work on summarizations of adaptive governance, adaptive capacity, and adaptive change (such as Huitema et al., 2009; Gupta et al., 2010; Munaretto et al., 2014; Chaffin et al., 2014; Wyborn, 2015; Fournier et al., 2016; Sharma-Wallace et al., 2018), and interacts with, as well as build-upon them, for use in contemporary settings.

For modern precursory frameworks, Munaretto et al. (2014) list fifteen determinants of adaptive governance for instance. While this exhaustive scheme allows for better delineation between sub-themes, we opted for broader categories to allow for width and clarity of analysis by combining elements such as

collaboration, polycentricity, and participation into one. Huitema et al. (2009) and Fournier et al. (2016) opt for a more succinct set of determinants, but, in various ways, critically omit some elements of adaptive capacity, community empowerment, inclusivity, leadership, and diversity for instance, present in other modern work (Gupta et al., 2010), which we assume to be weighty (sub-)elements. Lastly, our framework places communication as a central feature (Wyborn, 2015), rather than a sub-element of collaboration, such as Sharma-Wallace et al. (2018), as we perceive it to be crucial to the functioning of the other elements, and adaptive governance as a whole.

The literature review below can be characterized as a critical systemized and qualitative review (Grant & Booth, 2009), with the aim of finding central narratives in the literature in an adaptable manner. This means that our review of literature included elements of systematic reviews, such as (quality) assessment, reviewing, synthesising, tabling, et cetera, but remained one step away from being fully systematic. As such, we base our framework on purposeful sampling of a larger number of articles (47, alongside works that we opted to exclude), but remained one step from using exhaustive search queries and extracting data from this (Grant & Booth, 2009). We did aim to structure and present our framework in a way that resembles systematic reviewing based on articles that best fit our research design (table 1.).

Table 1. Theoretical framework of central features of adaptive governance

Element	Summary description	Key reference(s)
Polycentricity	Multiple (shared) centres of power and modes of governance with considerations to scale, supported by bridging actors. Adequate multi-actor top down and bottom-up participatory governance, with considerations to autonomous change, community empowerment, and capacity building.	Folke et al., 2005 Huitema et al., 2009; Olsson et al., 2006 Marshall, 2015
Knowledge, learning & experimentation	Inclusive and pervasive knowledge management and generation, including relational learning, use of social memory, single-double-triple-loop learning, and experimentation and monitoring.	Gunderson & Light, 2006; Pahl-Wostl, et al., 2009; Cvitanovic et al., 2015
Leadership	Existence of central figures that create a shared vision and agenda, lead networks, direct decision-making, take on risk, and provide trust and meaning through supporting fair governance principles.	Folke et al., 2005; Meijerink & Stiller, 2013
Flexibility & Variety	Allowing rapid adjustments, changes in deliberation, and the development of diverse frames and solutions under uncertainty, targeted at local or regional contexts, with access to resources that allow this.	Gunderson, 1999 Cosens & Williams, 2012
Communication	Adequate flow of information and data through inclusive stakeholder engagement, building social capital, conflict resolution, correct use of language, and transparency, supporting the other elements, both between actors and within organizations, facilitated by adequate platforms.	Crona & Bodin, 2006; Armitage et al., 2011; Wyborn, 2015

Supplementary sources: Dietz et al., 2003; Brunner et al., 2005; Pahl-Wostl, 2006; Lemos & Agrawal, 2006; Armitage et al., 2007; Ison et al., 2007; Ostrom, 2009; Armitage & Plummer, 2010; Folke et al., 2010; Gupta et al., 2010; Armitage et al., 2011; Munaretto et al., 2014; Chaffin et al., 2014; Meijerink et al., 2014;

Olsson et al., 2014; Schultz et al., 2015; Wyborn, 2015; Fournier et al., 2016; Janssen & van der Voort, 2016; Craig et al., 2017; Medema et al., 2017; Mortreux & Barnett, 2017; Nightingale, 2017; Bennett & Satterfield, 2018; Cosens, 2018; Cleaver & Whaley, 2018; Sharma-Wallace et al., 2018; Biddle & Baehler, 2019; Godden & Ison, 2019; Mees et al., 2019; Janssen & van der Voort, 2020; Alexandra et al., 2023; Koch et al., 2023.

Note: this framework was used to analyze water adaptation in coastal agriculture through the lens of adaptive governance

2.3 Polycentricity

Firstly, meaningful, multilevel, and multi-network collaboration between actors and across scales is key (Olsson et al., 2006; Huitema, 2009; Wyborn, 2015; Sharma-Wallace et al., 2018) in the ambitions of adaptive governance. Adaptive governance puts emphasis on decentralized distribution of decision-making authority and responsibility in order to combat problems and facilitate adaptation. The idea here is that effective governance involves multiple centres of decision-making, operating at different scales and levels, to address the complexities of socio-ecological systems in a more adequate manner (Huitema, et al., 2009; Biddle & Baehler, 2019).

Ideally, adaptive governance emphasizes a connected participatory collaboration process in order to include a wide array of stakeholders, most notably with the goal of incorporating bottom-up or indigenous knowledge in the governance process, which has been shown to support inclusive engagement, trust, and collective responsibility (Gupta et al., 2010). A result of this is the opportunity for autonomous adaptation for involved actors (Mortreux & Barnett, 2017). Furthermore, this process is supported by the sufficient existence of, and adequate access to, resources (Gupta et al., 2010), as well as the presence of bridging actors that connect and mediate between these diverse actors, in order to deliver shared solutions (Olsson et al., 2006; Munaretto et al., 2014).

2.4 Knowledge, learning & experimentation

Aspired adaptive governance embraces interdisciplinary and transdisciplinary knowledge creation and sharing, thus integrating insights from various disciplines and bridging scientific, professional, and local knowledge (Gunderson & Light, 2006; Chaffin, et al., 2014; Cvitanovic et al., 2015).

Learning is deeply connected to this, and essential in its power to shape the adaptation status quo (Gerlak et al., 2020; Pahl-Wostl et al., 2007). Adaptive management relies on learning from previous actions to improve interventions and strategies and building adaptive capacity (Gupta et al., 2010). Claudia Pahl-Wostl (2009) as well as Butler et al. (2015), emphasizes the importance of (relational) learning in social networks in order to strengthen the capacity for adaptation. It enables adaptive governance to navigate complexity, uncertainty, and achieve sustainable outcomes through the progressive steps of first, second, and third order learning (Pahl-Wostl, 2009), thus facilitating adaptivity by generating new routines and strategies, frames, and lastly: behaviours, values, and norms.

In the context of adaptive governance, experimentation plays a coupled and vital role in the creation and maintenance of knowledge and learning processes. Adaptive governance concerns itself with opening-up the space for innovative solutions, as well as the systematic testing of various strategies, policies and approaches for adaptive change in a more controlled environment, as well as monitoring of these (Huitema et al., 2009; Lee & Petts, 2013).

2.5 Leadership

Successful adaptive governance requires leading actors who can cultivate an arena where adaptive change is possible. They underscore a sense of awareness, urgency, legitimacy, understanding, engagement, and collective responsibility. Leading actors in the adaptive governance process articulate a compelling vision and purpose to inspire and guide stakeholders (Meijerink & Stiller, 2013). Furthermore, they assist in the

creation of social capital, promote resilience, facilitate trust, and steer decision-making processes, amongst other activities (Case et al., 2015; Folke, 2005; Pahl-Wostl et al., 2007; Meijerink & Stiller, 2013; Koch et al., 2023).

Adequate leadership guides decision-making processes that involve a myriad of actors by structuring their effective engagement through fair or 'good' governance (Gupta et al., 2010; Sharma-Wallace et al., 2018). Through this, linchpin actors foster a culture of reflection, transparency, knowledge-sharing, and sexperimentation (Meijerink & Stiller, 2013; Evans et al., 2015).

2.6 Flexibility and variety

Flexibility describes the capacity of government, as well as other institutions and communities, to dynamically create and adjust deliberations, arrangements, problem frames, and strategies in real-time (Gunderson, 1999; Cosens & Williams, 2012). Furthermore, it allows for the development of diverse solutions under uncertainty, targeted at local or regional contexts. Stakeholders must evolve with the challenges and uncertainties as the crop up or are being combatted, this flexibility enables adaptation by way of efficiently navigating unforeseen circumstances and problematics, enabling resilience and responsivity (Craig et al., 2017; Cosens, 2018).

In an ideal setting, adaptive governance allows for the intentional incorporation and management of a variety of diverse perspectives, problem frames, strategies, and approaches within the decision-making processes. The goal being the development of a multitude of problem frames and multiple solutions to deal with the wickedness of climatic problems at the same time (Munaretto et al., 2014).

2.7 Communication

Adaptive governance requires effective and adequate communication and communication strategies, with a focus on regular long-term exchanges between actors that focus on openness, compromises, inclusivity, and learning (Crona & Bodin, 2006; Armitage et al., 2011). Communication is central to the other key elements of adaptive governance as it supports the processes of the other elements by mitigating and avoiding conflicts; as well as fostering inclusive and meaningful cooperation (Wyborn, 2015). Concrete examples of this are sharing data, using understandable language, adequate knowledge sharing and knowledge sharing platforms, and inclusive information flows (Armitage et al., 2011; Koch et al., 2023)

This analytical framework will be used to examine the adaptation process in the coastal agriculture in the North of the Netherlands in the following sections using these criteria. While Adaptive Governance is often employed as a contextual concept or governmental strategy, explicitly looking at how the various sub-determinants of adaptive governance present themselves in the real, day-to-day world is rarer, and this research paper aims to fill this void.

3. Research design, case & methodology

This section will describe and outline the design of the research project, as well as the methods used for generating data; alongside the process by which the data was analyzed. As adaptation is deeply concerned with the manner in which humans interact, we have chosen to follow an interpretative and empirical research design (Andrade, 2009). As such, the focus of this design was on finding out the lived experiences of actors in their day-to-day realities (Gravetter & Forzano, 2018)

3.1 Case: Sustainable water adaptation projects in Northern Netherlands' coastal agriculture

As one of the largest water users, the agricultural sector is deeply affected by increasing water scarcity, resulting in shifts in governance of freshwater use in The Netherlands and Europe (Witte et al., 2020; Bartholomeus, 2023; European Environment Agency, 2012). Goals have been set up to allow for the mainstreaming of sustainability and adaptation in lieu of this (Noordzeeloket, 2013; Ministry of Infrastructure and Watermanagement, 2019). However, this appears to be a tough governance-mission with varying barriers such as inadequate policymaking, and lack of perceived efficacy (see, for instance: Biesbroek

et al., 2011; van Duinen, 2015; Biesbroek & Candel, 2020 for examinations).

This process has simultaneously been followed by the pursuit of adaptive governance in the Netherlands to reduce climate impacts of drought and salinization via strivings toward more legitimate, inclusive and flexible cooperation (Fournier et al., 2016; Molenveld & Van Buuren, 2019).

The chosen locale of the study is that of the north of The Netherlands, specifically the provinces of North-Holland, Frysland, and Groningen. Historically, it is an area vulnerable to climatic effects due to its geographical location near the Wadden- and North-Seas (Kabat et al., 2012), as well as the reliance on the Ijsselmeer Lake for freshwater in drier periods. Furthermore, it has a rich history of adaptive agriculture and water-management (Karel, 2013). In recent years, the national government has been pursuing sustainable and resilient water systems through the Deltaprogramma Zoetwater (Ministry of Infrastructure and Water Management (2019) in an integrated manner, with increased space for adaptation initiatives. This, amongst other processes, has led to a strong surge in projects aimed at adaptations in the water management system in the region, including but not limited to reducing freshwater demand, increasing freshwater availability, and water re-use by affected stakeholders. These include farmers, water authorities, knowledge institutes, NGO's, and lastly innovators, who are pushing new (technology-driven) adaptation initiatives (LTO Netherlands, 2023). These initiatives allow for an insightful look into the day-to-day realities of actors working in the process of adaptive change in the region.

Image 1. Map of the study area

3.2 Data gathering

In order to investigate adaptive governance in practice, data were obtained by performing semi-structured interviews with 23 experts, users, and other relevant stakeholders (appendix A in the 4TU.ResearchData repository) working in our case-area. Interviews are especially useful in generating interpretative data, as they allow in-depth insights into the thoughts, experiences, and stories of respondents toward a topic, phenomena, event, or history through open-ended and deep conversation (Bryman, 2016; Gravetter & Forzano, 2019).

We chose not to target specific projects, as we had the goal of forming an overlapping examination of the region as whole. The semi-structured interviews were supplanted with numerous conversational interviews, where the researchers spoke with respondents more informally in a 'walk-and-talk' manner for shorter periods at various locales, events, and organizations, facilitating a more comfortable and low-stakes environment. This more relaxed setting allows for more openness, as well as data based on specific inputs or experiences due to the locale (e.g. a presentation, an affected field, a task). In this way, triangulation between various settings was able to occur, leading to different insights into the lived experiences and subjectivities of actors (Creswell & Poth, 2017). These supplementary conversations were held with both initial respondents as well as new individuals.

The 23 semi-structured interviews were conducted between October and December 2023. Interviewees were recruited by contacting them based on their formal and public participation in pilot-projects, at various events discussing saline groundwater and drought, as well as snowballing. The respondents were selected based on their role within the field, where we aimed to garner a diverse group of individuals in order to gather data from many sides and geographical locations (consultants, advisors, policymakers, public servants, farmers, advocacy persons, researchers). This resulted in a set of respondents with a significant range of affiliations, which ultimately fit our research design as we aimed for both width and depth of data (Bryman, 2016). It must be noted however, that this selection strategy may result in clouded findings due to obfuscations and biases of researchers (Creswell & Poth, 2017).

The interview respondents have been anonymised to protect their privacy. The interviews lasted between 45 minutes and 2 hours, and were conducted both physically whenever possible, and through digital means when not. All interviewees were provided with both a verbal description of the study and data usage, as well as an informed consent form and verbal consent description, which was accepted prior or at the start of the interview. The interview questions focused on the determinants of adaptive governance, where the questions were also related to practical examples and experiences relating to working with adaptive solutions and governance, in order to gain empirical data by way of day-to-day stories and experiences (Creswell & Poth, 2017, see appendix B in the 4TU.ResearchData repository for the general interview protocol).

The conversational interviews were conducted at knowledge events aimed at drought and salinity (or both), as well as various pilot sites of both governance innovations and physical projects aimed at water-retention, water-storage, and drainage. These interviews were unstructured and open conversations, where the interviewer had certain themes to discuss but did not direct the conversation in any manner so as to give the interviewees space to give their insights into their experiences regarding adaptation (initiatives). These conversations lasted between 5 and 30 minutes. Prior to the data-gathering, ethical approval was requested and obtained through the HREC at the TU Delft University

3.3 Analysis

After obtaining the interview data, it was synthesized and subsequently summarized to be used in analysis, which involved stages of skimming, reading and interpreting the interview data, proposed by Glen Bowen (2009). During this stage, the information and data were organized into categories that are connected to the main research question, facilitating the emergence of themes and meanings pertaining to the research goals.

Following this, data analysis was done using the qualitative data analysis software Atlas.Ti. Firstly, an inductive approach was undertaken by identifying and setting-aside codes within the dataset as we examined it. The reason for this choice is so that a 'blank slate' type strategy could be applied, less uninfluenced by theory. Subsequently, another round of interpreting the codes and central statements was done, connecting them to adaptive governance theory in order to better contextualize them for the purpose of this research paper. This allowed the researchers to better link individual experiences of the respondents

towards more general themes of adaptive governance. The data was then systematically reviewed again in order to compare and synergize the two rounds of coding and to organize the data in ways that allowed the main empirical realities, meanings, and experiences within the data to present themselves for the presentation of results. Throughout this process, primary researcher kept a set of notes in order to further reflect on the data and steps taken.

4. Findings: the experience of adaptive governance as a vehicle for adaptation in coastal agriculture

Examining the contents of interviews pertaining to water-adaptation in agriculture revealed varying ways in which adaptive governance is presented in actual practice. The central themes of the analysis are congruous to the central themes of adaptive governance due to linking them to theory in the rounds of coding, but also due the encompassing nature of the theoretical concept more generally. Finally, as the findings are but an interpretation of the researchers, the (academic) background of the researchers and their views may have influenced the thematology.

Based on our analysis we present our findings along the five themes of the literature review. Before we continue it must be stated however, that there is (significant) interconnectivity between various (sub)themes and statements. In reality, they will flow into each-other much more than is shown here. With that being said, the topics are presented below and are summarised in table 2.

4.1 Polycentricity: responsibility, (dis)trust & fragmentation

Polycentricity, as proposed in adaptive governance, presented the central barrier in the real-world of coastal agricultural water adaptation, with the other themes being centred around this in some manner.

In the context of projects and interventions towards adaptive change, almost all the respondents brought up, in various ways, the manner in which “everyone” is responsible for adaptation, and that is for the best because then “everyone gets a kick under their butt to do something”. In this way, the structure of multi-level and multi-actor collaboration schemes is helpful in realizing adaptation, as it has led to a shared actionable frame and responsibility for adaptation interventions and behaviours. Furthermore, it has allowed for adaptation projects to come about in various locales, which “is easier when you actually have a voice”. Having multiple streams of decision-making, finance, and experimentation has opened up a space for innovations to come about in the region, something which is seen as a positive change, as “ten-twenty years ago it was not like that, good luck finding the right people then”. A seed of this is that access to resources is “supremely easy now”, which is something felt by farmers and innovators alike.

However, at the same time the polycentric structure presented as a major shortfall in practice. Now that the issue of climate adaptation of coastal agriculture has become something decentralized, it has taken on a more unfocused character due to the fractured nature. For some actors, sustainability and adaptation have become a “complete black box” besides the obvious idea of becoming more climate-friendly in the long-term. The ‘how’ is the culprit here. Farmers are (and are seen as) willing to take the expected responsibility for adaptive change by modifying their business process, but the steps to be taken towards this mission are not clear anymore as they are being influenced through multiple streams of decision-making (in and out of government), which is causing confusion and irritation, as “we do not know who is right”.

This effect also stems from the fragmented or ‘passed-on’ character of climate change adaptation, especially for farmers, who feel like the issue was just offloaded on “their already full plate”, who, then, are hand in hand with the provincial government, who are “overworked, understaffed, and overstressed”. While it was expected that the somewhat regional issues of salinity and drought were going to be passed down in some ways in the Deltaprogramma Zoetwater, this passing down has now caused much strife and distrust, which in turn has led to an unwillingness or uncaring view toward adaptation. It seems the regional authorities were unready to put this issue on their plate, and the national government exacerbated the issue by opening up the issue of climate change as a regional problem for bottom-up intervention too rapidly. Involved

stakeholders are now “waiting for the ministry to just pick up the problem again”.

4.2 Knowledge & Learning: availability, social memory, and experimentation

Information, data, and the expertise that stakeholders bring to the decision-making process was a second central theme. We identified three sub-themes as being critical to be considered to adaptive governance aspirations in regard to lacunae and actualities: availability, social memory, and experimentation.

Supporting inclusive and pervasive knowledge generation has had a two-fold impact in practice. One farmer mentioned that information is much too “heavy”, “scattered” and “bloated”, and feels like an “information overload”, leading to disinterest. Respondents echoed that a central and easy-to-understand platform must be set up to inform farmers of their rights, relevant regulations, relevant financial pathways, and other contextual information to deal with urgency and awareness on the topics of drought and salinity “easy and spelled-out”. On the other hand, however, multiple stakeholders identified that having more and more knowledge available, especially regarding salinization of groundwater, as a result of the recent local involvement is “crucial”, “we had no idea it was this bad really.” Knowledge events and ‘farmers’ evenings’ have been great boons in strengthening this. An opportunity regarding this theme is thus that through word-of-mouth and local community practices, the urgency and awareness towards adaptive change is increasing, which is seen by public officials, advocacy groups, and innovators alike.

A sub-element connected to knowledge is that of learning and experimentation. What is a negative actuality as seen by most respondents is that farmers and other relevant actors are not “learning from previous attempts”, highlighting that social memory is not actually being facilitated. This fragmented nature causes blockades in learning from the past due to lack of collaboration between regions and projects. The drive for experimentation in adaptive governance “unfortunately” strengthens this process, as the drive for innovations for adaptation feeds into the creation of new solutions, rather than building on existing insights, as the resource structure (financially and regulatory), values this more. With one respondent mentioning that “these three-year schemes feed into [market] competition and lack of long-term thinking”.

4.3 Leadership: visioning & inclusion

Leadership in the current strategy has found itself as a supporting theme, presenting as an element that local efforts unite around on the ground. While there is a feeling of a lack of central guidance (again, due to decentralization and fragmentation), there are in fact distinct actors that “people rally around for this mission”. An opportunity seen by both farmers, advocacy groups, and public officials is that innovators have picked up the baton in recent years in regard to taking responsibility for driving adaptation forward. Innovators are “taking a much needed and welcome role” in connecting farmers together and delineating various goals and responsibilities as to make them clearer, leading to more fair and achievable expectations. The current strategy under adaptive governance has made this more bottom-up process possible by making room for schemes such as this. Alongside this, as these innovators have run into legal, regulatory, financial, governance, and other social hoops, they are making headway, according both farmers and advocacy groups, in streamlining the processes towards change, resulting in more clear short-term progression in practice.

While the increased uptake in responsibility for adaptive change taken by innovators was seen as a positive in the previous theme, the fact that this was necessary at all has raised wariness with farmers and regional government alike, and was seen as a negative by even the same respondents. Innovators are generally profit-seeking, which has caused sometimes significant distrust towards the push for adaptive solutions, which then hampers adaptation. Most respondents were able to agree that change is needed, and that innovators are important in facilitating this, but the level of distrust in regard to their fairness stifled willingness to adapt some respondents. The question of “is this really the right solution” came up multiple times while discussing certain adaptation projects, showing that adaptive governance feeds into this wary mindset.

4.4 Flexibility and Variety: rapid deliberation and fracturing

Flexibility and variety presented certain hindrances to adaptation processes, mainly to do with further fracturing the already fragmented governance arena and solution-making, as well as issues with rapid deliberation.

A result of making climate adaptation a decentralized topic under adaptive governance, and supporting rapid, local deliberation and solutions, is that meaningful long-term change becomes more challenging in practice. Due to a local, short-term focus, a subsequent preference on technology has risen, as it is more applicable. Social experiments and innovations are presented as more problematic and "hard-to-do", while these are simultaneously seen (by others) as "crucial for intrinsic motivation" for change. This has subsequently fed into a mantra of mitigation rather than adaptation, leading to some actors thinking that "actually changing our minds seems off the table". On the other hand, an opportunity of this strategy is that 'modular' governance interventions become easier in reality (albeit slowly), which is felt in adaptation projects in the sense of "national rules, local application."

An unforeseen consequence of this is that collaboration between regions has had significant trouble coming about in water adaptation efforts in The Netherlands, and is "virtually non-existent and fractured". The South-West of the country is struggling with similar issues as the North in regard to drought and salinity but cooperation between these regions is minor, as stakeholders are "focusing on our own thing". However, this often means that actors are "reinventing the wheel", which is "slowing down our progress", as there exists a sense of subsidy-hunting and short-term projects that feeds into local mitigation, rather than adaptation: "There really is a strategy of mitigation where possible, adaptation where necessary". Furthermore, the monitoring of experiments becomes simultaneously generally disregarded due to this, as "there is no space for that in the world of fast-subsidies and short projects", making it so that the applicable, flexible, local solutions have a distinctly hard time diffusing past their initial pilot and becoming mainstream adaptations, highlighting that actual flexibility and variety is difficult to balance in practice. This shows that the current governance strategy is more about "building up what we have […] and not about bringing about the intrinsic motivation for adaptation".

4.5 Communication: language, sharing knowledge, and fairness

A crucial supportive theme that weaves through the topic of adaptation is that of communication. Various parties acknowledged that the communication both within todays' adaptive projects as well as outside of it, at the larger societal and governmental scales, is exceptionally poor in the current strategy.

Farmers, consultants, and even some lower-level public officials stated in no uncertain terms that they felt "completely unheard" in the recent discussions surrounding salinity and drought problematics. There is a distinct feeling of "zero transparency", and "being left out of the discussion of our lifetimes", especially in more recent years. Especially in the recent five years, the planning appeared to the respondents as having been created without any relevant local or professional contextual input, which causes strife. Within adaptation projects, the various parties also "plainly suck" at talking to each other, especially regarding in communication with farmers.

> We are using the wrong language at these meetings, I am sometimes sitting at the kitchen table while plans are presented or discussed, and I am like, how am I supposed to understand all of this nonsense, let alone these poor farmers. (Respondent 12)

While farmers are generally fairly highly educated, and have know-how of some jargon, the way in which innovators, consultants, and advisors present plans, data, goals, visions are sometimes incompressible to them, which feeds into the previously mentioned distrust.

Some respondents also mentioned that sharing knowledge between various stakeholders is problematic. An example of this is the new information from the central or provincial government that (should) trickle down, but does not or in a manner that is hard to understand or get a hold of: "we never hear things".

Another showcase of this issue is that of information obtained by innovators, who keep insights into adaptive practices, salinity and drought, efficacy and efficiency, and other forms of information pertaining to the operations close to their chest. This is seen as a hindrance by advocacy groups, researcher, consultants, and farmers, as they feel both uninformed but also sometimes "cheated". In their eyes the aspired cooperation and communication in adaptive governance thus leaves some things to be desired.

Connected to this is conflict resolution, which, on the other hand, has significantly improved under adaptive governance strategies. While conflict resolution between larger scales has been tough, for example between provinces, the conflict resolution within the region, and within projects, has been seen as "really massively improving". This is connected to the increased fairness people experience when discussing the topic, as people "can tell everyone wants to move forward somehow", and people "feel more heard these days", when problems are "nipped in the butt" due to practices of local inclusion.

Table 2. *Summary of themes and sub-themes of adaptive governance in theory, and their lacunae and opportunities in practice, as exemplified from the case of the Northern Netherlands.*

Factor	**Lacunae**	**Opportunities**
Polycentricity & Collaboration	Short- and medium-term goals; lack of responsibility for adaptive change; missing space for adaption, unfocussed governance; intrinsic motivation, local empowerment.	Open space for innovation for adaptation; shared responsibility; access to resources
Knowledge	Information overload; social memory; experimentation strategy; changing values, local knowledge inclusion	urgency and awareness; insights into innovation, local knowledge availability and spread
Leadership	Distrust in leadership toward public as well as private actors	New opportunities for actors to pick up a role as central figure; clarity in vision for future, fair governance (locally)
Communication	Knowledge transfer (content, process); language use; inclusiveness; scattered discourse	Conflict resolution, supporting structure
Flexibility & Variety	Lack of cooperation between regions; learning from the past; focus away from adaptation toward mitigation	Local solutions & involvement; 'fair' processes of deliberation

Note: this is but a simplification of the findings from the interviews, in reality there is much more overlap

5. Discussion

Drought and salinization are increasing at a rapid pace in The Netherlands, necessitating adaptive change, which has led to new programs and collaboration under the aspirations of adaptive governance. Using an interpretative and empirically focused approach, the presented study gives insight into how (sub-)elements of adaptive governance become present in practice, and how this affects the process for adaptive change. We investigated five key themes based on past academic reflections on what constitutes adaptive governance. The themes we analyzed are (1) polycentricity, (2) knowledge & learning, (3) leadership (4) flexibility and variety, and (5) communication.

Somewhat surprisingly, the polycentric nature of adaptive governance presents as the main discrepancy between the aspirations of the theoretical concept and actual practice, with the other factors all being connected to this theme in some way. The decentralized nature of climate adaptation under adaptive governance leads to an overall sense of shared responsibility and problem frame, yes, but it also leads to

significant confusion in the short- and medium-term goals, as well as distrust and a lack of motivation. The way knowledge is treated in the paradigm has in reality led to feelings of information inequity and overload, and a lack of social memory, even though it does increase urgency and awareness. Leadership under adaptive governance allowed for significant strides toward visioning and agenda-setting, as well as collaboration, but also causes some distrust. Interestingly however, respondents viewed this as less central an element than we expected it to be, being only a minor topic in most conversations, highlighting a more supportive nature of this theme. The aspirations of Adaptive Governance surrounding flexibility and variety interestingly also constrain cooperation. Current workings of variety under adaptive governance hamper adaptation in practice rather than strengthen it. Even though the more direct, flexible and specific strategies speed up deliberation times and local empowerment, due to blockades to interregional and transdisciplinary partnership it is ultimately more limiting. Most acutely, in practice it also shifts the focus towards an agenda of mitigation of small-scale problems rather than real adaptation. Communication weaves through these expectedly, as a source of conflict resolution hampered by the governance scales at play, leading to issues with knowledge transfer and language use.

Lastly, something we feel needs to be mentioned as it weaves through our findings, is that the societal context significantly influences adaptation in practice. In the Netherlands, shifts in the socio-political environment affect adaptive behaviour strikingly (Van der Ploeg, 2020), echoing previous investigations into the topic (Daniell et al., 2014; Nightingale, 2017; Nightingale et al., 2022). Furthermore, external factors such as Covid-19, the media, and economic swings also severely impacted motivation for change of our respondents. In this sense, sometimes even when the stars align for adaptation at the operational level, the timing is sadly not right in the grander context.

Our findings also reflect previous (critical) reflections into the merit of adaptive governance (Chaffin, 2016; Eshuis & Gerrits, 2021). We observe in similar fashion that adaptive governance has problems with mainstreaming adaptation long-term. The general consensus is that the current measures and goals are aimed at strengthening the current system to deal with climatic impacts rather than moving to a new state or modus operandi in regard to water-related climatic impacts. A more wholesale and lasting adaptation in the region most likely requires concrete transformative governance that could support this (Fedele et al., 2019; Visseren-Hamakers et al., 2021), either through ‘small-wins’, or rapid impactful intervention (Chaffin et al., 2016; Termeer et al., 2017).

However, we noticed that while pursuing adaptive governance as a strategy for enduring change is sometimes limited, it does open up space to make the adaptation processes possible. This shows that adaptive governance provides a welcome aid for adaptation initiatives more generally. Taking elements of adaptive governance, such as knowledge sharing, fair leadership, and open communication, as supporting structures for lasting adaptation thus does have significant value.

6. Conclusion

In this study, we investigate the elements of Adaptive Governance and how they present in the reality of actors working in climatic water adaptation. Our research highlights critical and practical insights into the lacunae and opportunities of adaptive governance for stakeholders involved in the water governance process. Overall, the findings of the study indicate that not only a more careful and introspective consideration of adaptive governance is necessary, but that from the perspective of meaningful adaptive change, it is imperative that one (re)considers the key elements that support adaptive behaviour long-term. Our findings complement existing academic literature on the merit of adaptive governance as a vehicle for adaptation (Fournier et al., 2016; Biddle & Baehler, 2019; Eshuis & Gerrits, 2021), highlighting that elements of adaptive governance do support adaptation efforts, but the paradigm generally falls short in bringing true long-term adaptivity. Utilizing an interpretative design aimed at uncovering the day-to-day experiences of actors involved in water-related adaptation in agriculture, we found distinct differences between the aspirations of adaptive governance and practice. There are several factors influencing this, most notably the unintended consequences of polycentricity and variety in practice, which block collaboration and the

motivation for adaptation, as well as the strivings for variety, which block cooperation and mainstreaming processes significantly.

On the other hand, however, visioning, urgency and awareness, conflict resolution, and local involvement currently flow neatly out of the aspirations of leadership, knowledge, communication, and flexibility, respectively. It is therefore not time to write off adaptive governance yet, as seems to be a growing sentiment due increasing criticism and an accruing buzzword-like status. In our eyes, adaptive governance can be reclaimed and reconsidered for (supportive) use in contemporary settings.

The differences between the aspirations of adaptive governance and practice show that the paradigm must be updated and reconsidered within the field of study, in a sense, to achieve this. We feel as though three measures could aid this most crucially. Firstly, by delineating what adaptive governance entails in a more focused manner, in order to shake off misuse and allow for better applicability. Secondly, by updating and re-examining the core elements for contemporary contexts. This can be done by reimagining elements such as polycentricity for present-day contexts or by taking inspiration from daughter-paradigms transformative governance and adaptive capacity, which underline intrinsic social dimensions such as motivation or societal values. And thirdly, by cooperating more intensely with fields such as transition studies, social psychology, and environmental sociology. Doing so allows more rigorous attention to topics such as communication, power, inclusivity, agency, and adaptive behaviour, which may greatly increase the legitimacy and efficacy of the paradigm as a governance strategy.

Despite these interesting avenues for the academic field, there are concrete possibilities for future studies yet unexplored in this paper. Firstly, some relevant actors remained hidden in our data-gathering and analysis. A look at these 'shadow players' such as insurers, (seed) exporters, and potato-chip factories that stay under the radar due to the complicated nature of climate change, something that needs to be addressed in future research. Additionally, a more thorough and long-term micro-level investigation on key actors such as intermediaries, policymakers, or NGO's may offer a deeper understanding of their experiences. Lastly, and most importantly, a view outside of The Netherlands, especially in the Global South, will offer crucial insights into the legitimacy of adaptive governance in settings with different socio-cultural and socio-economic status quos. All in all, developing a more complete consciousness of governing adaptation in practice will be crucial in the years to come. Academic ventures into the way the aspirations of adaptive governance shape real-world adaptation will thus help us understand how the climate-crisis can be acknowledged and confronted long-term.

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Leon Hermans: Conceptualization, Supervision, Writing – Review & Editing
Ellen Minkman: Conceptualization, Supervision, Writing – Review & Editing
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Conflict of Interest

There is no conflict of interest.

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