



Leadership within regional climate change adaptation networks: the case of climate adaptation officers in Northern Hesse, Germany

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Abstract In the climate adaptation literature, leadership tends to be an understudied factor, although it may be crucial for regional adaptation governance. This article shows how leadership can be usefully conceptualized and operationalized within regional governance networks dealing with climate adaptation. It applies an integrative framework inspired by complexity leadership theory, distinguishing several leadership functions to enhance the adaptive capacity of regional networks. We focus on one specific institutional innovation, appointed climate adaptation officers, who seek to connect science and governance practice, and to mainstream climate adaptation. Our question is twofold: What is the potential of climate adaptation officers to advance the adaptation agenda and to what extent did their establishment and working practice mirror the various leadership functions needed to raise the adaptive capacity of the regional network they operated in? The integrative leadership framework structures the analysis of climate adaptation officers forming part of a government-funded project seeking to enhance adaptation to climate variability in the central German region of Northern Hesse. The data consist of interviews with scientists and regional

authority employees and project documentation including an evaluation. We find that climate adaptation officers raised awareness for climate adaptation and helped to shape and implement a number of projects within the overall KLIMZUG programme, highlighting impeding and enabling factors. The process of setting up this institutional innovation involved all forms of leadership functions and is an example of vertical mainstreaming. Its operation involved most clearly enabling and connective leadership functions and is an example of horizontal mainstreaming.

Keywords Climate adaptation networks · Adaptive capacity · Mainstreaming · Regional adaptation governance · Leadership

Introduction

Climate change belongs to the most serious and urgent problems of our times. As there is increasing consensus that this change is at least partly caused by anthropogenic influences, many governments have developed climate mitigation policies, such as carbon pollution reduction schemes, over the past years. However, the general expectation is that in spite of these new policies, which may mitigate climate change to some degree, the climate will continue to change. Therefore, next to climate change mitigation, adaptation to climate change has gained a place on the governmental agenda. Climate change adaptation may be defined as “[...] all spontaneous responses and planned action taken to cope with the impacts of, or reduce vulnerability to, a changing climate. Such adaptation is needed to tackle current problems or anticipate possible future changes, with the aim of reducing risk and damage cost effectively, and perhaps even exploiting potential

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benefits” (Swart et al. 2009). Concrete examples of adaptation measures are the reinforcement of dikes, the creation of space for rivers, and the selection and development of new crop varieties by the agricultural sector.

For both the development and the implementation of adaptation policies, considerable cooperation is needed between different levels of government, policy sectors, and public and private parties. For instance, a water management agency that wants to realize a retention area to accommodate high peak discharges in a major river may be dependent on ministries that bear the responsibility for spatial planning and agriculture, on municipalities that have to change their land-use plans, and on private land owners. As a consequence, decision-making often is the result of deliberation and negotiation processes in multi-level governance networks. In this paper, we conceive of such multi-level governance networks as complex adaptive systems (Osborn and Hunt 2007; Uhl-Bien et al. 2007). These networks are complex not only because of the large number of parties involved and their different perceptions and preferences, but also because of the fundamental unpredictability of the social interactions within them (Ibid). They are adaptive because they are adapting to changes in their environment, such as changes induced by climate change. In doing so, parties within the network have to cope with many uncertainties, such as about the degree of climate change which will take place, the speed of climate change, the regional and local impacts of these changes, and the effectiveness of specific adaptation measures (Osberghaus et al. 2010).

The corresponding literature tends to mention leadership as one of numerous factors that may enhance the adaptive capacity of governance networks (Gupta et al. 2010; Ols-son et al. 2006). Such leadership, however, goes beyond the traditional hierarchical notion of leadership in which a, often charismatic, positional leader (someone with a formal leadership position) succeeds in getting followers for his ideas (see, for example, Burns 1978). Rather, it is likely to be multifaceted, performed by non-positional leaders, and, most importantly, exercised by several individuals. Inspired by complexity leadership theory (CLT), developed in organizational studies (Uhl-Bien et al. 2007), an integrative framework of leadership functions (political administrative, connective, adaptive, enabling, and dissemination) to enhance the adaptive capacity of governance networks has recently been proposed (Meijerink and Stiller 2013). These functions are conceptually linked to three main leadership challenges faced by these networks, on top of increasing their adaptive capacity, when dealing with climate adaptation. They comprise (1) influencing the policy process to get adaptation policies accepted and implemented; (2) enhancing connectivity across different policy-making levels, sectors, and actors; and (3)

enhancing the capacity of society to learn in response to feedback from the natural system and anticipating long-term impacts of climate change (Ibid: 241–242).

As to the strategy of climate adaptation networks to tackle these challenges, the climate change literature has studied efforts to develop climate adaptation as a discrete policy area. In addition, empirical research has shown that actors are searching for solutions that do not only serve climate adaptation goals as such, but integrate them in existing policy areas, a process referred to as “mainstreaming” (Uittenbroek et al. 2013). Mainstreaming climate adaptation in policy areas such as urban planning, water management, and public health implies that stakeholders need to consider the effects of climate change for their respective domains and to decide on the implementation of appropriate measures to reduce the vulnerability of their policies to effects of climate change. The underlying assumption is that the more adaptation is integrated in functionally linked policy documents and processes, the better the chances are for societies to become “climate proof” (Mees and Driessen 2011; Kok and De Coninck 2007). By creating linkages between adaptation measures and problems in related policy fields, innovations in terms of problem-solving and opportunities for increasing efficiency and effectiveness of policy-making will arise. For instance, mainstreaming is assumed to stimulate the effectiveness of policy-making through combining objectives, increasing efficient use of human and financial resources, and ensuring long-term sustainable investments (Kok and De Coninck 2007; Smit and Wandel 2006). As to how mainstreaming is implemented in practice, a classification of strategies in horizontal and vertical integration has been proposed and applied in cases at the local level (e.g. Wamsler et al. 2014; Rauken et al. 2015). Generally, vertical strategies (including regulatory, managerial, and directed mainstreaming) are linked to implementation by governmental agencies and conditions that involve top-down control of the actors involved. In contrast, horizontal strategies (including add-on, programmatic, and inter- and intra-organizational mainstreaming) can be linked to less powerful actors and conditions that involve one or several actors that lack strong authority (Wamsler et al. 2014, p. 191). In practice, several strategies may coexist. For instance, Wamsler et al. conclude in their study of four Swedish local governments “mainstreaming strategies can complement and reinforce each other and (...) how a combination of activities together with strong leadership can balance the shortcomings of single strategies” (p. 198). While “strong leadership” here refers to keen individuals such as politicians and civil servants who push the cause of adaptation, our paper will look at leadership using an analytical approach that highlights how leadership is collectively exercised in adaptation networks.

In this paper, we apply the integrative framework of climate adaptation leadership to analyse and assess the set-up and practice of an institutional innovation designed to mainstream climate adaptation in the central German region of Northern Hesse. Our guiding question is twofold: What is the potential of climate adaptation officers (CAOs) to advance the adaptation agenda and how can their installation and working practice be understood in terms of the various leadership functions needed to increase the adaptive capacity of the regional network they were embedded in? Northern Hesse, a predominantly rural area with a population of two million, forms the northern part of the German federal state of Hesse. In terms of mainstreaming strategies, Northern Hesse is a particularly interesting case to assess from a perspective of leadership functions in adaptation networks: within the German government-funded KLIMZUG project on climate adaptation in regions, it is the only region where deliberately appointed climate adaptation officers (*Klimaanpassungsbeauftragte*, hereafter referred to as CAOs) were installed, albeit for a limited time period (2009–2013). Their main tasks were: to raise awareness for climate change adaptation in the region, to engage with scientists and policy-makers to identify promising adaptation options, and to initiate and implement pilot adaptation projects. In doing so, they had to manoeuvre between regional and local governance networks, to gain support for the adaptation agenda, and to link it to the agendas of related policy sectors, such as agriculture and forestry, public health, and water management.

First, the integrative framework of leadership functions is outlined briefly. Next, we describe our methodological approach and introduce our case, the KLIMZUG Northern Hesse project with a focus on the role played by CAOs. The following section applies the various leadership functions to assess the role these played in establishing CAOs and in developing and realizing new adaptation practices in Northern Hesse. The concluding section summarizes how and under what conditions CAOs dealt with their tasks, proposing enabling and impeding factors which may be useful for similar “mediators” in their efforts to mainstream climate adaptation. Moreover, it explains how the set-up and operations of CAOs relate and complement the extant classification of mainstreaming strategies and reflects on the usefulness of the analytical framework of leadership functions.

A model of leadership functions

Complexity leadership theory (CLT) argues that for modern organizations to survive, they need be able to adapt to changes within their environment (Uhl-Bien et al. 2007).

Therefore, an organization’s adaptive capacity is crucial to its success. Hierarchical, top-down leadership alone does not suffice to create adaptive capacity as this type of leadership limits variety, room for experimentation and innovation, and the development of new ideas and practices (Ibid).

CLT assumes that important leadership functions are fulfilled by organizational members who do not possess a formal leadership position. Professionals, researchers or consultants may play an equally important role in realizing meaningful change. The theory distinguishes between the adaptive, enabling and administrative functions of leadership within an organization (Uhl-Bien et al. 2007). Adaptive leadership is about the development of new ideas and practices. This leadership function may be fulfilled by persons with creative new ideas but more often is the result of the interactions between people within an organization hence is seen as an emerging system property. Enabling leadership aims at the creation of the necessary conditions for generating new ideas and practices. This may be done by making available human or financial resources for pilot projects, by setting deadlines and with that creating a sense of urgency, by introducing new work formats, and/or by allowing parts of the organization to deviate from existing organizational routines. The adaptive function also refers to the management of the entanglement between the innovation network and the formal organization, which, among other things, refers to the translation of newly developed ideas into formal organizational policies. Finally, administrative leadership aims at creating order and stability within an organization. It is about the formulation of the organizational policy and strategy, and about the allocation of the necessary resources for realizing this strategy. CLT argues that all three leadership functions are equally important and that organizations need to balance between order (which is maintained through the administrative function) and chaos (which is created by the adaptive and enabling functions). Meijerink and Stiller (2013) have translated CLT, which was developed for analysing leadership within organizations, to a model of leadership within public–private governance networks dealing with adaptation issues (see Fig. 1). For that purpose, they made a systematic review of the literature on policy leadership

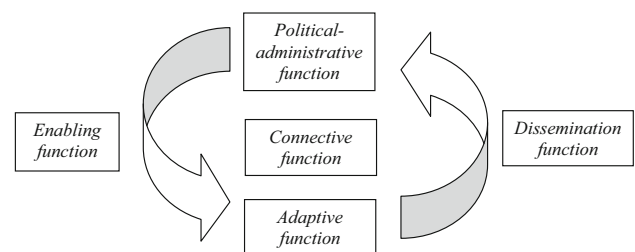


Fig. 1 Model of leadership functions for climate adaptation (Meijerink and Stiller 2013)

(Luke 2000), policy entrepreneurship (Kingdon 1984), ideational leadership (Stiller 2009), catalytic leadership (Luke 1998), collaborative leadership (Chrislip 2002), integrative leadership (Crosby and Bryson 2010), eco-leadership theory (Allen et al. 1999), and leadership in social-ecological systems (Olsson et al. 2006). The concept of leadership functions, which is central to CLT, offered a framework to combine and integrate insights from the various leadership concepts. The review of the literature on leadership for connectivity (Luke 1998; Chrislip 2002; Crosby and Bryson 2010) also gave reason to add another function: the connective function (Meijerink and Stiller 2013). This function emphasizes the need for cooperation between the different organizations involved in developing and realizing climate adaptation policies.

Because many adaptation measures, such as flood protection, do have characteristics of public goods, it is not surprising that next to private parties, government agencies often play a crucial role in adaptation projects. Unlike in private organizations, in governmental organizations, elected politicians are a specific category of positional leaders. Therefore, CLT's administrative function was relabelled as political-administrative function. It entails decision-making on visions, strategies, and plans, and on the allocation of budgets for realizing these plans. The connectivity function is about establishing connections between different levels of government, policy sectors, public and private parties and between science and policy. Initiating meetings, establishing working groups, and linking new people to existing networks are examples of such connectivity leadership. As CAOs were expected to play an important role in bridging the gap

between scientific knowledge on climate change and adaptation policy practices, the policy–science interface is particularly relevant here. The literature on knowledge brokers (Meyer 2010, p. 120) distinguishes the following tasks or activities of knowledge brokers: “the identification and localization of knowledge, the redistribution and dissemination of knowledge, and the rescaling and transformation of this knowledge”.

The adaptive function is similar to the adaptive function in CLT. It is about the generation of new ideas and practices, for example in pilot projects or experiments. The enabling function is about the creation of necessary conditions for innovation, for example if a national government makes available a budget for research and innovation or allows for experimentation with new approaches. Finally, the dissemination function is about the insertion of newly developed ideas into the formal governmental networks, and/or to other contexts.

Our expectation is that that it is possible to empirically assess whether and to what extent leadership functions are being fulfilled within a governance network by searching for tasks that correspond to the various functions (save adaptive leadership, which relies on emergent processes). To this end, specifying tasks is a way of operationalizing the functions, enabling researchers to trace them with a qualitative approach, applying content analysis to interview transcripts and documents, similarly to other applications of the integrative framework (Meijerink et al. 2015). This approach diverges from other work that seeks to operationalize CLT in applying it to processes within single organizations (Hazy and Uhl-Bien 2015). Table 1

Table 1 Leadership functions, their locus, and associated tasks (Meijerink and Stiller 2013)

Leadership function	Locus of leadership	Leadership tasks
Political administrative	Positional leaders (Elected) politicians and/or public managers	Decide on, communicate, and monitor the realization of a shared vision on climate adaptation Generate and allocate necessary resources for climate adaptation
Adaptive	Complex adaptive system	NA (adaptive function is emergent property of the CAS)
Enabling	Positional leaders Key individuals (sponsors, boundary spanners, policy entrepreneurs, champions)	Allow for and stimulate a variety of adaptation strategies Create a sense of urgency, e.g. by setting deadlines Insert adaptive tension Foster interaction
Dissemination	Positional leaders Key individuals (boundary spanners, policy entrepreneurs, champions)	Insert newly developed ideas (within the CAS) into the network of positional leaders Get accepted newly developed ideas
Connective	Positional leaders Key individuals (sponsors, boundary spanners, policy entrepreneurs, champions)	Promote problems and mobilize actors to search for solutions Bring people together/agree on a collaborative strategy Stimulate multiple action options/working together/ building trust and legitimacy Forge agreement/move to action/implement strategies

summarizes the various leadership tasks related to these five functions, and information on the locus of this leadership. Whereas the political-administrative function may only be performed by positional leaders, such as elected politicians or public managers, the other functions may be performed by non-positional leaders as well (such as CAOs in the case presented here).

Climate adaptation officers and climate change adaptation in Northern Hesse

Data and methodology

Our choice for a single case study design is related to the uniqueness of CAO's within the context of the overall KLIMZUG project (described in more detail in the paragraph below): only in the Northern Hesse region, this experiment took place. The data include, first, numerous pieces of project documentation available on the KLIMZUG project website and the relevant parts of the published final project evaluation regarding the performance of CAO's (Bauriedl et al. 2013). Second, these documents were complemented by three lengthy semi-structured interviews with key informants identified by consulting the project management. More specifically, interviews 1 and 3 were held with scientists involved in KLIMZUG who dealt with the evaluation of governance innovations and with the sectoral coordination of CAO involvement in several spheres of activity, respectively. Interview 2 was conducted with the CAO coordinator from the Northern Hesse regional government agency. Whereas including interviews with (some of) the CAOs themselves, describing their experiences, would have been desirable and was planned as part of the data collection, their cooperation could not be gained due to the ongoing internal project evaluation. Although this is admittedly a weakness, we managed to collect indirect evidence from respondents familiar with how they fared in their job. All interviews were transcribed and coded using the leadership functions and related leadership tasks listed in Table 1. The coding of the interviews was undertaken separately for each respondent and checked among co-authors to ensure inter-coder reliability.

In the whole of the material collected, including background information, project documents, and interview transcripts, we searched for evidence of the various leadership functions, first in the process of establishing the institutional innovation of CAOs, and, second, in their efforts to develop innovative climate adaptation policies and project initiatives. Before presenting the results of the analysis of leadership functions, the following section has two functions: first, it provides some background of the

case by describing their origin as institutional innovation, including the roles of relevant actors in the already existing climate adaptation network. Second, it describes and analyses their working experience during the early and later phases of their appointment, highlighting the challenges CAOs encountered during their appointment when trying to mainstream climate adaptation. The narrative makes use of direct and indirect citations from the interviews wherever appropriate.

KLIMZUG Northern Hesse as a trigger for institutional innovation

The German Federal Ministry of Education and Research (BMBF) is funding the research programme "KLIMZUG-Managing climate change in the regions for the future". The programme consists of seven regional joint projects, funded over a period of 5 years (2008–2014) (Bardt et al. 2012). Its objective is to develop innovative strategies for adaptation to climate change and related weather extremes in regions. Within the programme, anticipated changes in climate are meant to be integrated in processes of regional planning and development since the former need to be tackled at regional and local levels of government, not at least to ensure the future competitiveness of regions. Moreover, KLIMZUG aims to advance the development and use of new technologies, procedures, and strategies for adapting to climate change on the regional scale. The main instrument used to advance these goals is regional network development and implementation. Such networks are intended to bring together the scientific, planning, technical, and entrepreneurial strengths of regional stakeholders and to proactively create structures for a new approach to managing climate change. They should evolve on a long-term basis, thereby strengthening competitive advantages for future climate conditions (Federal Ministry of Education and Research 2010).

Researchers of the University of Applied Science and the University of Kassel exploited the window of opportunity which was opened by the launch of the federal KLIMZUG programme, and contacted the regional council (*Regierungspräsidium*), administrative districts (*Landkreise*), and the city of Kassel. These administrative actors showed interest in cooperating on the theme of climate adaptation and jointly developed the idea of experimenting with three institutional innovations: climate change adaptation officers (CAOs), managers, and academy, which are to link partners from science and practice (Interview 2, 31 October 2012). Five climate adaptation officers have been employed by the regional council to engage in knowledge transfer between the project's research activities and administrative actors. In addition, three climate adaptation managers are working at the regional management agency

to transfer knowledge about climate adaptation to the various economy-related stakeholders. Finally, the climate adaptation academy is run by two employees close to the adult education centre, providing knowledge transfer to the general public (Bauriedl 2011). The adaptation governance network in Northern Hesse potentially consists of science (University of Kassel), education (adult education, schools), business (regional management agency, entrepreneur associations), and political-administrative (regional council of Northern Hesse) actors. To this cluster of actors (not all of which cooperate with each other already), the three institutional innovations mentioned previously have been added. In the following, we focus on the specific institutional innovation of CAOs.

Their main task is to sensitize regional and county administrative authorities by setting climate adaptation onto their policy agendas. The idea of appointing specific officers for this is considered innovative in at least two respects. First, it is a novelty to explicitly create a job profile for officers who function as contacts for a dialogue between researcher and administrative practitioners and who help to apply research results in administrative procedures and policies. Second, although these officers are formally employed by the regional council, most of them are based at various departments of sub-regional administrative districts (*Landkreise*), close to the municipal levels of government, where specific projects linked to adaptation strategies are to be implemented (Bauriedl 2010; Bauriedl et al. 2010, pp. 91–93). More formally, the initially formulated goals in the sub-project of the CAO's included:

- (1) supporting the establishment of a climate adaptation network for the Northern Hesse region in the area of administration and research,
- (2) the establishment of the thematic area climate change/climate adaptation at the administrative level,
- (3) the implementation of climate adaptation measures within sub-regional/local administrations;
- (4) bringing in/transferring administrative experience in the various scientific sub-projects of the overall KLIMZUG Northern Hesse project,
- (5) sensitization for opportunities and risks of climate change by using multiplying actors (KLIMZUG Northern Hesse 2010)

The KLIMZUG programme offered ample space for diversification across the German states, which is to say that different kinds of initiatives were taken in different states. As stated above, in Northern Hesse, it was decided to focus on institutional innovations, among which the appointment of CAOs, specifically. Although Northern Hesse is the only region where these specific institutional innovations were initiated, the lessons learned through

them were expected to be relevant for other regions, too. For the purpose of knowledge dissemination, KLIMZUG organized several conferences during the duration of the project.

The appointment and first activities of CAOs

After the proposal for KLIMZUG Northern Hesse had been approved, the regional council was able to employ five CAOs. Even though the regional council was their formal employer, they were based at various (and differing) departments of administrative districts (*Landkreise*), at the regional council, and at the city of Kassel. These included an environmental department, a spatial planning department, and a central staff department. The project managers involved decided to appoint young professionals who had just obtained their academic degree, and no or hardly working experience within the governmental sector yet. As one of the respondents stated:

(...) they had only little or no work experience in public administration at all. And we should not underestimate this, as they did not exactly know how public administration functions, how communication within such organizations takes place, and how one should react to certain patterns of behavior within administrations. Perhaps also not how to build coalitions either (Interview 1, 26.10.12).

After the newly appointed CAOs had acquainted themselves with their working environments, they started working on raising awareness for climate adaptation issues. This endeavour turned out to be more difficult than they had expected. During the first months, they learned that actors they dealt with either did not recognize the sense of urgency of climate change adaptation at all or that they were of the opinion that they had already been working on adaptation issues for a long time, for example in the field of water management. One respondent summarizes the latter as: “And, why should we start dealing with climate adaptation? It is not a new theme for us at all” (Interview 1, 26 October 2012). Whereas these parties did not see the novelty of considering climate change adaptation, others questioned the added value of the newly appointed CAOs because they did not perceive a need for working on adaptation issues in this specific region. Because of the long time frame of climate issues and the absence of tractable issues, such as high water levels and flood events, it turned out difficult to pinpoint the need for adaptation in the Northern Hesse case. As one respondent put it: “In Northern Hesse, it is not that easy to get across the relevance of climate adaptation issues” (Interview 1, 26 October 2012). More specifically, “this region differs from coastal areas, where they have reason to worry about sea

level rise and so on. We do not have that problem. That is to say, based on what we have learned so far on regional impacts, the impacts of climate change in the region of Northern Hesse will be relatively moderate” (Interview 2, 26 October 2012).

Still, interviewees pointed out that the CAOs managed to raise awareness for taking climate adaptation seriously to a considerable extent. The reason for this may be that the CAOs have been identifying local priority issues making the need for climate adaptation tangible, for instance demographic change, education, and foremost health. As one respondent explains: “This issue (i.e. health) is relevant to all: when elderly and chronically ill people die, nobody wants this to happen. There are other problems which are perceived to be less serious (...) we can live with them” (Interview 1, 26 October 2012).

Next to their awareness raising efforts, the CAOs started making inventories of information needs within their respective organizations, and communicated the results to the scientific partners of KLIMZUG Northern Hesse. However, the very specific and narrow questions posed by the civil servants did not make much sense to the scientific researchers involved (or could not be answered by the disciplines represented in the project), and the CAOs who found themselves in the difficult position to build bridges between science and policy, became rather frustrated by this troublesome undertaking during the first months of their contract period (Interviews 1, 2, and 3). As one respondent put it, “they are positioned very much in between, and had to cope with a lot of resistance and people with different motivations” (Interview 2, 31 October 2012). One of the problems was that some civil servants expected scientists to provide exact information on the consequences of climate change for the region so that different actors could start developing adaptation options based on this knowledge. In practice, it is not possible to provide such data as there are too many uncertainties involved. “We had believed for a long time that we would get precise predictions about what will happen. But nobody is able to give such a prediction with certainty. This was extremely difficult for the CAOs to motivate people to act whilst it is not yet sure what exactly will happen and hence what the need for action will be” (Interview 2, 31 October 2012).

A final problem CAOs had to cope with was the lack of financial resources for climate change adaptation. KLIMZUG had made available sufficient resources for appointing five CAOs for a period of 5 years, but did not provide funding for the implementation of adaptation projects they would initiate. Although the CAOs had serious complaints about that, this issue could not be resolved. In short, during their first months, the CAOs were confronted with many actors who did not see the relevance of working on

adaptation issues; with administrative and scientific actors speaking different languages and holding different expectations concerning their cooperation; and with a lack of financial resources for realizing their ideas.

Continued efforts and first successes

In spite of the many difficulties which the CAOs encountered during their first months, they did not change jobs and demonstrated perseverance instead: they continued working on raising awareness for adaptation issues, and building networks between administration and science. In doing so, they focused on developing and implementing regional adaptation strategies in five project-defined areas (natural resources, energy, transport, tourism, and health) through close cooperation between researchers, local business, political decision-makers, and administrations and civil society actors. They had learned to use existing (sectoral) networks to start discussing adaptation issues.

“The fact that the theme of climate change adaptation had to be connected to existing networks was already stated pretty clearly by the CAOs after their first ‘phase of frustration.’ On the administrative level nobody showed interest in establishing new networks, but in using existing ones to rework adaptation issues, including additional actors where needed”. Moreover, the networks, in which adaptation issues and options were discussed, may be characterized as learning networks (Interview 1, 26 October 2012). The latter is matched by the idea behind the CAO sub-project: “[...] within this project we have continuously made improvements rather than starting with a specific idea and keeping it intact until the project ends. Instead, the project was a discursive process aimed at correcting observed shortcomings and developing new approaches” (Interview 3, 21 October 2012). The CAOs are said to have played a crucial role in this learning process. “CAOs act like a joint so to speak: they are the ones who transmit information in both directions (science and administration). And in any case, it is their strength, even though it is extremely difficult to do” (Interview 2, 31 October 2012).

In practice, the CAOs aimed primarily at realizing small-scale demonstration or pilot projects in the short term, either in conjunction with other KLIMZUG-related actors or using already existing forms of cooperation among local actors. Small-scale implementation projects were considered particularly important for attracting new supporters of the adaptation agenda, and for transferring newly gained experience gained to other local contexts. The CAO based at the regional government agency (*Regierungspräsidium*), initiated the “implementation network” (*Umsetzungsverbund*) land-use planning, and contributed to the regional land-use plan by making a

Table 2 Overview of the role of CAOs in implementation projects

Implementation project	Goal(s)	Extent of CAO involvement
Mosquitos and ticks	Improve knowledge about dangers of mosquito and tick-related diseases and high-risk areas; promote awareness and prevention among citizens of Northern Hesse	Intensively with PR, organizing and running events, contacting suitable actors for consolidating the project (and its financing)
Quality seal	Certifying climate adaptation proof care services assuring prevention of risks for the elderly	Connecting to actors with disseminating and advisory functions
Neighbourhood assistance	Creating neighbourhood-based care structures before arrival of emergency assistance in exceptional situations	Selecting and contacting key regional actors, running events
Spatial planning	Integrating climate adaptation concerns into regional spatial planning to identify sensitive and sound areas	Initiation and project management
Energy plant cultivation	Improving, disseminating and applying climate proof cultivation methods for energy plants	PR, selecting and contacting regional actors, generating district funding, organizing and running events
Interior climate	Improving interior climate conditions in a Kassel school	Hardly any involvement
Local public transport	Adapting provision of public transport to climate change-related weather events, changes in customer demand etc	Selecting and contacting suitable regional actors, PR
Tourism	Informing and sensitizing regional actors for climate-friendly tourism	Selecting and contacting suitable regional actors, design of partial projects, PR

Sources: KLIMZUG North Hesse website on implementation projects; personal communication by interview respondent on KAB involvement, 16 August 2013

systematic check of adaptation needs. “And when we know, for example, those places where agricultural lands are more valuable than average because they will still have sufficient water in 40 or 50 years and will not suffer from desiccation, then we know that you have to protect these areas even better when it comes to decision making on where to locate new industrial estates or whatever” (Interview 2, 31 October 2012). Other CAOs worked on the cultivation of energy plants, teaching and education projects for schools, and on a mobile exhibition entitled “Heated head and wet feet” (“Heisser Kopf und nasse Füße”), in cooperation with four museums which had not cooperated until then (Bardt et al. 2012). Another concrete example is the development of a new type of bus shelter, which has a roof that reflects sunlight so as to decrease temperature within the shelter.¹ Table 2 below summarizes CAO involvement across the various implementation projects.

The conclusion of KLIMZUG and prospects for continuity

By June 2013, the federal KLIMZUG programme and KLIMZUG Northern Hesse came to an end, and accordingly, the funding of the CAOs expired. As the organizations involved have not made available the necessary resources for continuation of the positions of CAOs, the institutional experiment has also ended. This should not

¹ For a complete overview of the implementation networks and projects, see <http://klimzug-nordhessen.de/index.php?id=1546>, accessed 24 July 2013.

come as a surprise given the attitude within administrations with which they had been received, as one of the respondents summarizes as “CAOs? Well, if someone funds these positions, then we will take them” (Interview 2, 31 October 2012). Yet two out of the five CAOs reportedly continued to work for their respective administrations, but as the funding by the federal government has stopped, their job profiles changed. They started working for specific policy sectors, such as land-use planning or health policy, continuing to work on adaptation issues, one of them in combination with climate mitigation issues. The respondents are quite positive about the heritage left by the CAOs, as one of them states: “Thematically, I am pretty sure that the project has left a legacy, but I am less sure about the continuation of the position of the CAOs and of working procedures. But maybe that is not so bad, because the theme is on the agenda now. A beginning has been made and there is an idea now about time horizons. In any case, a process has been set into motion” (Interview 2, 31 October 2012).

The observations in the three previous paragraphs are complementary to the conclusions of the official project evaluation undertaken by KLIMZUG, which focused on CAO core tasks (intermediating and establishing connectivity; establishing structures assisting climate adaptation; and implementing climate adaptation measures) as well as the strengths and weaknesses of CAO performance in each of these areas (Bauriedl et al. 2013, see Table A1 in the appendix for an overview).

Interestingly, the evaluation was directed at judging processes—in line with the primary task of CAOs, to

facilitate processes—rather than the achievement of objectives, since KLIMZUG had not set concrete goals for any of the three institutional innovations (Ibid: 689). While expressing overall satisfaction with how CAOs had carried out their tasks, the evaluation also identified important weaknesses, most of which had their origin in the design of their position: financial and structural independence of host administrations (leading to the termination of contracts or an uncertain future in a different position), too high expectations coupled to an ambitious work package, and lack of financial resources other than those assigned to implementation projects.

CAOs and the performance of leadership functions in Northern Hesse

After having sketched the evolution of the experiment with appointing CAOs, we use the framework of leadership functions presented earlier to unravel the different manifestations of leadership. For the analysis, we distinguish two levels: the level of the institutional innovation of appointing CAOs, and the level of regional and local innovations referring to their working practice (Table 3).

Leadership and the institutional experiment of appointing CAOs in Northern Hesse

On the highest level, the German federal government and the Ministry of Education and Research have fulfilled an important *enabling function* and partially also the *political-administrative function*, by initiating the KLIMZUG programme, and by providing funds for regional project initiatives aimed at developing and implementing knowledge on climate change adaptation. Only because of this federal project initiative, the region has been able to, among other things, appoint five CAOs. Moreover, the federal Ministry had to formally approve the Northern Hesse KLIMZUG proposal, and the regional and local governments had to give their consent to housing the CAOs within their respective organizations, which are manifestations of the political-administrative leadership function. At the same time, the federal government, however, did not make

available financial resources for the implementation of adaptation policies, thereby delegating to some degree the political-administrative function of leadership in terms of providing resources to lower levels of government in the region.

The University of Applied Science and the University of Kassel contributed to the *enabling function* as well by recognizing and exploiting the window of opportunity which was opened by the launch of the KLIMZUG project. They established contacts with regional and local government agencies to start discussing a regional proposal for innovations in climate change adaptation (*connective function*). During the interactions between these actors, the idea of proposing several institutional innovations, among which the ideas of appointing CAOs, was developed. This emergence of new institutional innovations is an example of the *adaptive function* of leadership, being not the result of actions by one individual, but rather emerging from the network of actors discussing promising contents for their proposal. Within the context of KLIMZUG Northern Hesse, a lecture series was organized by the Climate Adaptation Academy (*Klimaanpassungsakademie*) to inform CAOs on adaptation themes. Although this was not much appreciated by the CAOs, mainly because of the time effort needed to attend the series, the organization of this support for the CAOs has contributed to the *enabling function* of leadership.

Notably, the institutional innovation of CAOs was considered an experiment, which, by definition, may fail. On the one hand, the project coordination recognized the experimental nature of the CAOs very well, as this interviewee describes: “This really is a pilot project. It is also about learning, and one can draw a series of important lessons, which need to be taken into account when evaluating them (CAOs)” (Interview 3, 21 October 2012). However, in reality the CAOs perceived a high amount of pressure to succeed given the various ambitions set out in their initial work package. They were frequently told that “The evaluation of KLIMZUG Northern Hesse will largely be based on the success or otherwise of the CAOs, because working with this institution is specific to KLIMZUG Northern Hesse” (Interview 1, 26 October 2012). However, putting such pressure on a project to succeed while

Table 3 Summary of gauging the presence of leadership functions across the two levels of analysis (possible values: absent, some contribution, present)

Leadership function	Levels of analysis	
	Institutional innovation	CAO working practice
Political administrative	Some contribution	Absent
Enabling	Some contribution	Present
Adaptive	Present	Some contribution
Disseminating	Some contribution	Some contribution
Connective	Present	Present

recognizing its experimental character in this case proved to be counterproductive to *enabling leadership*. Finally, the many meetings and conferences which were organized at the level of the KLIMZUG programme have contributed to the *dissemination function*, although it should be noted that the institutional innovation of appointing CAOs was not picked up and copied by other German regions during the five-year project duration.

In sum, a brief sketch of the context of actors which created and accommodated the institution CAO points to the presence of various leadership functions; most prominently the connective and adaptive ones. While the political-administrative, enabling, and disseminating leadership functions were provided for in principle, they were “counteracted” by factors such as limited resources for project implementation, overly high expectations and the relatively short duration of the project.

Leadership and the development of innovative adaptation policies and projects in Northern Hesse²

On the project level, CAOs could not exert political-administrative leadership by design of their working package, which lacked funding for implementing projects. Hence, this specific leadership function may rather be sought in positional leaders within the Northern Hesse adaptation network, such as elected officials and high-ranked civil servants of the regional government agency, districts, and the city of Kassel. These positional leaders would demonstrate political-administrative leadership if taking decisions on plans and budgets for climate change adaptation. Although we lack specific data on this, this function has been fulfilled by one or several officials for the sectoral implementation projects that took shape during the overall KLIMZUG project period, such as the “mosquito and tick” project or others (see Table 2 above).

In contrast, the CAOs contributed mainly to the *connectivity* and *enabling functions* within the regional adaptation networks. First, they tried to match practical demands within administrations for general knowledge on climate change adaptation and expertise for specific adaptation measures of the scientific partners of KLIMZUG Northern Hesse. Second, although they did not so much create new networks but rather made use of existing ones, they managed to connect the adaptation agenda to specific sector agendas. Establishing this connectivity was of crucial importance to the realization of pilot projects as the CAO’s did not possess resources for realizing adaptation policies: hence they remained fully dependent on other

parties. In spite of the many difficulties which the CAO’s encountered, they have been rather successful in this respect. This might be explained partly by their efforts to emphasize tangible aspects of climate adaptation, and by framing adaptation in ways that enable linkages with the frames used by other actors. For example, the CAOs deliberately decided to focus on public health issues that affect weak societal groups as a result of heat waves and other extreme weather events, which are relatively tangible. The practice-oriented pilot projects carried out within implementation networks (*Umsetzungsverbände*), such as the development of the climate proof bus shelter or the idea to develop a mobile exhibition, clearly are manifestations of *adaptive leadership*, to which KABs contributed their share.

Connecting newly developed ideas and practices to formal governmental networks and policies (*dissemination function*) remains an important challenge: “Looking at the problem of climate change adaptation, a specific challenge in the medium term is to raise the consciousness of formal decision-makers, which should be the central task of CAOs” (Bardt et al. 2012, p. 38). By continuously spreading information on and drawing attention to the need for climate change adaptation, the CAOs have contributed to such awareness raising, not only with managers and decision-makers of their respective administrative departments but also with elected regional leaders: “The commitment of administrative leaders, that is, chief executives of districts for the climate adaptation theme has proven to be essential, as well as reaffirming this commitment. It was also helpful, for instance, when climate adaptation was included as a central theme in the future development strategy of a district. Such signifiers were really helpful” (Interview 3, 21 October 2012).

To sum up, given their particular tasks and the limitations of the context they operated in, CAOs contributed to the adaptive function of leadership and were strongly involved in the enabling and connective functions of leadership. By operating as they did, they kept sensitizing positional leaders in administrative bodies and regional politics for the issue of climate adaptation, which to some extent overlaps with the dissemination function of our leadership framework. It is only the political-administrative function to which they—by design of their work package and competences—could not contribute.

Discussion and conclusion

The case of CAOs in the Northern Hesse KLIMZUG project constitutes a unique example of an institutional innovation that seeks to mainstream climate adaptation in regional public–private networks. It is based on “agents

² The claims made in this paragraph are mainly based on our interviews and on the official evaluation contained in Bauriedl et al. (2013).

with a mission” to sensitize and connect actors rather than a top-down prescription of adaptation strategies to specific sectors. The first part of our research question inquired about the potential of CAOs to advance adaptation on policy agendas. In response, we argue that by virtue of their work package and location, they were able to act as effective “messengers of adaptation” across policy sectors, albeit under certain conditions. Our analysis suggests three impeding factors as well as some enabling factors. Taken together, they specify under what conditions similar actors may facilitate the mainstreaming of climate adaptation.

First, climate adaptation was generally not (yet) perceived as an urgent issue in this region; hence, it was difficult to mobilize support and resources. The CAOs managed to cope with this challenge by carefully framing the adaptation issue so as to make it more tangible and connect it to existing regional concerns. This illustrates that framing may be an important leadership strategy. Second, they did not have their own budget for the realization of adaptation projects. As a consequence, CAOs were fully dependent on the willingness of other actors to cooperate with them. In order to help realize concrete adaptation projects, they needed to connect the adaptation issue to the problems perceived by other actors—who typically pursue specific sectoral interests—tapping into the budgets of their respective administrations or private actors. Finally, the government agencies involved decided to appoint young university graduates as CAOs. Whereas appointing individuals from outside public administration may enhance the likelihood of realizing innovative projects (i.e. projects deviating from the standard patterns within the organization), their relative unfamiliarity with administrative and political processes seems to have hampered their performance. Their initial disappointment with the lack of problem awareness and financial resources may also be partly attributed to their inexperience as they still needed to learn that institutional change processes are time-consuming, and that their core strategy would be to connect the adaptation agenda to sectoral agendas. One could hypothesize that CAOs, who are familiar with the functioning of public administration, would be more effective in establishing connectivity across sector boundaries. In the light of the sheer size of their overall task, the capacity to establish connections and to operate effectively in organizations was probably more key to success than bringing in fresh ideas. At the same time, despite these limitations, CAOs progressively adapted to their task during the course of their appointment, and persevered. They managed to raise awareness for climate adaptation to a certain extent, and helped to launch and realize a number of implementation projects within the overall KLIMZUG project. Given the general inertia of institutions and the relatively short project time frame of 5 years, one may hardly expect more concrete results.

Returning to the classification of mainstreaming strategies briefly described in the introduction, the case of CAOs is instructive in two ways. First, the use of CAOs (when minimizing the real and potential drawbacks of their role, as our analysis has shown) combines the two dimensions of mainstreaming strategies. While their set-up is an act of directed mainstreaming (a vertical strategy) that redirects the focus of administrations via topic-related funding (via the KLIMZUG programme), their actual operation combines horizontal strategies of programmatic (modification of administrations’ core work by integrating adaptation aspects into on-the-ground programmes or projects) and inter-organizational mainstreaming (promoting collaboration of departments with other stakeholders to interact for sharing knowledge, development competences, and take action for adaptation). Second, our results add to the finding of Wamsler et al. (2014), who argue that several mainstreaming strategies can complement and reinforce each other, typically when combined with strong positional leadership. We do so by showing how the operation of CAOs combined different horizontal strategies, which, at the same time, represent activities belonging to enabling and connective leadership functions that depart from a traditional, hierarchical view of leadership, indicating that leadership for climate adaptation may benefit from been seen and understood as a collective undertaking.

More generally, CAO-like agents could probably be used for other causes that call for mainstreaming than climate adaptation issue. As Wamsler et al. (2014, pp. 190–191) put it, “mainstreaming is framed as incorporating new aspects into existing core work”. As such, the term has been applied to cross-cutting issues including gender, environment, disaster risk reduction, HIV, education, and learning. For all these issues, it is thinkable to install officers in relevant government institutions who, similarly to CAO’s, set out to insert new aspects into established policy networks, challenging dominant thinking. Although the enabling and impeding factors we identified above may be a starting point, the specific conditions under which CAO’s could serve to mainstream any of these issues require further investigation as they may face issue-specific challenges and barriers.

The second part of our question inquired how to understand the CAO case in terms of leadership functions for increasing regional adaptive capacity. We analysed leadership on the level of the institutional innovation of appointing CAOs within the context of the KLIMZUG project (and the larger climate adaptation network), and, in more depth, on the level of the CAOs while operating and their performance including projects which they initiated. It was found that individual actors, e.g. CAOs, may contribute to more than one leadership function and that one leadership function may be fulfilled by more than one individual or actor (such as

CAOs next to regional government officials being enabling leaders). Other case studies of leadership within regional climate change adaptation networks lead to a similar conclusion (Meijerink et al. 2015; Scholten et al. 2015). This conclusion has both theoretical and practical implications. Theoretically, it suggests that leadership research should shift focus from the study of key individuals to the study of networks or groups (Cullen and Yammarino 2014). Leadership in many cases involves collective leadership. CLT and our slightly modified version of CLT offer a framework which highlights the complementary leadership roles which several individuals may play within governance networks. The practical implication of our findings is that organizational actors involved in efforts to mainstream climate change adaptation can use the framework to assess whether leadership functions within their (regional) adaptation network are fulfilled. Questions that are central to such an assessment are: Which actors fulfil which leadership functions? Which functions are most relevant to the specific adaptation issue and context? Which functions still need more attention and who could contribute to them? (Van Lamoen and Meijerink 2014).

The model proved useful for disentangling leadership on both levels, showing that CAOs contributed most clearly to the enabling and connective ones, and, to a lesser degree, to the adaptive and dissemination functions. Moreover, both the German government and the two universities involved demonstrated enabling leadership by providing resources and knowledge for creating CAOs. More generally, the framework has been helpful to specify various manifestations of leadership that transcend traditional leadership roles, and it directs attention to network-directed manifestations of leadership such as adaptive and connective leadership. The way forward is to use the framework also in comparative designs comparing cases of adaptation practices from different national institutional contexts and/or comparing cases where adaptation initiatives were taken by public and private actors (Scholten et al. 2015; Meijerink et al. 2015) to draw out whether some leadership functions are more crucial than others under conditions of institutional variation.

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