

# Municipal collaborative planning boosting climate resilience in the built environment

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## Abstract

**Purpose** – A meta-study covering the past decade maps the development of Norwegian municipal planning, climate adaptation and institutional vulnerability towards climate change. This paper aims to explore the implementation of climate adaptive changes in Norwegian legal planning and building framework into municipal practice and policy instruments from 2007 to 2016. The study is planned to answer the question: what drivers ensure increased municipal efforts in their climate adaptive planning and building practice?

**Design/methodology/approach** – The paper presents empirical findings from two qualitative research projects, each with nine interviews of municipal key personnel within three municipalities' planning and building services and an ongoing qualitative, expert interview-based study (eight individual/group interviews).

**Findings** – Risk reduction and climate resilience are still unsatisfactorily attended in many Norwegian municipalities. There is a gap between political and administrative levels in communicating bilateral expectations and needs for incorporation of climate adaptive measures. Policy instruments maintaining climate adaptation are in demand by different building process actors. Yet, extreme weather events seem to be the main drivers for actual implementation of climate change aspects into municipal policy instruments. Networking, both within and between municipalities, is an important strategy for learning climate adaptation.



**Research limitations/implications** – Both globally and in Norway, the focus on climate change impacts is steadily increasing. Municipal risk and vulnerability analyses are statutory, as is the incorporation of the results into local plans at appropriate levels.

**Originality/value** – The originality of this paper is the meta-perspective over the past decade, the qualitative approach and the use of environmental psychology theories.

**Keywords** Resilience, Climate change, Built environment, Climate adaptation, Law and regulatory frameworks, Local planning

**Paper type** Research paper

## 1. Introduction

### 1.1 Background

Climate strain poses vast challenges to the Norwegian built environment on a day-to-day basis (Lisø and Kvande, 2007). Anticipated future climate changes will lead to increased climate loads on buildings and infrastructure in Norway. Important tasks for the municipalities are to prevent damages and prepare the society for climate change. How do Norwegian municipalities prepare for climate change?

The Norwegian planning and building legislation (Planning and Building Act – PBA) has been subject to two major legislative reforms in the past two decades – a process-related reform in 1997 and a comprehensive restructuring and amendment in 2009/2010. The main intention of the 1997 PBA reform was to achieve a higher quality of the built environment through, among other things, implementing a thorough regime of participant control and public/municipal supervision. The latter reform resulted in a more perspicuous and user-friendly legal framework. The PBA of 1997 placed the responsibility for quality standards increasingly on the professional actors of the building process. The advisory and supervisory role of municipal and government institutions was reduced (The Ministry of the Environment, 1997). The 2010 reform introduced a new requirement, stating that the municipalities should either perform risk and vulnerability analyses or ensure that it was otherwise performed.

Different researchers acknowledge that institutional resources, such as municipal planning, are critical to the capacity to undertake actions adjusting to local climate variations, both in the short and the long term (McCarthy *et al.*, 2001; Yohe and Tol, 2002; Næss *et al.*, 2005). Further, Tompkins and Adger (2005) maintain the importance of the legal framework but emphasise that changes in the law itself are not enough to drive changes in practice. Lisø and Kvande (2007) substantiate the need for incorporation of adaptation to climate change- and moisture-related issues in municipal planning, handling of building applications, performing municipal supervision and developing of policy instruments. This need for municipal incorporation is further explored in other studies, also upholding that, among others, local knowledge on climate strain is mostly informal and not documented (Eriksen, *et al.*, 2009). Further, the municipal development of statutory risk and vulnerability analyses is lagging and thus impeding the progress of the focus on climate adaptation in municipal planning (Øyen *et al.*, 2010; Aall *et al.*, 2011; Almås, 2013; Flyen *et al.*, 2014).

The EU Commission has developed a roadmap for climate services in cooperation with a group of experts (Street, 2015), describing the EU's future efforts within climate services. They stress the importance of establishing knowledge-based climate services for incorporation in locally based instruments, policy instruments and tools to meet, among others, the climate challenges ahead.

This paper presents a qualitative meta-study with an empirical selection from three projects focussing on different aspects of municipal practice in climate adaptation, covering

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a timespan from 2007 to 2016. Through a cross-project analysis, the aim is to enlighten the following problem approaches:

- How were climate adaptive changes in Norwegian legal planning and building framework implemented in municipal practice and policy instruments from 2007 to 2016?
- What drivers ensure increased municipal efforts in their climate adaptive planning and building practice?
- Do increased networking and collaborative planning contribute to overcoming barriers to climate change adaptation?

### *1.2 Theory and research*

There are well-known psychological mechanisms that can explain why we do not do more for climate adaptation than we do. One of the first to summarise and categorise these “dragons of inaction” was Gifford (2011). Psychological research on barriers and drivers for climate change often divides between structural barriers and psychological barriers. Our prehistoric brain comes in the way when dealing with the danger of the climate crisis. The brain reacts fast and effective on sudden dangers, but slow-coming dangers happening far away (and, for example, in the future) are difficult to react on. This is explained through evolutionary psychology and the development of the brain. The human brain is embossed by dangers common in prehistoric times, where alertness and awareness for sudden dangers were crucial for survival. Environmental psychology research shows that people have a tendency to underestimate future dangers, and they believe that climate challenges are worse far away than locally. Another well-known psychological fact is that people have a tendency to take their own environment for granted (habituation). Thus, climate change is not comprehended before it becomes a problem or an extreme weather event occurs and serves as a revelation. This explains why climate adaptation occurs *after* a devastating flood or storm, reminding people about the meaning of their environment. Uncertainty is also a barrier for climate adaptation. When not knowing what to do, inaction or postponed action is justified. This phenomenon underlines the importance of information and concrete guidelines. The uncertainty tied to predicting future climate change is therefore a problem because it prevents people from acting. Cognition and thinking related to the climate crisis is demanding for human beings. People do however have the intelligence to understand why climate cognition is difficult; thus, they have the opportunity to act (Gifford, 2011; Stoknes, 2015).

Another important psychological mechanism influencing climate adaptation is that people look to others to find out how one should behave. This may act as a barrier for climate adaptation. Behaviour that benefits the environment can dominate in some groups. In other groups, there is a growing focus on environmental issues. In seeing others who do nothing, one can justify doing nothing oneself. On the other hand, if someone does an effort for the environment, others will follow their example (Gifford, 2011). Research shows that this influence is large (Nolan *et al.*, 2008). What other people do is one of the strongest predictors of environmental behaviour, when it comes to recycling and energy use. Other important drivers for increased efforts are to be seen and appreciated for a contribution. Stoknes (2015) recommends focussing on social strategies for climate communication, which harnesses the power of social networks. The municipalities are supposed to respond and act according to climate change information. The invitation to invest in social strategies for climate communication (Stoknes, 2015) says something about the importance of networking

both within the municipality and with neighbouring municipalities. This can help to build a professional identity, as “our municipality or organization is concerned with adaptation to climate change”. Further, it will encourage employees to absorb information and guidance increasingly on this topic.

Næss *et al.* (2011) describes how the informants call for more cooperation between municipal administrations, research institutes and national authorities. Municipalities have a considerable freedom in shaping their climate adaptation measures and policy instruments because of their knowledge of local conditions, needs and preferences. They do however have a need for knowledge development. Eriksen *et al.* (2009) describes how municipal climate adaptation is vulnerable to human resources, both because of a drainage of knowledge because of high turnover in the municipalities and because of the 1997 amendments of the legal framework, which represented a huge shift in apportionment of responsibilities. Hanssen *et al.* (2013) see a great potential in “multi-level networks” or “interpretive network arenas” to solve climate change. Multi-level networks are networks in which actors participate at different levels (state, county and municipality). A case study of multi-level cooperation between knowledge users, researchers and representatives from the government demonstrated how this type of networks made the municipalities better equipped to meet challenges of climate change (Hanssen *et al.*, 2013). The main reason was the knowledge gained through network participation. The multi-level network approach was also appropriate to meet challenges linked to translation between researchers and practitioners of climate change adaptation.

Klaussen *et al.* (2015) emphasise the importance of networking to learn adaptation strategies. Participants in a network consider other municipalities’ approaches and solutions and imitate each other. Networking is just as important for private developers and other private actors, who may work in different municipalities, and may transfer knowledge from one place to another. The Cities of the Future (CF) network is probably the most important of several established networks operating between cities, municipalities, county and state authorities. Almås *et al.* (2015) maintain that learning and competence of participating individuals and organisations must be described as strong and considerable, making ripple effects through other networks and collaboration in other settings. Municipal representatives participating in role model projects describe such networking as crucial for knowledge and ambition development. CF was a network initiated by the Government, as a collaboration between the Government and the 13 largest cities in Norway (Rambøll, 2014). An overall objective was to achieve a reduction of greenhouse gases and to make the cities better to live in. Main drivers of the network were to support the municipalities in developing awareness, knowledge, policies and strategies together and to share and cooperate this with industry and commerce, counties and the Government. Table I gives an

**Table I.**  
The CF network members’ incorporation of climate change adaptive aspects in municipal governing documents, policy instruments and administrative procedures

Municipal development of climate change adaptation aspects	2008	2014
Objectives and strategies in the social part of the municipal master plan	4	12
Requirements to climate adaptive considerations in zoning planning	2	13
Requirements to climate adaptive considerations in building application process	0	13
Risk and vulnerability analyses with climate change impacts incorporated	1	13

Source: Rambøll (2014)

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overview of the development of range of policy instruments within the network member municipalities in the operating period.

From the 2008 start-up, to the 2014 conclusion, the member cities developed from having almost no focus on climate-related issues to incorporating climate change considerations in the municipal master plans, administrative procedures and other policy instruments. Main drivers of the network were to support the municipalities in developing awareness, knowledge, policies and strategies together and to share and cooperate this with industry and commerce, counties and the Government. [Table I](#) gives an overview of the development of range of policy instruments within the network member municipalities in the operating period. The final evaluation report from the study ([Rambøll, 2014](#)) emphasises that the network was a well-suitable instrument to reach the formulated aims, contributed to both short- and long-term changes, and that the formulated aims of incorporating climate change aspects in municipal policy instruments were met. The massive turnaround in awareness and development of policy instruments is remarkable and reveals a huge potential of what might be possible to obtain also within the remaining 417 municipalities in Norway. Alas, there are no plans of an extensive follow-up of the network. Most municipalities/cities participating in the CF are now members of a new network, called In front. The focus is mainly on climate adaptation, and it is administered by the Norwegian Environment Agency.

In August 2010, the city of Copenhagen, Denmark, experienced heavy rain, which resulted in flooded basements and roads. After this, the city council determined that, most likely, flooding will occur in the city every 10 years on an average. The sewer systems meet today, largely, the normal precipitation amounts, but they cannot accommodate future 30-40 per cent greater quantities of water. Based on the experience from 2010, the city council started to work on a climate adaptation plan for Copenhagen which was finalised in 2011 ([Copenhagen, 2011](#)). This is one example of a city acting in the aftermath of an extreme weather event.

## 2. Method

The methodological approach is a meta-study based on empiricism from three different, qualitative studies. The three qualitative case studies are independent, with overlapping subjective approaches within climate change and moisture safety. In all the three projects, the empirical collection was performed through qualitative, semi-structured interviews for obtaining in-depth understanding of the climate adaptation process.

Based on an ongoing PhD study (Flyen), one of the case studies enlightens municipal practice within planning and building between 2008 and 2010. Through a climate and moisture focus, the work is exploring the development of local planning and municipal policy instruments, development and implementation of legal framework and dissemination to and cooperation with the professional participants of the building process, in three Norwegian municipalities. The study embraced nine interviews with key personnel (managers and executive officers) within planning and building departments in the three municipalities, and it was performed prior to the 2010 amendment of the PBA. The PhD case selection of municipalities was strategic to cover different climatic-, architectural-, societal- and management-related challenges. The study has been part of the Climate 2000 programme, financed by the Research Council of Norway and industrial partners.

The BIVUAC project (Buildings and Infrastructure – Vulnerability and adaptive capacity to climate change) is a study concluded in 2015, dealing with the interface between buildings and infrastructure for storm water management, climate change adaptation and municipal practice. From this study, empiricism enlightening development, drivers for and

barriers towards incorporating climate change aspects in local planning is used. The analyses embrace three large municipalities in Norway, all part of the CF. The empirical collection in the BIVUAC project was performed between 2010 and 2014, subsequent of the 2010 amendment of the PBA. The study covers nine interviews with key personnel within planning, building and water mains and sewerage departments of the three municipalities. The case selection was strategic, representing three of the 13 member municipalities of the CF network. None of the municipalities are the same as in the PhD study. BIVUAC was a research project financed by the Research Council of Norway.

The third case study is from Klima 2050, a Centre for Research-based Innovation (SFI) running for eight years, financed by the Research Council of Norway and the consortium partners. The centre is emphasising on development of moisture-resilient buildings, storm water management, blue-green solutions, measures for prevention of water-triggered landslides and socio-economic incentives and decision-making processes. Extreme weather and gradual changes in the climate are both addressed. One of the centre's four work packages is aiming at, among others, developing new, integrated and innovative decision-making models for local authorities, to enhance the society's capacity to handle the impacts of climate change. The empiricism chosen for this paper is part of an ongoing expert interview case study between 2015 and 2016. The interviewees form a selected panel of eight key experts amongst industry partners of the programme, relevant research institutions and other private and public organisations. In addition, one group interview with ten participants was conducted, with informants from two municipalities and some key personnel from different governmental directorates.

### 3. Findings and discussion

#### 3.1 Study A – findings in the PhD study

The empirical selection represented urban settlements with development pressure and a population exceeding 25,000. The three municipalities were geographically widespread to represent different climate conditions and to reflect how the differences in local climate conditions might affect municipal practice.

In all the three municipalities, both management and executive levels in the planning and building departments had a clear comprehension that adaptation to climate change and moisture strain were important issues. They emphasised the need for incorporation in development of plans, policy instruments, guidelines, tools and activities related to handling of building application and building permits. There were clear divergences in the knowledge levels, both within and between the municipalities. In the largest and most climate-exposed municipality, the executive officer had a much better overview and understanding of practice, needs and necessary initiatives and solutions within climate and climate change adaptation than the management. This elucidated clear knowledge gaps, explaining the lacking strategies for climate-related issues. In the municipality with the least harsh climate, the interdisciplinary cooperation between the planning and building departments functioned far better than in the other two. There, the level of local, climate-related knowledge seemed quite homogenous in the management and executive levels. This was the only municipality of the three where a risk and vulnerability analysis (RVA) had been initiated. Further, they were preparing the incorporation of climate- and moisture-related information in planning, policy instruments and other activities towards the public and professional actors of the building process. The county authority had required the RVA, both anticipatory and the legal amendments, and to use it as a template for neighbouring municipalities.

There was some communication between political and administrative levels in the two smallest municipalities; however, it was rather absent in the largest. This communication was not specifically targeting climate adaptation or climate change-related issues. Communication and planning collaboration between the different sectors of the three municipalities seemed to be lacking or was at least rather limited. The awareness of climate change issues and direct/practical relevance to the municipality was not obvious in two of the municipalities. One was however conscious of the shortcomings, blaming over-complex planning- and building application processes, lack of resources and a recent municipal merger, for not prioritising incorporating of climate-related issues into policy instruments and activities. None of the three municipalities did perform any supervision activities related to climate adaptation, climate strain or moisture-related issues. Based on their experiences, the smallest, yet most proactive, municipality pointed to increased subject-specific control and supervision, and independent control both in design and during construction as key success criteria to deal with the large number of building damage related to climate stress and moisture. The two largest municipalities took it for granted that the responsible actors of the building process attended to climate-related issues in the building process and saw no need for follow-up of climate- or moisture-related issues through disseminating information, supervision or other activities. In the largest municipality, no real effort for developing or implementing climate adaptive measures was made, until the municipality joined CF in 2008. The study revealed that the two largest municipalities, exposed to the heaviest climate, had the most evident wait-and-see attitudes and the least proactive practice attitudes.

### *3.2 Study B – findings in the BIVUAC project*

In the largest municipality, an overarching focus on climate change was embodied in various policy instruments. As part of the planning hierarchy, a number of directions for climate adaptation were developed. Alas, these directions were fragmented, linked to a large number of plans and were difficult to grasp in its entirety. The network CF was very important for the municipality's work on climate adaptation. The municipality recognised the need to develop knowledge and the need for better cross-sectoral cooperation on issues related to climate change.

In one of the other municipalities, the idea of climate-adapted storm water management was supported both at political and administrative levels. The key principles were legally binding provisions in the municipal development plan and the leading sector plans. Inter-sectoral collaboration to integrate storm water- and climate adaptive considerations in planning was successful. The ongoing changes in storm water management were necessities to cope with aged and undersized equipment rather than an expression of adaptation. The municipality stressed that achievements and focuses in the CF network were important for their increased focus on climate-related issues, moisture and storm water management and climate change adaptation.

The smallest municipality has for many years been seen as a forerunner because of their climate adaptation efforts within planning and building. However, the study visualised lacking formalised coordination across sectors within the municipality. Climate expertise, experiences and practice in the water and sewage management department (WSM) were extensive. This competence was unfortunately not used in planning and supervision activities within the planning and building departments. The municipality early initiated climate adaptive planning, building application activities and WSM but not necessarily with coordinated efforts. There was a demand for experience feedback from the WSM to the planning department, but the cross-sector collaboration was not well established. The

municipality was actively involved in several research projects on environmental and climate issues and engaged in CF. Despite the need for further development of cooperation between the agencies, it is clear that the municipality's active participation in research projects and CF has been of great importance for their development of competence and systems to address climate change aspects. Continuation and dissemination of results from the CF and other similar projects will be essential also for municipalities that have not participated. However, major drivers to achieve success were linked to active political commitment and network participation.

### *3.3 Findings from expert interviews in Klima 2050*

The expert interviews revealed that local knowledge and competence on climate adaptation is present in the municipalities, but that the main barriers occur at the decision-making levels (mainly political level). Administrative initiatives are not prioritised or do not get acceptance by the decision makers. For the member cities/municipalities, the CF network had great importance, as each individual mayor had to sign a contract with the network to enrol the municipality. This anchoring of membership led to a political commitment, thus supporting and securing a local implementation of the accomplishments obtained within the network. The knowledge development, consciousness and understanding of the importance of climate adaptation were intense during the first four to five years of the network. Actual climate-related incidents, or extreme weather events, are also important as drivers to put climate challenges and climate change on both the political and the administrative agenda. One of the interviewees explained the importance of the CF network:

One of the key success factors was not only the network itself but the fact that 13 mayors signed a paper and pledged to collaborate. There was no talk of money during the period [ . . . ] it was not primarily the resources, but that there was a dedicated person, that the mayor had signed, and that they had this network'. Further, 'The executive level is not heard or seen, or are not prioritized. So how the signing of a paper by thirteen 13 mayors became a door opener is an important and fundamental recognition.

Lack of inter-sectorial collaboration is a huge barrier to incorporate local knowledge of incidents, vulnerabilities and resilience in buildings and infrastructures. Correspondingly, such collaboration is important, with a huge potential to achieve better plans, policy instruments and guiding documents. One of the expert interviewees described this challenge:

The Water and Sewer Management is located only six kilometres from the town hall, where the people working with zoning and building permits are located. It's not very easy to achieve cooperation between the two agencies. It has never been possible to get any of the people in the regulation or building departments to accompany us to anything relating to climate adaptation, whether it is Cities of the Future or any other event. Once, a person found out that 'yes, but you can come to us and we can invite you', it is almost two years ago and we have not heard anything yet.

This quote illustrates the meaning of network between municipalities:

If one has an interest in a common problem, so it's easier to see the value of cooperation. Finding something smart – What is in it for me - an analysis of common destiny with neighbouring municipalities, do an analysis, find interfaces with the neighbouring community. It is perhaps the key to establishing cooperation with neighbouring municipalities. All municipalities are supposed to make a Risk and Vulnerability analysis. In this context, make a list of municipalities; this we can benefit greatly from by collaborating with a neighbouring municipality. Then it goes on both



quality and capacity - they will save money. They can get many good things out of this. And learn from each other.

Many of the interviewees emphasise inter-municipal cooperation as a good idea, necessary in terms of the learning potential from each other and the possibilities of performing risk and vulnerability analyses together. Beyond the CF network, this is not a general approach amongst the remaining 417 Norwegian municipalities. It is however becoming somewhat more common amongst neighbouring municipalities to cooperate in planning matters.

The expert interviews enhance the understanding of the CF network as a highly valuable tool in establishing awareness and initiating efforts and political ownership to the climate adaptation. It also substantiates the acknowledgment that the remaining 417 municipalities are also in need of a similar boost to initiate efforts of adaptation.

#### 4. Discussion and conclusions

The empiricism enhances the literature references in emphasizing that a legal amendment is not single-handedly capable of inducing changes in practice. As the meta-study shows, the meaning of network between municipalities and governmental organisations is one of the most important drivers for climate adaptation strategies. It anchors the decisions on the highest level and leads to commitment and knowledge among the participants. There is a need for new network initiatives for the remaining 417 Norwegian municipalities. The meaning of networking for climate adaptation corresponds well to psychological research on how to facilitate pro-environmental behaviour and the strength in social strategies (Gifford, 2011; Stoknes, 2015). Not knowing what to do with climate challenges is paralysing, and uncertainty leads to inability to act (Gifford, 2011). Participating in networks for climate adaptation leads to knowledge development and copying measures and behaviour. The success of such a network is of course dependent on well-functioning leadership, meetings and participation and, in particular, commitment to the strategies by the mayors.

Figure 1 presents the development in implementing climate adaptation strategies in the case studies across the three research projects. The main strategies of the legal amendment were known prior to the date of effectivity (2010), yet only a few municipalities were preparing for the legal changes.

How are climate adaptive changes in Norwegian legal planning and building framework implemented in municipal practice and policy instruments from 2007 to 2016? Despite a

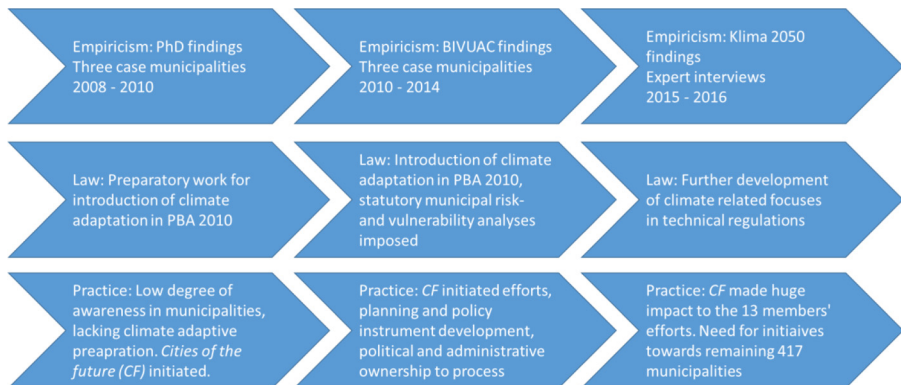


Figure 1.  
Development and  
discussion chart

Note: CF = cities of the future

steadily increasing focus on climate change impacts, both globally and in Norway, incorporation of climate adaptive measures are still deficit in municipal planning. The legal framework imposes the responsibility of performing risk and vulnerability analyses on to the municipalities. Further, local authorities are to incorporate findings from the analyses into local plans at appropriate levels. However, risk reduction and climate resilience are still unsatisfactorily attended to in a large share of Norwegian municipalities. There seems to be a gap between political and administrative levels in communicating bilateral expectations and needs for incorporation of climate adaptive measures. Climate-adapted local planning is in demand by the professional actors of the building process, both for new buildings and for renovation/upgrading projects, to obtain a climate-resilient built environment.

What drivers ensure increased municipal efforts in their climate adaptive planning and building practice? A main driver for obtaining mapping of risks and vulnerabilities, planning of danger zones and preventive protection measures (e.g. against flooding) is the occurrence of extreme weather events. It seems that the more exposed to climate strain in general, the easier to overlook (habituation). Preparedness to handle climate change is thus as much a mental adjustment as a physical adaptation. The governmental follow-up is however not intercepting, or reacting to, the lack of municipal attention to ensure the integrity of the PBA. Amongst obstacles to incorporating relevant climate-related issues into local planning, our findings point to lacking collaboration both in the development of local planning and in intra-municipal collaboration and in cooperation between neighbouring municipalities.

Do increased networking and collaborative planning contribute to overcoming barriers to climate change adaptation? Yes, the networks between the municipalities and public organisations, the commitment of the mayors in these networks and the safeguarding of a holistic approach in anchoring the networks within the municipalities are the main drivers in the continued climate adaptation process. In addition, the using of in-house competence to enhance the collaborative planning both across sectors within each municipality and between municipalities seem to be a sound economic, knowledge wise and sustainable way forward.

What has then caused these changes of behaviour? The gap between political and administrative municipal levels may be understood by what happened in the CF network. The theory explains how our prehistoric brain “comes in the way” when dealing with the danger of the climate crisis, and how we tend to respond with inaction in times of uncertainty. The fact that the impacts of climate change are not known in detail creates uncertainties of not knowing what to respond to. Lacking political anchoring creates uncertainties of not knowing how to respond or if it is strategically correct to respond. The mutual effect is paraplegic, causing low activities at the different levels within the municipalities. The creation of the CF network answered to both the lack of knowledge and the lack of anchoring. Through the development of knowledge on how to respond and adapt to climate change and the anchoring of political responsibility, the grounds for being inactive were diminished. The municipalities of the CF network became more aware and focussed of local impacts of climate change; the uncertainties were reduced because of increased knowledge and awareness also in political levels, resulting in improved planning efforts. The CF network was not necessarily the answer to all problems, and it did not erase all problems linked to climate change challenges of the municipalities. However, the focus in the participating municipalities changed and a more proactive and holistic attitude has been the result. In addition, we have seen that actual extreme weather events, a higher general level of focus, e.g. in mass media, and increased knowledge, have been instrumental in driving also the public authorities in increasing their efforts in adapting to climate change.

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