

# Adaptation to climate change in Norwegian: the role of municipal governments

Presentation at the NORDCLAD-Net PhD course “Bridging the science, policy and practice of adaptation to climate change in the Nordic countries”

6-8 November 2010, Stockholm Environment Institute (SEI), Sweden

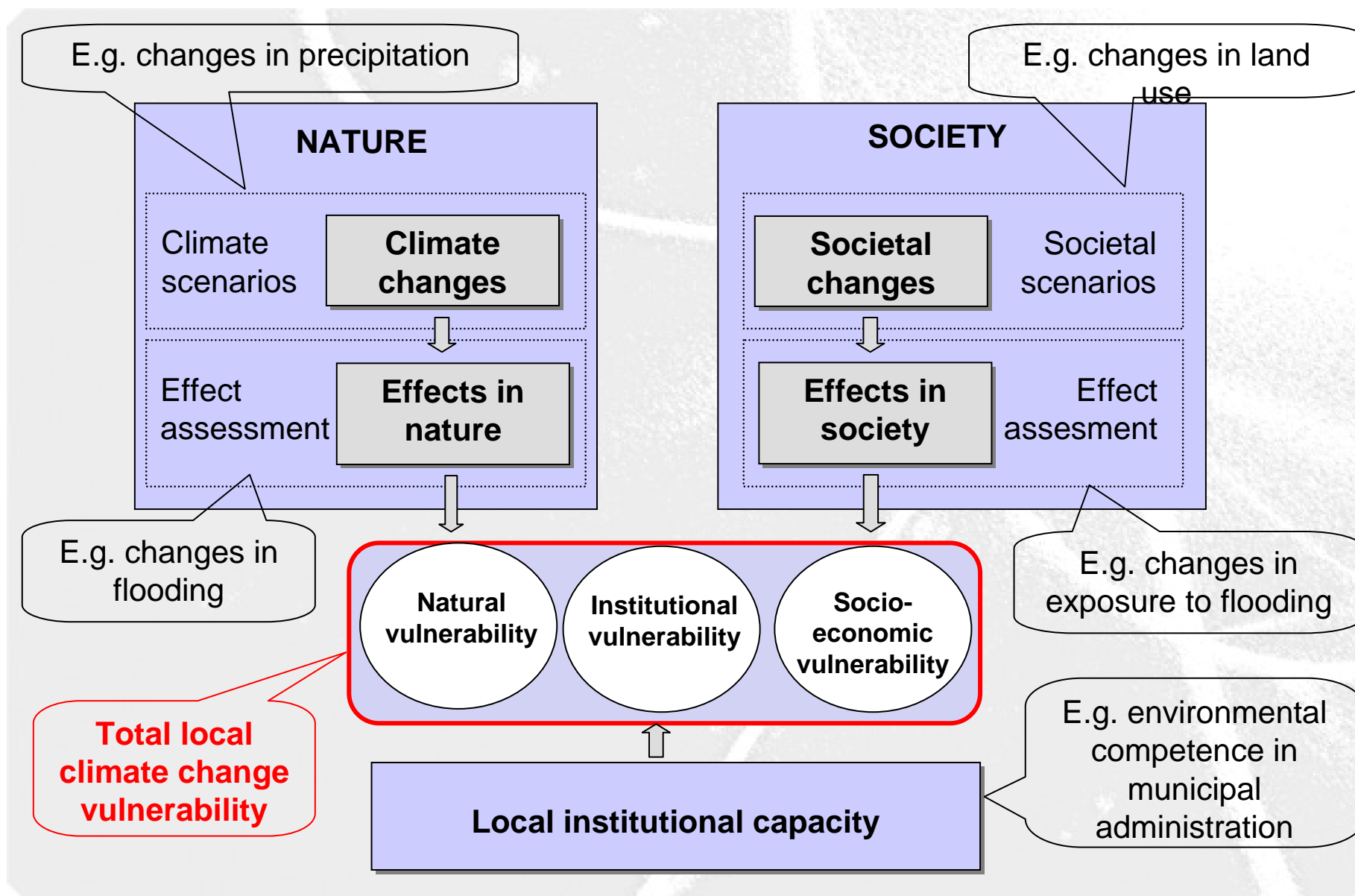
Dr Carlo Aall  
Western Norway Research Institute (WNRI)



## Outline of presentation

- **Conceptual model**
- **Putting “climate change adaptation” (CCA) on the political agenda in Norway**
- **Early experiences from local CCA**
- **Hindrances in working with CCA at the local level of governance**
- **What's next?**

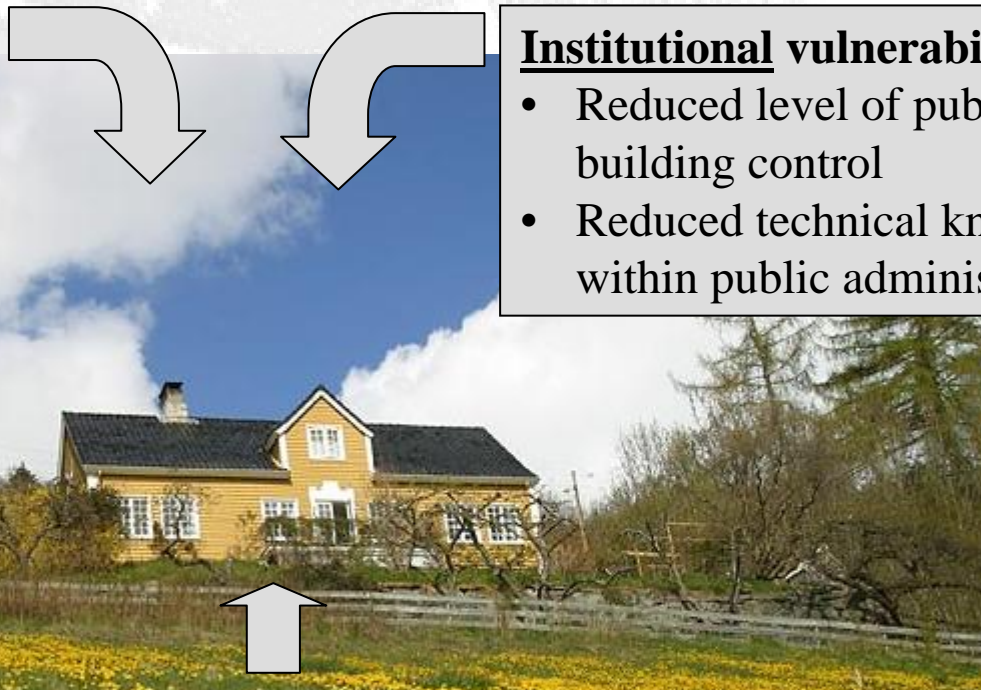
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## Example: case of climate change vulnerability in residential housing

### **Natural vulnerability**

- Most important economically: more "horizontal" rainfall (combination of wind and rain)
- Other aspects: Higher storm tide, more avalanche, more flooding, more frequent changes between frost and



### **Institutional vulnerability**

- Reduced level of public building control
- Reduced technical knowledge within public administration

### **Socio-economic vulnerability**

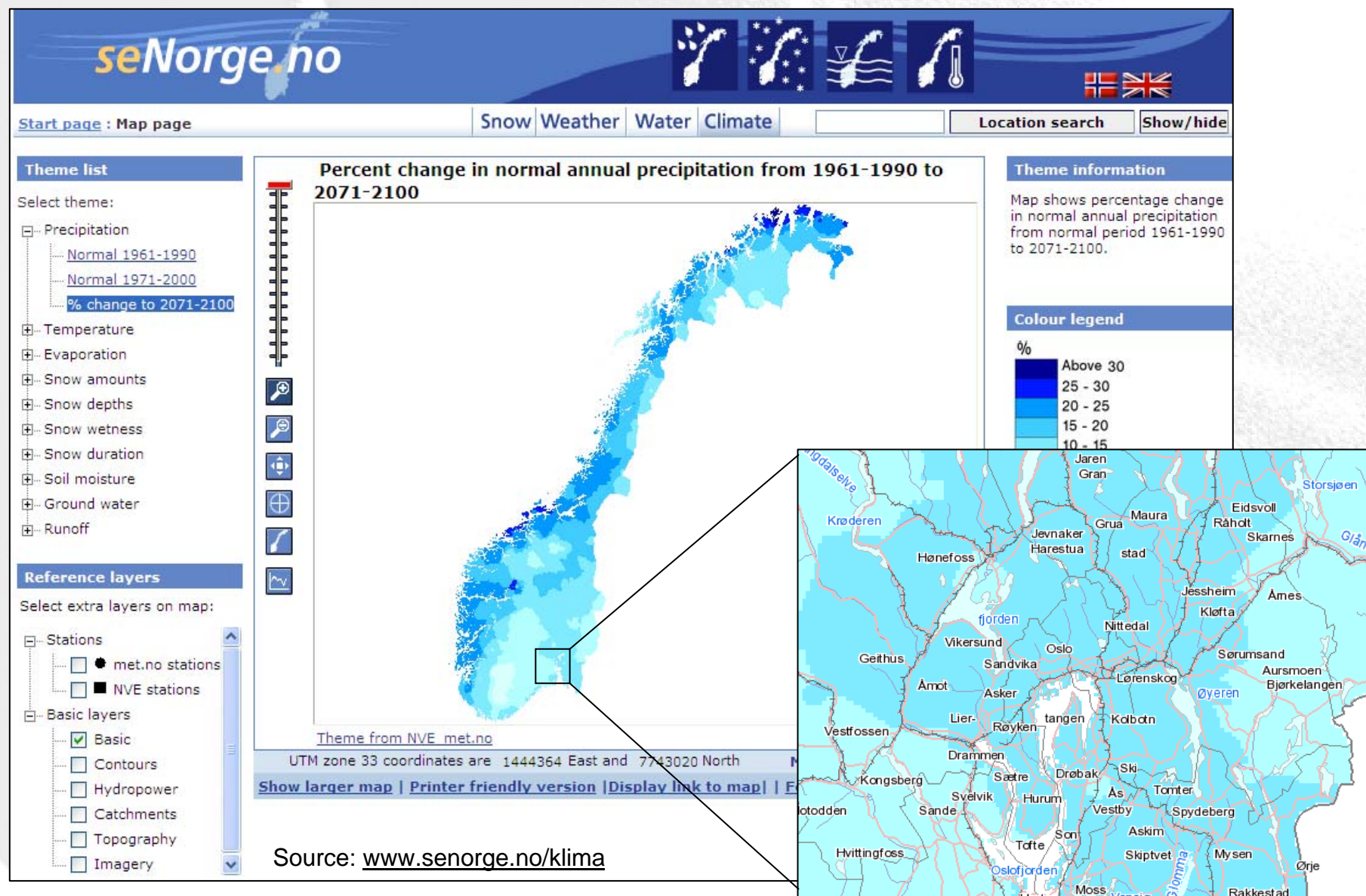
- Reduced budgets for maintenance of public buildings
- Construction of more "low standard" buildings
- More often location of buildings in "climate risky" locations (e.g. close to sea)

- Conceptual model
- **Putting “climate change adaptation” (CCA) on the political agenda in Norway**
  - Prior to CCA agenda setting
  - Local level
  - National level
  - Questions
- Early experiences from local CCA
- Hindrances in working with CCA at the local level of governance
- What's next?

## The situation prior to CCA being placed on the policy agenda in Norway

- **None of the so far four Government White Papers on climate policy (1995, 1998, 2001 and 2007) have included policies in Norway on CCA**
  - Impacts in Norway of climate change described as easy to handle
- **CCA for a long time a non-issue for all Norwegian environment NGOs**
  - Still less than 15 % of articles regarding “climate” on the website to Friends of The Earth Norway deals with CCA (the remaining dealing with CCM)
- **Research on CCA**
  - 1997: First major research effort (the RegClim project) which eventually leads to the establishment of a web portal downloading free-of-charge downscaling of global climate change scenarios ([www.senorge.no](http://www.senorge.no))







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  - 2002-03: First social science research program on CCA (a “pre-program” for NORKLIMA)
  - 2004-13: NORKLIMA: Large scale multi disciplinary research program on climate change, climate change mitigation (CCM) and CCA

## Front runner municipalities – running in front also of the national government?

- **2005:** The Municipality of Flora as the first Norwegian municipality starts to develop a CCA strategy
- **2007:** The Association of Local and Regional Authorities (KS) initiates its first major research project on the role of local authorities in CCA
- **2007-09:** Several research and development projects on CCA involving several municipalities were funded by NORKLIMA
- **2008:** The annual meeting of KS issues a policy statement on the role of local authorities in CCA
- **2008-14:** The development program “Cities of the Future”, which included work on CCA, was set up by The Ministry of Environment and KS involving the 13 largest cities in Norway
- **2010:** KS initiates its second major research project on the role of local authorities in CCA and issues a handbook on local CCA on [www.ks.no](http://www.ks.no)

## Handbook in local CCA

Likevel vet vi allerede nok til å handle, fastslår forskerne. Som plan- og beredskapsmyndighet har vi i kommunesektoren også et betydelig ansvar for å gjennomføre helt nødvendige tiltak i eget område. Det er derfor liten tvil om at klimatilpasning bør skyves høyere opp på agendaen hos mange av oss.

Som et lite bidrag til dette, lanserer vi her en samling eksempler på nye tilpasnings-tiltak til inspirasjon, diskusjon og kanskje etterfølgelse. Eksempelene er hentet fra de fleste landsdeler og fra kommuner styrt av forskjellige partifarger. Flere av disse eksemplene viser at problemene med et endret klima allerede er blitt svært så tydelige i mange norske kommuner, ikke minst som følge av kraftigere styrtregn og medfølgende overvann.

I et værutsatt land som Norge har vi alltid måttet ta forholdsregler mot skiftende værforhold. Derfor er det ikke noe prinsipielt nytt vi nå står foran i tilpasningsarbeidet, selv om vi nå vil måtte forholde oss til enda mer ekstreme skiftninger og dermed langt mer omfattende investeringer enn før. Dette gjør at vi også kan dra nytte av gammel kunnskap – og ikke minst, hverandres erfaringer, som erfaringene i heftet her.

*Halvdan Skard*  
Halvdan Skard  
Leder i KS

### Innhold

3	Krafttak mot oversvømmelse	Fredrikstad
6	Vedtak skal vare i 100 år	Sogndal
8	Tøft klima krever tøffe tiltak	Hammerfest
10	Inviterer til analysedugnad	Sogn og Fjordane
12	Fra teori til praktisk handling	Ski
14	Prøver ut nytt analyseverktøy	Stavanger
16	Lovendring gir ryggdekning	Flora
18	Partnerskap for klima og energi	Buskerud
20	Byøkologiske grep	Oslo
22	Tar klimautfordringene på alvor	Bergen

Lokale tilpasninger  
til globale klimaendringer



Utgitt av KS, april 2010

#### Redaksjon:

Jostein Aarstad  
Nicolay Bjørn-Lian  
Kjetil Bjørklund  
Marit Gilleberg  
Ole Jørgen Grønn  
Rolf Petter Haldenstrøm  
Nurket Kleim  
Kirsten Kleveland  
Tore Leithe  
Nina Solberg

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## Krafttak mot oversvømmelse Fredrikstad

*– Vi er i gang med å  
ruste opp avløpsnettet i byen  
for flere hundre millioner  
kroner, forteller ordfører  
Eva Kristin Andersen (Frp)  
i Fredrikstad kommune.*



– Vi har hatt flere kraftige  
oversvømmelser de siste årene.  
I tillegg er vi blant kommunene som  
har hatt flest stormfloskader. Disse  
erfaringene gjør at vi tar forskerne på  
alvor når de anslår at havnivået vil stige,  
nedbørmengden vil øke, og at vi vil oppleve  
hyppigere stormer og oversvømmelser, fort-  
setter ordføreren.




Fotgjengere måtte vente en stund før de kunne ta i bruk denne  
undergangen i Østre Fredrikstad.

**Kobler klima og samfunnsutvikling**  
Gjennom prosjektet "Lokalt klimatilpasning  
og klimasårbarhet i Norge" (NORADAPT)  
har Fredrikstad analysert hvilke konse-  
kvenser klimaendringer vil få for kommun-  
en, og hvordan kommunen kan håndtere  
disse utfordringene. Ved å koble vurdering-  
er av den framtidige samfunnsutviklingen


## A late – but good – start at the national level

- **2003:** CCA first mentioned - very briefly - in a national policy document (Government White Paper on civil protection and social security)
- **2006:** The Ministry of Environment established a cross-ministerial working group on CCA assigning a secretariat to the Directorate of civil protection
- **2007-11:** A major research project on CCA and transportation established by the Norwegian Public Roads Administration
- **2008:**
  - A brief policy note on CCA was issued by the Ministry of Environment
  - Public Committee on Climate Change Adaptation established and assigned to present a Public Report on CCA by autumn 2010
  - The web portal [www.klimatilpasning.no](http://www.klimatilpasning.no) was launched




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## Norwegian Climate Change Adaptation Programme

The climate is changing, and as a result, climate change adaptation is necessary. The work to adapt to climate change involves all administration levels and most sectors of society. A challenge in the climate change adaptation process will be to gain better knowledge through research, mapping and practical experience. Klimatilpasning.no is an online portal which collects this knowledge.

[Read more about the Norwegian Climate Change Adaptation Programme](#)

### What's new

#### [Spruce growth conditions deteriorating](#)


Spruce is the most important timber species for the Norwegian forestry industry. Climate change impacts growth conditions in the forest, and in the driest parts of the country spruce forests are particularly vulnerable. That could have serious financial implications.

The Norwegian Forest and Landscape Institute, The County Governor in Vestfold, 21/06/2010

#### [Sea level rise in Norway in the 21st century](#)

The report "Havnivåstigning i norske kystkommuner" (Sea Level Rise in Norwegian coastal municipalities, revised edition) presents estimates for future sea level rises for all coastal municipalities in Norway. The tables show estimated values for sea level rise, land rise and flooding for the years 2050 and 2100.


Directorate for Civil Protection and Emergency Planning (DSB), Norway, 12/07/2010



#### [Climate Change Adaptation in Norway](#)

Adaptation to climate change is an important priority area for the Norwegian Government. This brochure gives you information about how the work is organised.

Directorate for Civil Protection and Emergency Planning (DSB), Norway, 23/06/2010




### Sectoral Responsibility

- [Building and Construction](#)
- [Private Sector](#)
  - [Energy sector](#)
  - [Fisheries and Coastal Sector](#)
  - [Agriculture and Forestry](#)
  - [Reindeer Husbandry](#)
  - [Tourism and Leisure](#)
- [Health](#)
- [Natural and Cultural Management](#)
- [Natural Hazards](#)
- [Transport and Communications](#)
- [Water Supply and Sewerage](#)

### Counties

Click on map to select county:



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- [Temperature](#)
- [Floods](#)
- [Sea level rise](#)
- [Slides and Avalanches](#)
- [Wind](#)

### Library

- [Best Practices](#)
- [General Issues](#)
- [Maps](#)

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- **2009:** A Government White paper on Agriculture and Climate which includes important policies on CCA
- **2010:**
  - A guidebook on local CCA launched



[Ministry home](#)[Frontpage for the  
Norwegian Climate  
Adaptation Programme](#)[Counties](#)[Climate Impacts](#)[Sectoral Responsibility](#)[Library](#)[Climate Change  
Adaptation in Norway](#)

VEILEDER: Hva bør du vite?

## Kart: Klima i Norge 2050 og 2100

Hva vil skje med klimaet i din del av landet? I dette kartet kan du selv se hva som er den mest sannsynlige utviklingen for temperatur og nedbør i 2050 og 2100.

30.09.2010



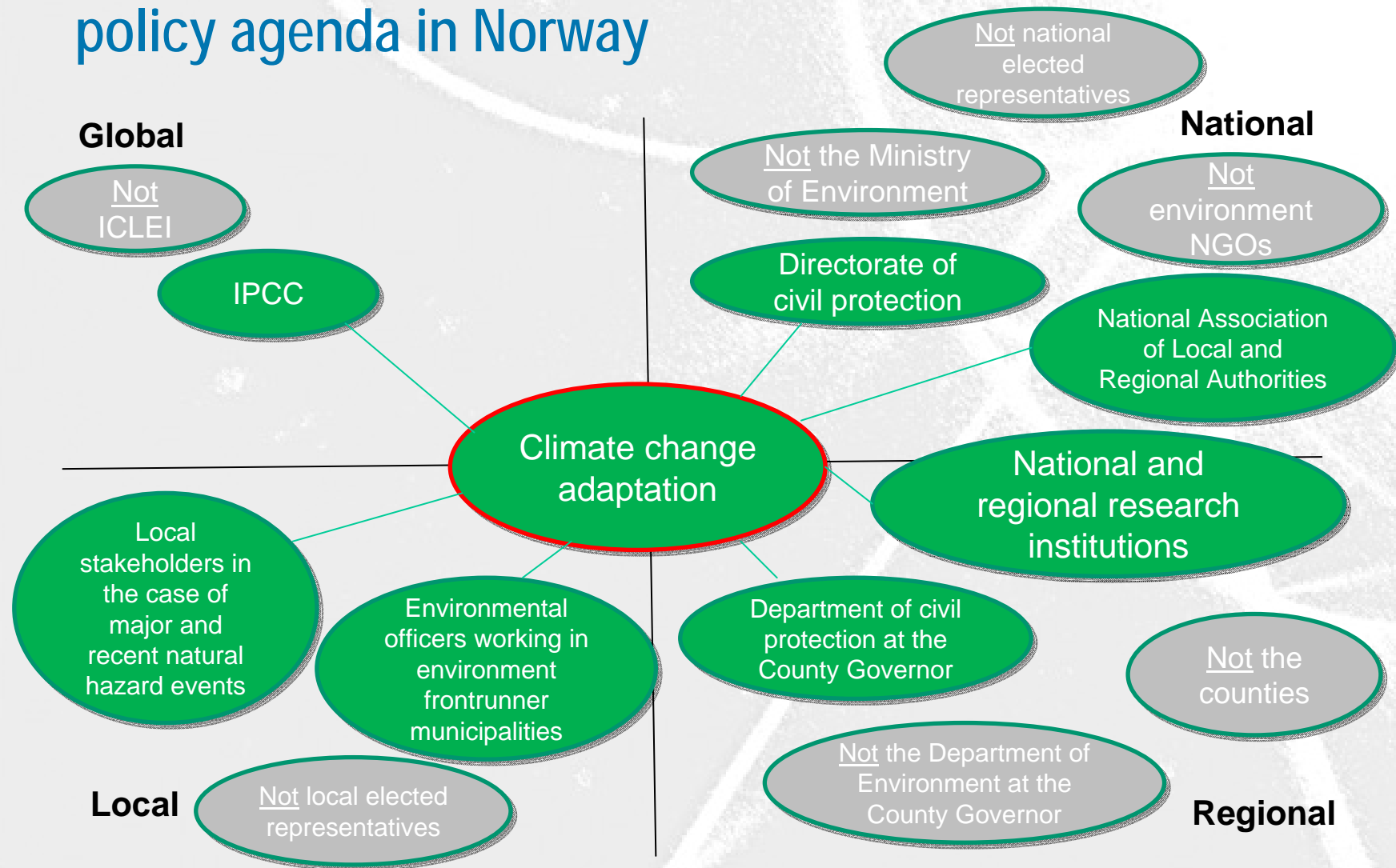
[Kartet viser framtidig temperatur- og nedbørendringer i Norge i 2050 og 2100.](#) Tallene angir temperatur- og nedbørendringer med høy, middels og lav framskriving i forhold til perioden 1961-90 (normalperioden). Framskrivingene kommer fra rapporten "[Klima i Norge 2100](#)". Framskrivingene er basert på klimamodeller og er derfor usikre.

[dere](#)[ilpasning i kommuneplanen](#)[ilpassing i regional  
gging](#)[råder](#)[Veien videre](#)

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  - **15<sup>th</sup> of November the Public Report on CCA to be launched**

# The most important stakeholders in putting CCA on the policy agenda in Norway



## Some reflections and questions regarding putting CCA on the agenda in Norway

- **Norway a late starter**
  - After Finland, Denmark and Sweden
- **Important drivers**
  - Research community
  - civil protection institutions
  - Environment front-runner municipalities
- **What comes after “agenda-setting” in the case of Norway**
  - Does it matter who will be the main actor in formulating and implementing CCA policies? Sectors (environment or civil protection), or integrated in all sectors?
  - Does it matter whether or not CCA policies are formulated in the context of climate change as a “man made” problem?

# Adaptation/mitigation -- versus -- mal-adaptation/mal-mitigation

This is where CCA can end up to be (e.g. in tourism)

**Adaptive Emissions**  
e.g. Expanded use of air conditioning;  
construction of sea walls

This is where we ought to be

**Vulnerability Reduced**  
**SAM**  
e.g. Drought preparedness through demand  
side management; expanded application of  
recycling and conservation principles  
**Emissions Reduced**

**Emissions Increased**

**Unsustainability**  
e.g. Rapid deforestation for land use  
change (agriculture, mining, etc)

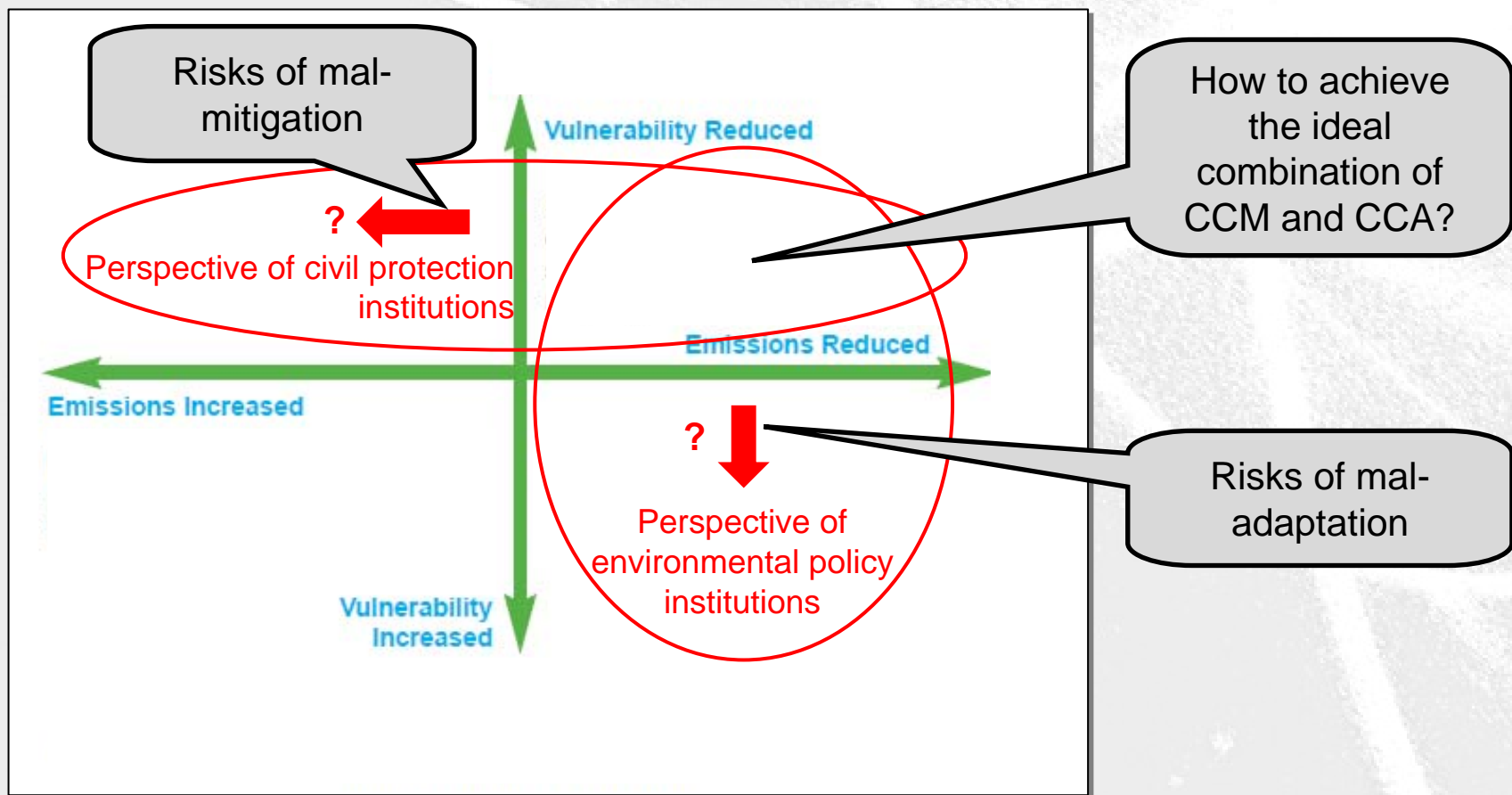
**Vulnerability  
Increased**

**New Vulnerabilities**  
e.g. Switch from fossil fuels to expanded  
large hydro development

Business as usual!

This is where CCM can end up to  
be (e.g. for the case of Norway)

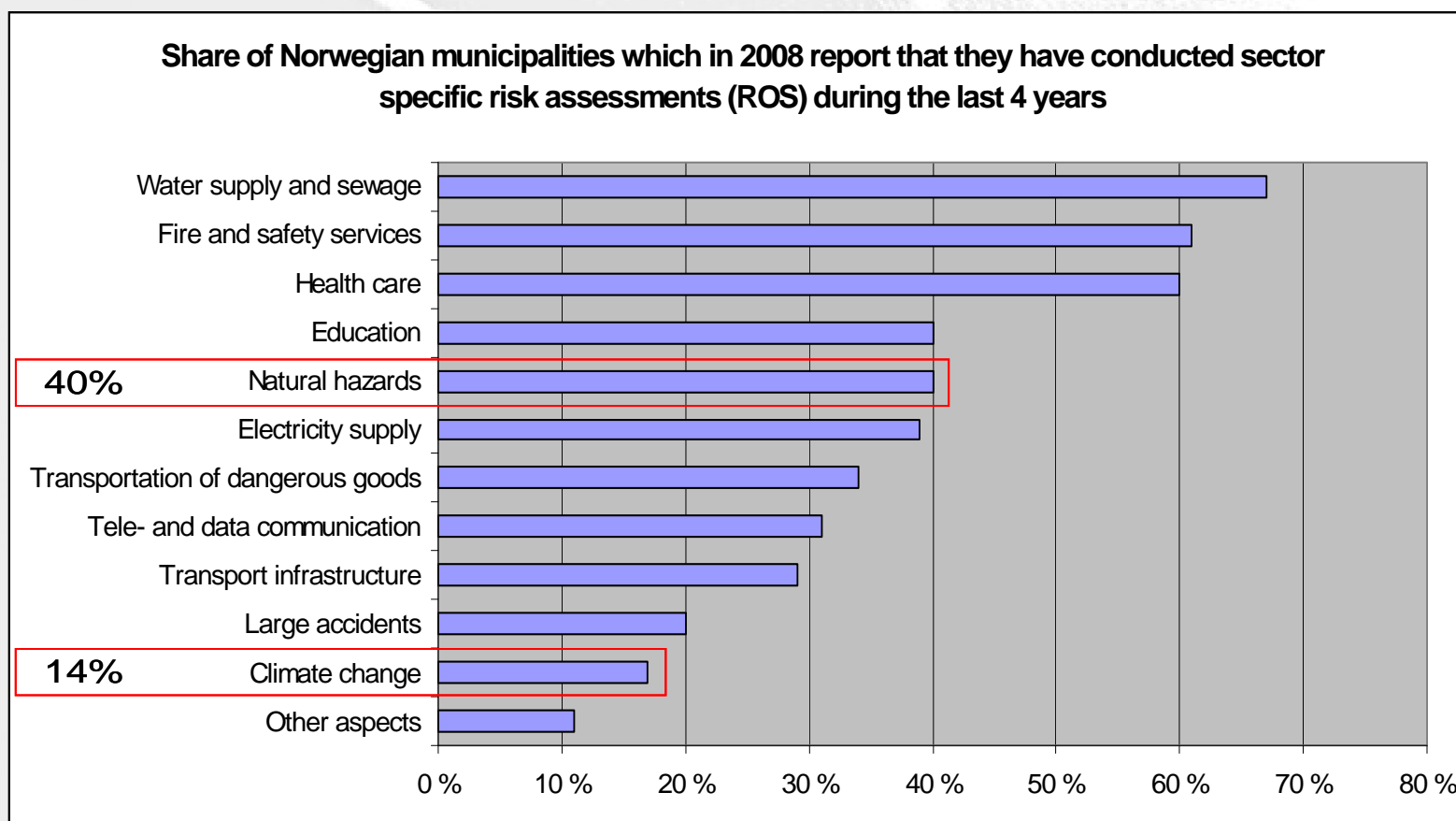
# Adaptation/mitigation and mal-adaptation/-mitigation





- Conceptual model
- Putting “climate change adaptation” (CCA) on the political agenda in Norway
- **Early experiences from local CCA**
  - The status of CCA alike work at the local level
  - Approaches to CCA applied at the local level
  - Examples from one municipality and one county
  - Questions
- Hindrances in working with CCA at the local level of governance
- What's next?

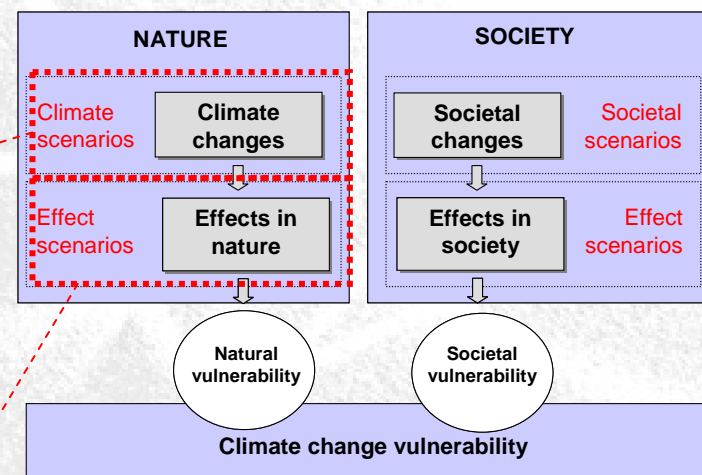
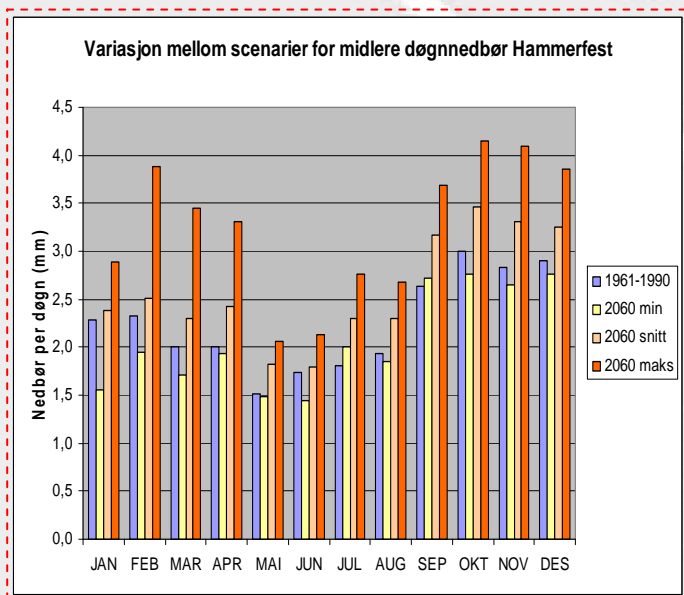
## Local risk assessments (ROS) in Norway



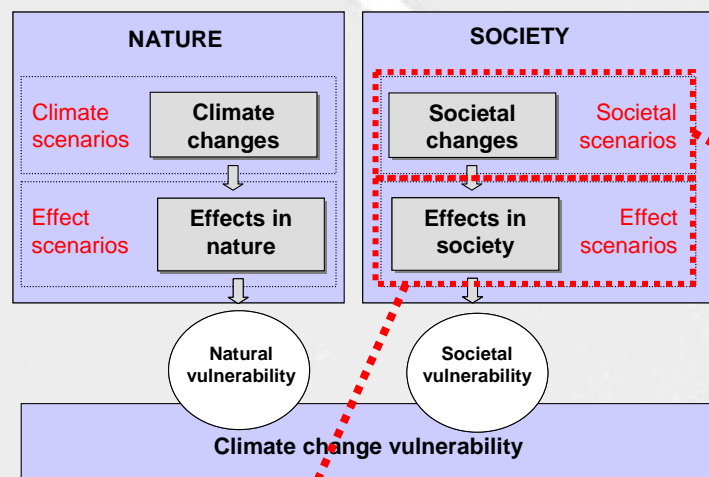
By July 2009 it is mandatory for municipalities to do ROS in connection with land-use planning

## An approach to CCA which has been applied at the local level in Norway: The “natural hazards” project

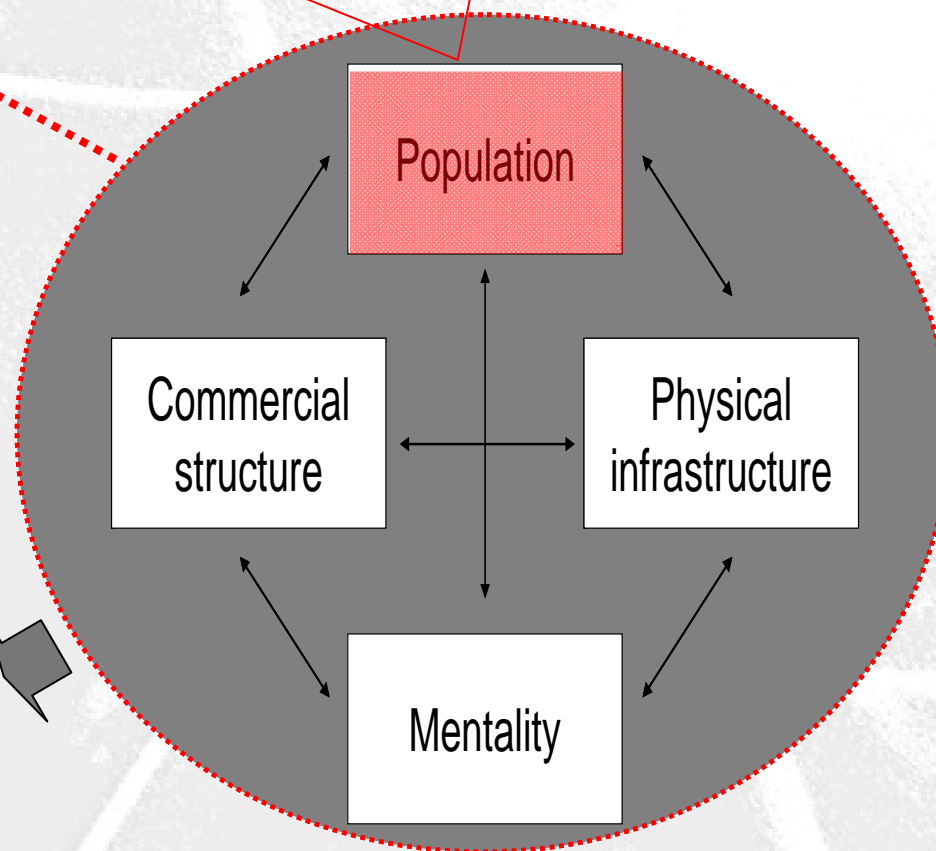
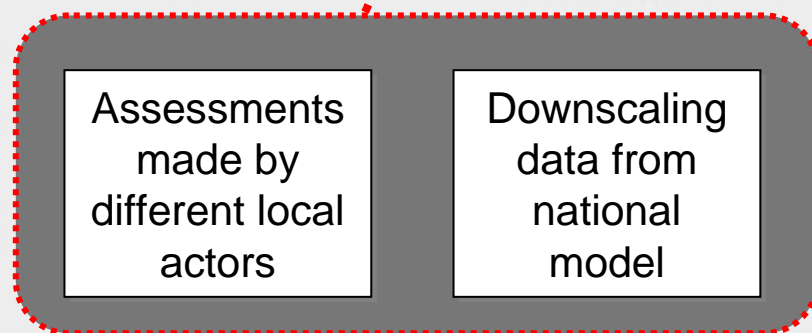
- 2007-2008: R&D project financed by the Norwegian Association of Local and Regional Authorities (KS research)
- Co-operation between WNRI (project leader), University of Stavanger, Norwegian geological survey (NGI), Eastern Norway Research Institute and the Bjerknes Centre for Climate Research
- Assessing climate change vulnerability in 7 municipalities, but limited to natural hazards
- Customized downscaling of climate change scenarios from the Bjerknes Centre for Climate Research
- A societal change scenario model developed by Eastern Norway Research Institute, allowing for downscaling within same timespan as the climate change scenarios (up to 2060)

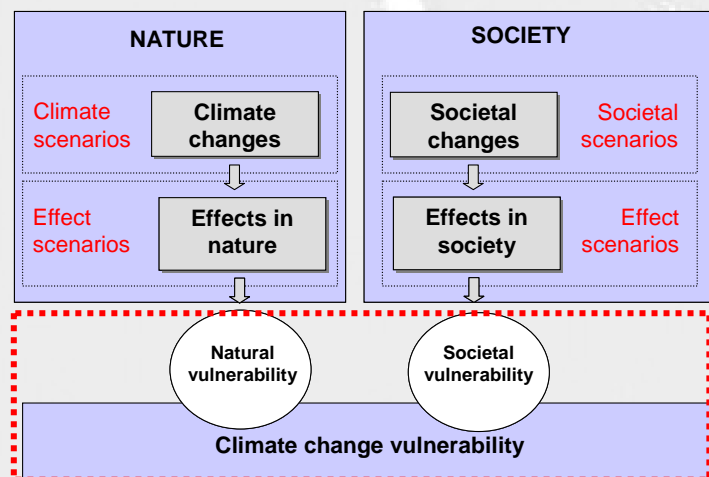


Sea-level rise  
Avalanche  
Flooding  
Storm surges



A “demographic-deterministic” model



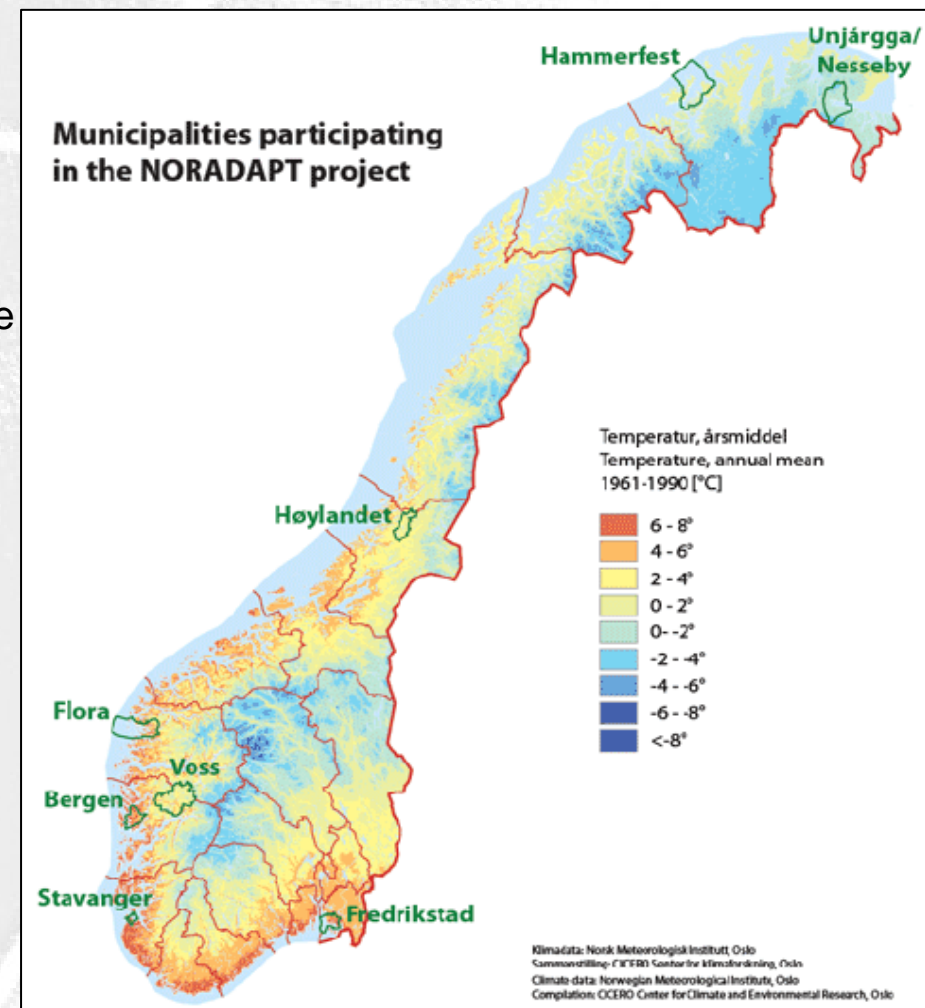


		Natural vulnerability		
		Effect N1 (e.g. increased risk of avalanches)	Effect N2 (e.g. increase in growth season)	Effect N3 (e.g. sea-level rise)
Societal vulnerability	Effect S1 (e.g. centralisation)	Does S1 lead to changes in conclusions regarding N1?	etc	
	Effect S2 (e.g. more buildings close to the sea)			
	Effect S2 (e.g. reduced maintenance of public buildings)			



## Present CCA front-runner municipalities in Norway

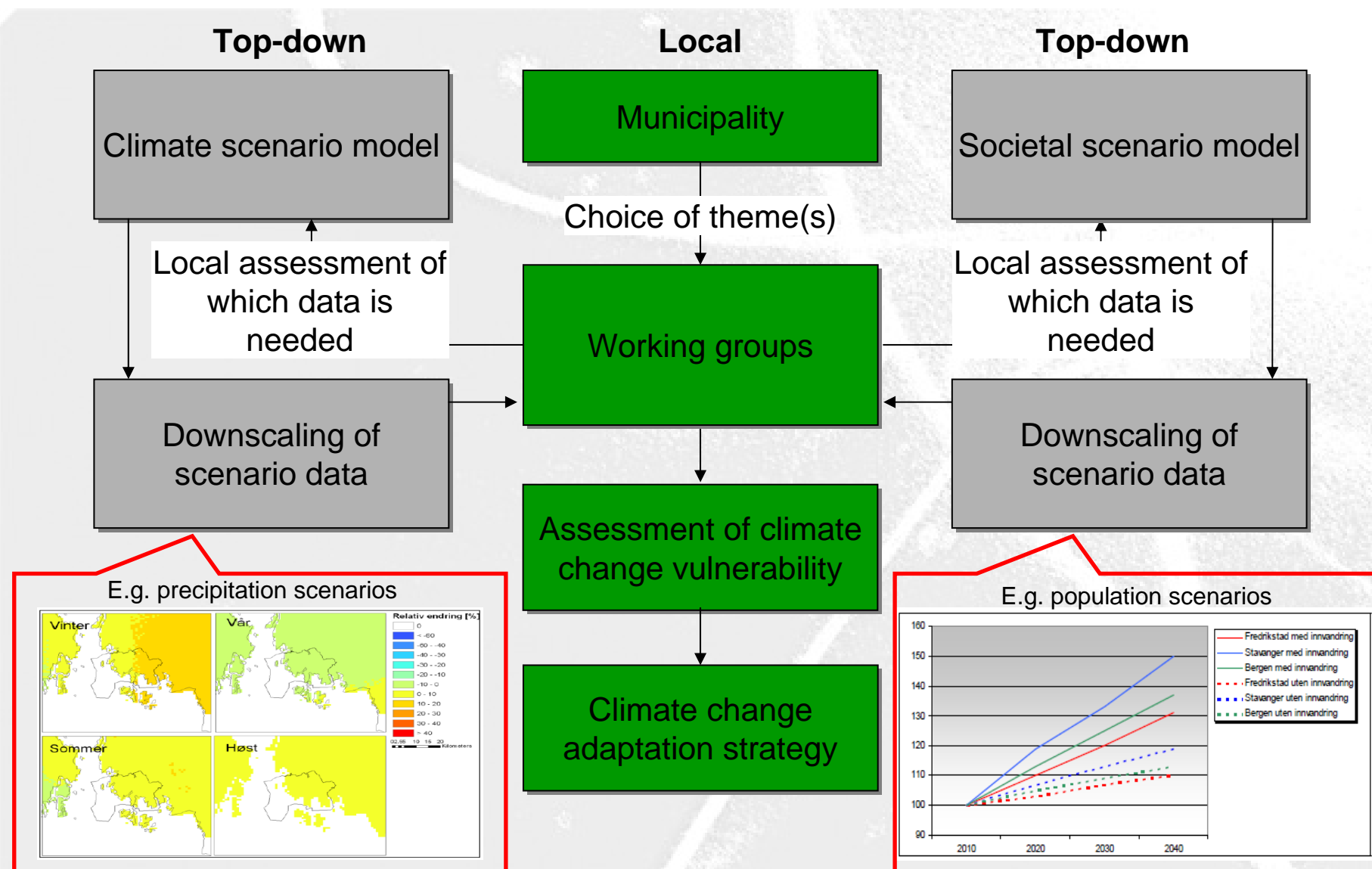
- 2007-2010 R&D project financed by the Norwegian Research Council program NORKLIMA
- Co-operation between CICERO, WNRI, Eastern Norway Research Institute and the Meteorological institute of Norway
- Assisting 8 municipalities with assessing climate change vulnerability and developing climate change adaptation strategies
- Further developing the methodology from the “natural hazards” project
- More involvement from the municipalities than in the “natural hazards” project
- Results to be published in 2010-11



# Fredrikstad: First “full scale” local climate change vulnerability assessment and CCA plan

- **Local impacts of local climate change**
  - Municipality decides on sectors to be studied and which climate parameters they think are relevant
  - Top-down and local assessment process
  - Report to be followed up in formal planning documented adopted in accordance with the Planning and Building Act





# Fredrikstad: First “full scale” local climate change vulnerability assessment and CCA plan

- **Local impacts of local climate change**
  - Municipality decides on sectors to be studied and which climate parameters they think are relevant
  - Top-down and local assessment process
  - Report to be followed up in formal planning documented adopted in accordance with the Planning and Building Act
- **Local impacts of global climate change**
  - Approach developed by WNRI
  - Discussion of possible impacts done by WNRI
  - Perspectives to be further developed into concrete local assessments



# Sogn og Fjordane: First county to adopt a CCA plan in accordance with the Planning and Building Act

## The process

- Jan 2008: A public seminar on climate change, mitigation, adaptation and forestry
- April 2008: Public hearing of draft of planning program for how to carry out the Climate Plan
- April 2008: Seminar for all the municipalities in S&F on the possible regional effects of climate change
- September 2008: Public hearing of first version of the Climate Plan
- September 2008: A public seminar presenting the first version of the Climate Plan
- February 2009: Presenting a second version of the climate plan at a seminar for all the municipalities in S&F
- May 2009: Final adoption of the plan by the county

## The content

- Mitigation and adaptation plan
- A rough assessment of climate change vulnerability
- Decision on main CCA strategies
- Budget for follow-up actions
- To be revisited every 4<sup>th</sup> year



## Budget for the climate and environment plan (mill. NOK)

**Adaptation: NOK 4 million**

Tiltak	2009	2010	2011	2012	2013	2014	2015
<b>Klimatilpassing</b>							
Analysere klimasårbarheita i kommunane i Sogn og Fjordane	0,10	0,40	0,50	0,25	0,25	0,25	0,25
Bestille klimamodellar	-	0,50	0,50	-	-	-	-
Aktuelle tiltak klimatilpassing landskap, biologisk mangfald og leveområder	-	0,50	-	-	-	-	-
Kunnskapsutvikling tilpassing klimaendringar landbruk	-	-	0,25	-	-	-	-
Kartlegging konsekvensar klimaendringar fiskeri og fiskeoppdrett	-	-	0,25	-	-	-	-
<b>Utsleppsreduksjonar - fylket</b>							
Utvikle indikatorar for utslepp frå produksjon og forbruk	0,20	0,75	0,75	-	-	-	-
Lage klimarekneskap	-	-	-	-	-	-	0,15
Miljøsertifisering bedrifter	-	0,50	0,50	0,50	0,50	0,50	-
Vidareføre ENØK fond	-	2,00	2,00	2,00	2,00	2,00	-
<b>Utsleppsreduksjonar – fylkeskommunale organisasjon</b>							
Miljøsertifisering av den fylkeskommunale verksemda	0,02	0,08	0,08	0,08	0,06	-	-
Kartlegge utslepp for den fylkeskommunale verksemda	-	0,05	0,05	-	-	-	-
Kommunesamarbeid	-	0,10	0,10	0,10	0,10	0,10	0,10
<b>Tverrgående</b>							
Regional og lokal kompetanseheving	-	0,15	0,15	0,15	0,15	-	-
<b>Sum</b>	<b>0,32</b>	<b>5,03</b>	<b>5,13</b>	<b>3,08</b>	<b>3,06</b>	<b>2,85</b>	<b>0,50</b>

**Mitigation: NOK 16million**



## Summing up the general categories of climate adaptation

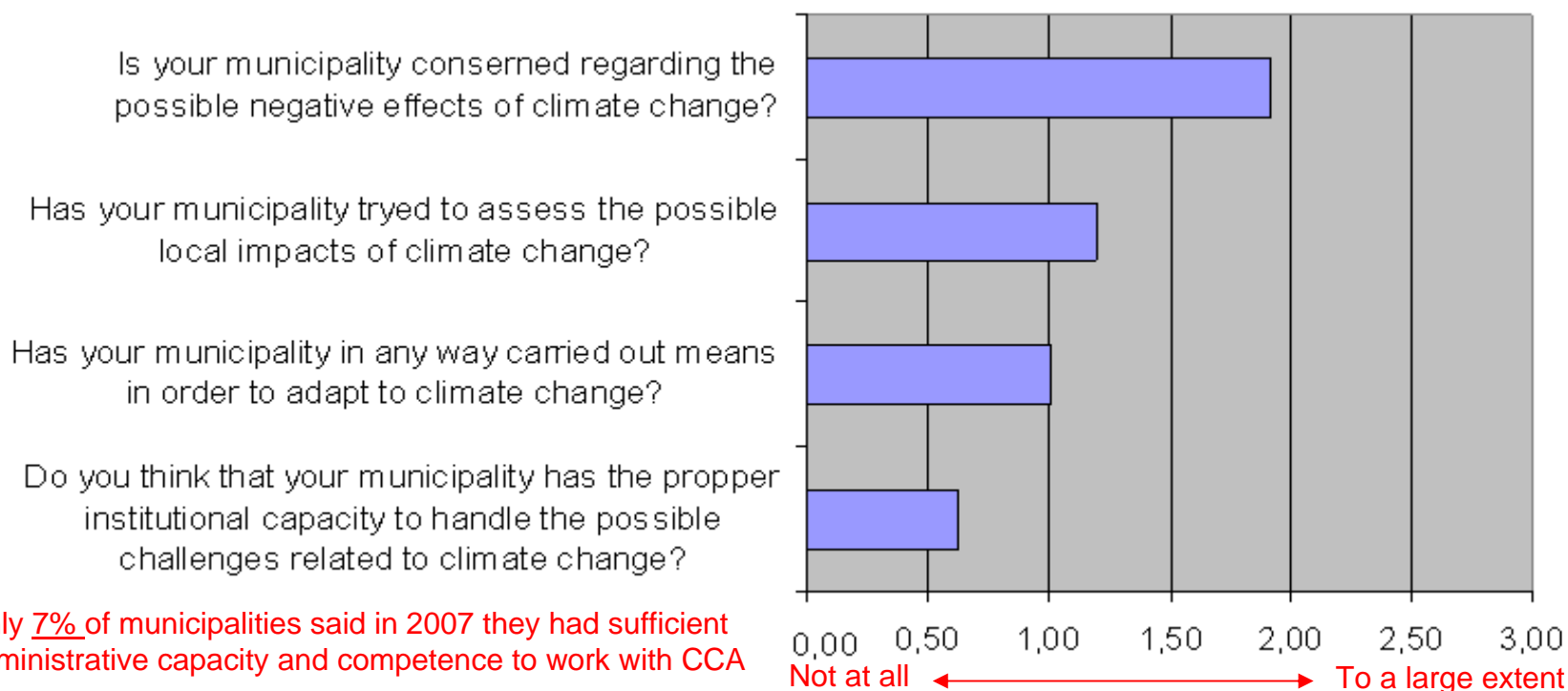
1. Adapt to today's climate
2. Further analyze local climate change vulnerabilities
3. Secure sufficient local institutional capacity
4. Inform locally about local climate change vulnerabilities and adaptation options
5. Prioritize planning before concrete acting
6. Prioritize cause- before effect-directed strategies and means

## Questions

- Is adapting to “today’s” and “tomorrow’s” climate often mixed?
- How much information is needed for “acting”?
- Do uncertainties regarding local effects of climate change differ from uncertainties in other policy areas?
- What should be the role of the local level of governance compared to that of the regional and national level?
- Who does today take part in local CCA policy development processes?

- Conceptual model
- Putting “climate change adaptation” (CCA) on the political agenda in Norway
- Early experiences from local CCA
- **Hindrances in working with CCA at the local level of governance**
  - Categories of hindrances
  - Questions
- What's next?

## Self assessment by Norwegian municipalities on their institutional capacity for handling CCA

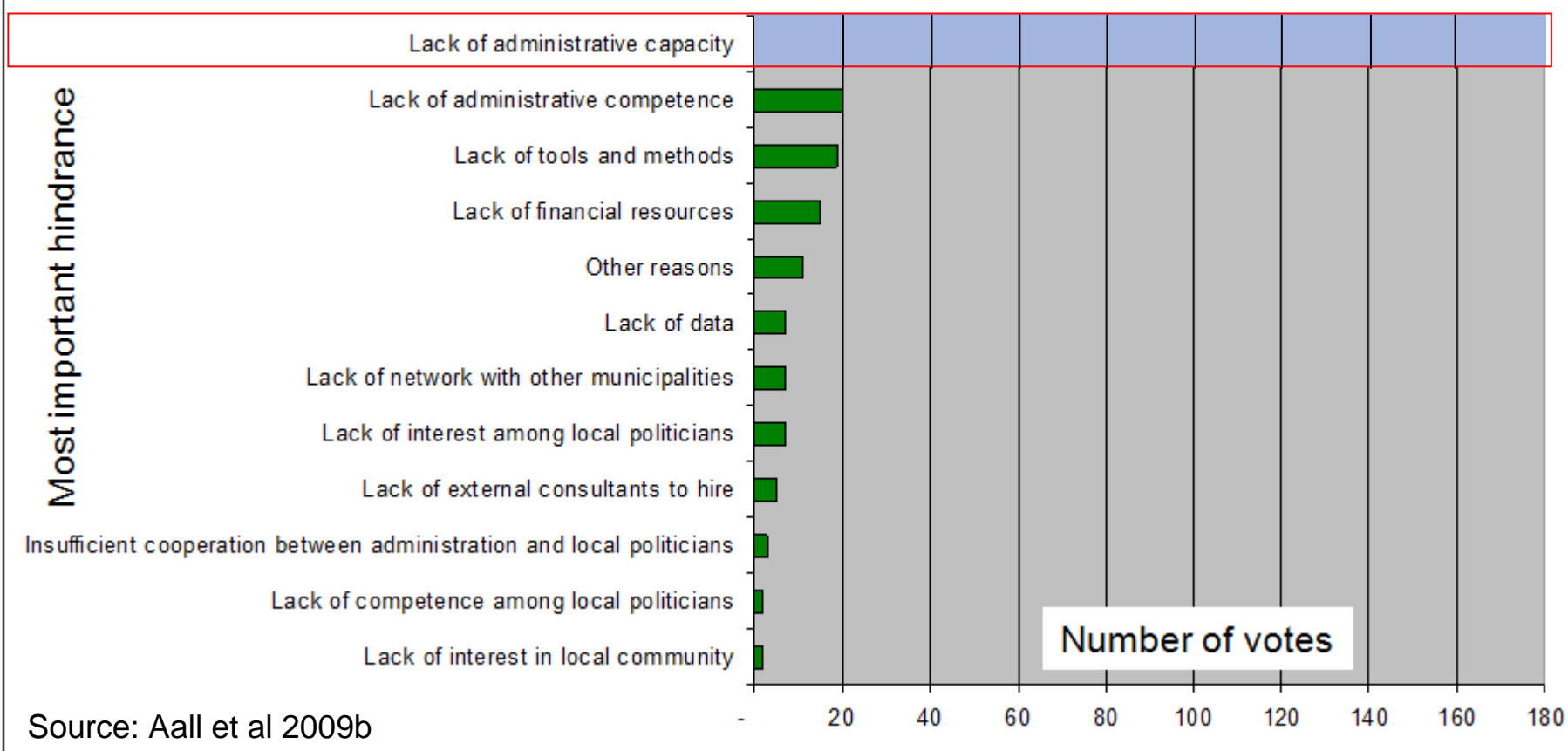


A questionnaire to all Norwegian municipalities with a response rate of 72%. 14 questions grouped into four groups and the answers made into indexes with 0 = "not at all", 1 = "to very little extent", 2 = "to some extent", 3 = "to a large extent".

Source: Aall et al, 2009a; DSB, 2008

## Self assessment by Norwegian municipalities on major hindrances in working with environmental policy

258 answers from one informant in each of 97 municipalities that take part in either of the two network projects “Viable communities” and “Green energy communities”



## Important hindrances other than lack of administrative capacity

- **Government systems for assessing risks on natural hazards have not included existing knowledge on climate change**
  - Risk zones for flooding, risk zones for geo-hazards, risk zones for sea level rise
- **Municipalities not familiar with existing free-of-charge government provided information on natural hazard risks**
  - Risk zones for flooding, risk zones for geo-hazards, downscaled climate change scenarios
- **Natural hazard events have so far attained much more focus than the incremental effects of climate change**
  - civil protection institutions have been an important driver in setting CCA on the policy agenda
- **A language issue**
  - “Climate adaptation” often used when we mean “climate change adaptation” leading to confusion on adaption to “present” or “future” climate



## Questions

- Why do the observed hindrances occur?
- To what extent are the observed hindrances “real”?
- How to overcome the identified hindrances?

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- **What's next?**

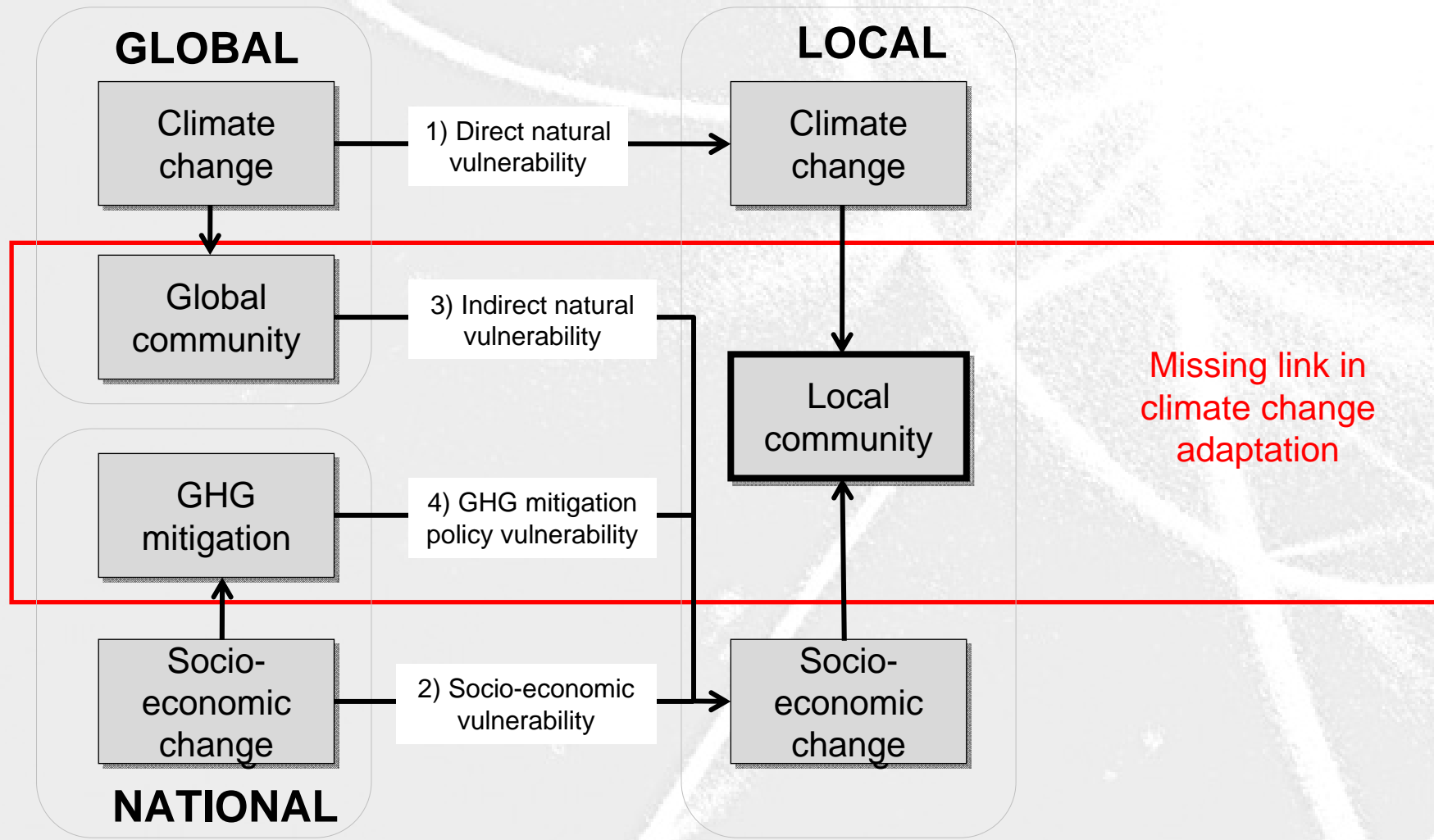
# Possible future problems and prospects on CCA

- **Next IPCC report**
  - More dramatic effects due to increased emissions and more “complete” knowledge basis, which in turn may lead to increased uncertainties
- **Economic development in Europe**
  - Less public spending available for CCA measures?
- **Assessments of local climate change vulnerability**
  - Increasing examples of assessments showing a theoretical miss-match between global effects of global climate change and local effects of local climate change?
- **May altogether lead to increased climate skepticism?**

## Research agenda

- **Investigate policy links**
  - Between climate change mitigation and adaptation
  - Between climate policy and sustainable development
- **Research goal: avoid “mal-development”**
  - Mal-adaptation
  - Mal-mitigation
  - Mal-sustainability

## Four modes of climate vulnerability



## Corresponding four modes of climate adaptation

### **1. Effect oriented adaptation to local climate change**

- E.g. build flood protection

### **2. Cause oriented adaptation to local climate change**

- E.g. change location of areas for new housing development

### **3. Indirect oriented adaptation to climate change taking place elsewhere**

- E.g. protect farmed land from housing or road development

### **4. Climate change mitigation policy adaptation**

- E.g. secure access to public transportation in tourism development



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**Thank you for your attention!**

**Carlo Aall**

**[caa@vestforsk.no](mailto:caa@vestforsk.no)**

**+ 47 991 27 222**

**Vestlandsforskning / Western Norway Research Institute**

**[www.vestforsk.no](http://www.vestforsk.no)**