

Framing research in climate change adaptation

Science informed environmental policymaking...

The Danish government has chosen a specific policy and governance approach to adapt to climate change impacts so that adaptation is taking place at local municipality level, while research communities are to generate relevant and usable knowledge – knowledge that the state as a broker makes available to citizens. Faced with this challenge, the Danish research communities are organising around a general theme to frame the research in this new field of interest.

Coordinating to prepare for a new climate

IPCC is underlining that we have to prepare for a new climate. Since its establishment in 2008, the Danish Coordination Unit for Research in Climate Change Adaptation (KFT, www.kft.au.dk) has played an important role in coordinating the national research efforts of universities and research institutes. Our coordination efforts have resulted in:

- Advances in the public access to research-based knowledge regarding climate change adaptation through the web portal www.klimatilpasning.dk; and
- Support of a number of small use-oriented research projects that enhance our knowledge and generate tools and solutions of relevance to adaptation.

Framing adaptation to climate change in Europe

Vulnerability to climate change impacts differs from region to region in Europe and from community to community.¹ In North-Western Europe an increase in winter precipitation and decrease in summer precipitation, sea level rise and increasing temperatures are expected. However, the impacts of these changes can be met with planned adaptation

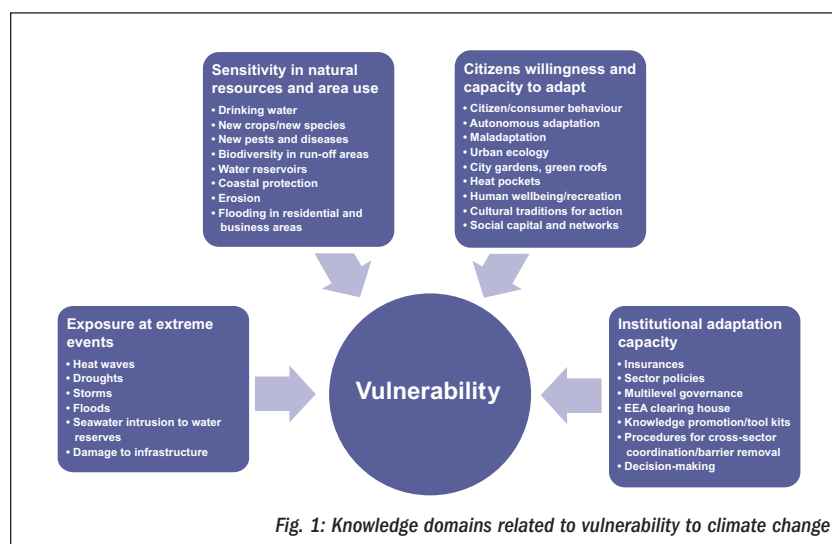


Fig. 1: Knowledge domains related to vulnerability to climate change

approaches that require anticipatory knowledge-based governance. Or the impacts may be met with autonomous adaptation approaches that may not necessarily be research-based.

The risk of extreme events influences the framing of adaptation significantly as these events play a dominant role in media and politics. Journalists and politicians often equal the flooding of basements or highways with climate change impacts. So such extreme events serve as important drivers for more planning to adapt to climate change but the events may not be accurate precursors of climate change. The concerns of impact of extreme events are thus underpinning the general concerns of climate change and consequently the framing of vulnerability.

International organisations like the IPCC and the European Environmental Agency operate with a framework to climate change adaptation that divides vulnerability to climate change into four factors.² The factors are, on the impact side, the exposure to impacts of climate change and the sensitivity of the unit in question. On the adaptive side, the framework distinguishes between

the communities' willingness to adapt and the capacity to adapt in the communities' governance structures.

Vulnerability as the research focus for 2012

Vulnerability represents a 'conceptual cluster' of concepts and terminologies from various disciplines and research traditions such as resilience, risk assessment and fragility among others.^{3 4} Acknowledging the integrative human-environment research needed in Denmark, KFT has embraced this concept.

The dimensions of the four factors, mentioned above, can be captured in so-called 'knowledge domains' that influence vulnerability to climate change impacts. Research in adaptation must thus be integrative as it requires intensive collaboration between researchers representing all four knowledge domains. This collaboration is not easy as terminology and traditions differ quite significantly. A common conceptual research framework is thus a first prerequisite to enable this integration. Secondly, the research output must be of relevance and use to society.⁵ To reach this, research activities must

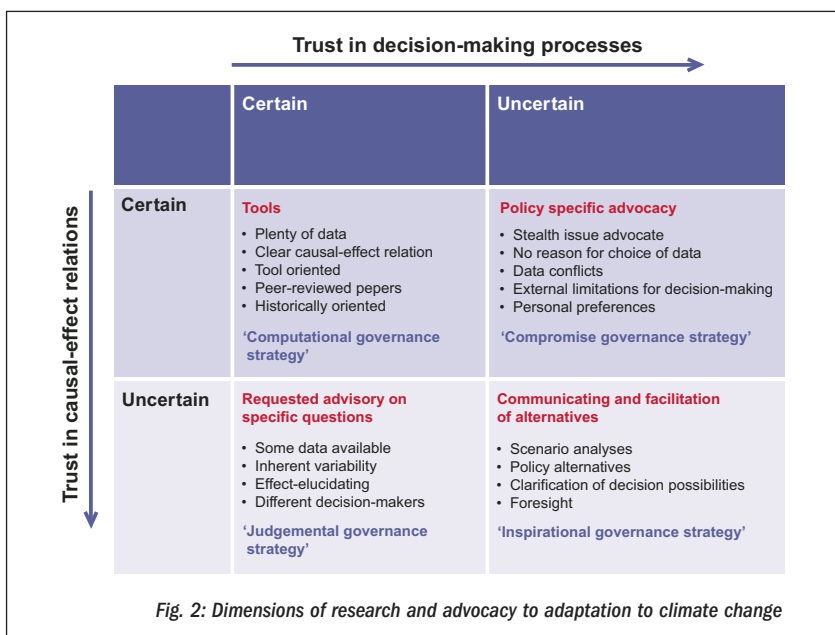


Fig. 2: Dimensions of research and advocacy to adaptation to climate change

use the same cases and share data to the largest possible extent.

In 2012, the research activities in KFT will be carried out within all four knowledge domains (Fig. 1) and they will be linked together in a large effort to secure data-sharing. We anticipate that the associated learning may be an important side effect that can guide us in the research framing for the coming years where we move into the unknown in terms of climate changes as well as future societal developments.

Challenges for solutions beyond the well-known

Research in adaptation to climate change is a new research field. 15 years ago very few had considered the actual processes of adaptation in detail. But today the starting point for handling the challenge is that we now operate in a world abundant with knowledge. However, in relation to adaptation, this knowledge is fractionated and originating from different contents where the causal-effect relations are unclear. At the same time, society does not always acknowledge what knowledge that it requires or how this potential knowledge can be put into use. This is partly because the decision-makers may be uncertain as to what future scenarios to expect. Thus, it is important to link foresighting in complex systems to development

in adaptation. These two dimensions lead to the following matrix (Fig. 2).

Research in climate change adaptation is a young field full of uncertainties. This matrix illustrates four categories of how science can inform environmental policymaking in situations where uncertainty differs, both in the causal-effect relations and in the decision-making processes. These four categories further lead to different governance strategies.

Tools

Large amounts of relevant data are already available – or can be made available. Synthesised in appropriate forms, these data give the basis for quite precise historical descriptions of the weather the last 100 years, number and frequency of extreme events, etc. Availability of these data is important for research in the other categories, eg in modelling scenarios.

Requested advice on specific questions

Much public advocacy has traditionally been in this category where a government body has requisitioned a project through established channels and experts who then give a qualified elucidation of the question based on their insight in the area in question and the available published data.

Policy specific advocacy

Experts play an active role in drafting and advocating certain choices

because data does not provide a reason for choice or the data supports several choices. The active role of experts is possible – and even needed – due to uncertainties in the policymaking process.

Communicating and facilitation of alternatives

There is limited relevant data available and it is uncertain what kind of new data is needed. Further, the political situation is not clarified. Thus, there is a need for predictions and scenarios to define alternatives and potential decision possibilities.

Commitment

Denmark has strong traditions for a sound science-informed environmental policymaking. The Danish research institutions are committed to continuing to address both the known and the unknown future in relation to climate change adaptation in the interest of society as a whole.

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- 2 S Isoard (2011) Perspectives on adaptation to climate change in Europe. In: *Climate Change Adaptation in Developed Nations: From Theory to Practice* (Eds.: J D Ford and L Berrang-Ford) Springer
- 3 H M Fussler (2007) Vulnerability: A general applicable conceptual framework for climate change research. *Global Environmental Change* 17, 155-167
- 4 B Newell, C L Crumley, N Hassan, E F Lambin, C Pahl-Wostl, A Underdal and R Wasson (2005) A conceptual template for integrative human-environment research, *Global Environmental Change* 15, 299-307
- 5 D E Stokes (1997) *Pasteur's Quadrant - Basic Science and Technological Innovations* Brookings Institution Press, Washington DC



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