



AALBORG UNIVERSITY
DENMARK

Aalborg Universitet

Risk as a challenge in practice

investigating climate change in water management

Larsen, Sanne Vammen

Published in:
Regional Environmental Change

DOI (link to publication from Publisher):
[10.1007/s10113-010-0123-7](https://doi.org/10.1007/s10113-010-0123-7)

Publication date:
2010

Document Version
Accepted author manuscript, peer reviewed version

[Link to publication from Aalborg University](#)

Citation for published version (APA):
Larsen, S. V. (2010). Risk as a challenge in practice: investigating climate change in water management. *Regional Environmental Change*, 11(1). <https://doi.org/10.1007/s10113-010-0123-7>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.

Risk as a Challenge in Practice: Investigating Climate Change in Water Management

Sanne Vammen Larsen, PhD. Fellow, Aalborg University/Rambøll A/S

1. Introduction

Risk has many definitions and is studied in many contexts. Generic definitions are for example that risk is “*a possibility that something unfortunate or unwanted will happen*” (Politiken 2002) or that risk is “*a danger with an uncertain outcome*” (Bang et al. 1999, 831). In accordance with this, risk can be defined as a negative future development. Risk can be viewed on a personal level and an action oriented level, where “*to take a risk normally means that one deliberately exposes oneself to a possible danger in order to gain something*” (Breck 2001), and as such risk is a negative side-effect. Risk can also be viewed at a societal level, which is the case in this article.

One of the risks which concern society today is climate change and its possible negative consequences. Water is one of the issues on which climate change potentially has a range of effects. The linkages between climate change and water are emphasised in the IPCC Technical Paper VI on climate change and water: “*Observational records and climate projections provide abundant evidence that freshwater resources are vulnerable and have the potential to be strongly impacted by climate change, with wide-ranging consequences for human societies and ecosystems*” (Bates et al. 2008, p.3). Some of the possible global effects of climate change on water are pointed out in the fourth assessment by the IPCC. The effects include for example rising sea levels, decreasing snow and ice cover, changes in the amount of precipitation and number of extreme events, changes in river flows, increased flooding, and changes in available water resources (Bernstein et al. 2007a). Changes are already occurring: for instance it is stated in the fourth IPCC assessment that “*There is high confidence that some hydrological systems have also been affected through increased runoff and earlier spring peak discharge in many glacier- and snow-fed rivers, and effects on thermal structure and water quality of warming rivers and lakes*” (Bernstein et al. 2007a, p.2). In the Danish context the effects of climate change on water are predicted to include for example increased precipitation and extreme events, increased run-off, increased flooding, more leaching of nutrients, and a rising sea level (Sonnenborg et al. 2006; Danish Ministry of Finance et al. 2007). These facts point to the relevance of handling the risks posed by climate change through planning and actions in the water sector.

Many studies have been carried out to investigate how and why the effects of climate change are taken into consideration in planning and practice both in general (see e.g. Berkhout et al. 2004; O’Brien et al. 2006; Blennow and Persson 2008; Adger et al. 2009; Battaglini et al. 2009) and in the water sector (see e.g. Eisenack et al. 2007; Moser and Tribbia 2007; Næss et al. 2005; Arnell and Delaney 2006; Subak 2000). The study presented in this article aims to add to the previous

research a case study of how climate change is dealt with in another context. In the water sector, Denmark and the rest of the EU member states are currently implementing the EU Water Framework Directive by preparing river basin management plans (RBMPs). Denmark is an interesting case, because the Danish state has chosen to exclude climate change as a factor in the plans, even though from an overall perspective it seems like an obvious factor to include. The purpose of this article is to shed light on the attitudes towards an integration of climate change among other actors in the planning process and what influences these attitudes. Specifically, which factors are perceived as drivers, barriers, and challenges in integrating climate change in the RBMPs? In this way the article seeks to provide a more nuanced picture of the attitudes towards integration of climate change in RBMPs in Denmark, instead of leaving it up to the state alone to define the problem.

The findings in this article are analysed and discussed in the light of the theory of risk society put forward by Ulrich Beck. Beck's work is useful for describing the nature of climate change as a risk, and suggests a theoretical interpretation of some of the developments that can be seen in practice in the case of RBMPs in Denmark. Thus the theory of risk society is used for forming hypotheses about the challenges posed by an integration of climate change in RBMPs, which are tested in practice. The theory of risk society has also been utilised in similar ways in other research (see e.g. Hinchcliffe 1997; Matten 2004; Gow and Leahy 2005; Cebulla 2007; Olofsson and Öhman 2007). It is often used to investigate whether or not the theoretical hypotheses are corroborated by empirical data, as well as to interpret collected empirical data. The testing of Beck's theory of risk society with empirical data has special interest, since this has not been a focal point in Beck's work itself (see e.g. Matten 2004; Cebulla 2007; Olofsson and Öhman 2007).

The theory of risk society is presented in Section 2, and the Danish case of RBMPs is presented in Section 3. The methodology is presented in Section 4, followed by the analysis in Sections 5, 6, and 7. Finally, conclusions are drawn in Section 8.

2. Beck's Risk Society: A View on the Risk Posed by Climate Change

Beck describes the transition from traditional society to a risk society, which is increasingly dominated by awareness of risk. As opposed to traditional society, the risks present in a risk society are produced by modernisation, technology, and progress, in other words by human action and decisions. Beck describes this as part of reflexive modernism, where modernisation undermines itself through risks. This is in opposition to traditional society, where risks were to a greater extent external and imposed upon society by nature. It should be noted that Beck does not claim that we live entirely in a risk society or in a traditional society. Rather modernity still exists, but it is becoming reflexive. (Beck 1997; Beck and Willms 2004)

The risks in risk society are described as global, complex, self-inflicted, and irreversible. They also transcend the time scales within which society used to operate, as they have long time horizons and cross generations. Risks are unobservable by our senses and thus not based on concrete firsthand

experience. Rather they are partly constructed and until they materialise they exist only due to our awareness and scientific knowledge of them. The knowledge of risks is based on knowledge of their causal relations, but in risk society it is becoming increasingly difficult to establish these relations with certainty because of high complexity. This also means that it is increasingly difficult to establish who is responsible for the risks and who will be affected by their consequences. (Beck 1997; Beck and Willms 2004)

Traditional society is focused on obtaining concrete knowledge about nature in order to be able to control and exploit it. In this regime, science and scientists play an important role as providers of knowledge, and the notion that science knows best prevails. In risk society, however, science has problems providing certainty and knowledge regarding risks and also in relation to the uncertain causal relations mentioned above. This means that issues are open to different risk definitions and perceptions, and consequently there can be different opinions of for example whether a risk is substantial or not. Because of this Beck (1997, p.40) states that science is losing its “*monopoly on rationality*” – risks are defined no longer only by knowledge produced by science, but also by things such as competing demands and different interests, values, and opinions. Risk thus becomes more contested. The risk definitions, in turn, influence decisions regarding risk, for example about whether and how risk should be handled. Another issue regarding decisions and risk is what Beck terms “subpolitics”. According to Beck (1996, p.18), “*The concept of subpolitics refers to politics outside and beyond the representative institutions of the political system of nation-states*”. In subpolitics, business and the public gain influence over decisions regarding risk, and therefore the decision-making competence moves slightly from the appointed political field into the subpolitical field. This can for instance happen through public movements, grassroots organisations, and lobbying. (Beck 1997)

2.1 The Challenging Characteristics of Climate Change

Climate change is viewed as an example of the new risks that society faces today, because climate change has many of the characteristics of the new risks. Climate change potentially has significant negative impacts on a global and long-term scale (Bernstein et al. 2007a). It is arguably a result of progress, technology, and the actions of society, namely greenhouse gas emissions. This is supported by the IPCC in its fourth assessment, where it is stated that “*Most of the observed increase in globally-averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG emissions*” (Bernstein et al. 2007a). At the same time, climate change is uncertain and disputed, as illustrated for instance by the existence of different perceptions of risk (see e.g. Etkin and Ho 2007; Lorenzoni et al. 2005; Risbey 2008; Zehr 2000). Also there are still uncertainties and a lack of scientific knowledge about climate change and its consequences, notably on a regional and local level (see e.g. key uncertainties in Bernstein et al. 2007b).

The characteristics of the new risks, as described by Beck, can be viewed as hypotheses of what the challenges of integrating climate change in planning and decision-making processes are. The fact

that climate change has the features of lack of knowledge and data, complexity, non-transparent consequences, and causal mechanisms and that it is contested and has long time horizons can make it difficult for planners and decision makers to handle. Possible challenges stemming from the characteristics of climate change are summarised in Figure 1. The challenges are divided into those that mainly concern planners, understood as the administrative professionals who prepare plans, and those that mainly concern decision makers, understood as those who have decision powers regarding the plans.

Characteristics	Challenges	
Lack of knowledge and accessible data	<i>For planners</i>	To calculate and factor climate change into their plans To provide decision makers with unequivocal answers regarding climate change
	<i>For decision makers</i>	To assess the plans and make a decision
Complexity, non-transparent consequences and non-transparent causal mechanisms	<i>For planners</i>	To calculate and factor climate change into their plans To provide decision makers with unequivocal answers regarding climate change To communicate knowledge to decision makers and the public in an understandable way
		To secure the necessary cross-disciplinarity
		<i>For decision makers</i>
	Contested	<i>For planners</i>
<i>For decision makers</i>		To agree on plan and decision
<i>For both</i>		To handle the differing views of the public
Long time horizons	<i>For planners</i>	To provide decision makers with justification to prioritise against immediately visible and pressing issues
	<i>For decision makers</i>	To prioritise against immediately visible and pressing issues

Fig. 1 Characteristics of climate change as a risk and how the characteristics can pose challenges to planners and decision makers

The challenges proposed in Figure 1 are based on some implicit preconditions, such as the necessity of considering the views of the public and a demand for a certain knowledge and rational decision-making. These preconditions can undoubtedly be discussed; this is, however, outside the scope of this article.

Some of the issues in Figure 1 have been discussed in contemporary literature. Both Adger et al. (2009) and Eisenack et al. (2007) discuss the issue of lack of knowledge and data in relation to climate change and how this perceived lack of knowledge is often used in decision-making as an argument for inaction. Difficulties with prioritising climate change because it can seem distant and

non-pressing are also discussed (Lorenzoni et al. 2005). These theoretical characteristics and the proposed challenges are used as hypotheses for investigating the challenges of integrating climate change in the Danish RBMPs. This can lead to new insights into the practical challenges of integrating climate change in water management and planning and can be discussed in relation to both theory and other research.

3. Case: The Danish RBMPs

In 2000 the EU issued *Directive 2000/60EC of the European Parliament and of the Council of 23rd October 2000 establishing a framework for Community action in the field of water policy*, also known as the Water Framework Directive (WFD). Its purpose is “to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater”. This purpose is pursued through setting up a framework for implementation of river basin management planning in the Member States. According to the directive, RBMPs should contain environmental goals for all surface waters and groundwater within the water district and a programme of measures for reaching these goals. The ultimate environmental goals of the directive are to prevent deterioration of water quality, and to achieve good water quality by 2015. (Directive 2000/60EC 2000)

In 2003, the WFD was implemented in Denmark through national legislation. According to this, the Danish state is responsible for preparing overall RBMPs for the Danish water districts. These plans contain, among other things, an overview of the state of each water body, the environmental goals for each water body, and the programme of measures to reach the goals. (Danish Ministry of the Environment n.d.a; Law on Environmental Goals 2006) On the basis of the RBMPs, the 98 Danish municipalities, which are the local authorities in Denmark, will prepare action plans. These plans will contain specific directions for the implementation of the RBMPs within the geographical area of each municipality. (Danish Ministry of the Environment n.d.a; Law on Environmental Goals 2006) Figure 2 illustrates the planned process as well as the division of tasks between the state and the municipalities.

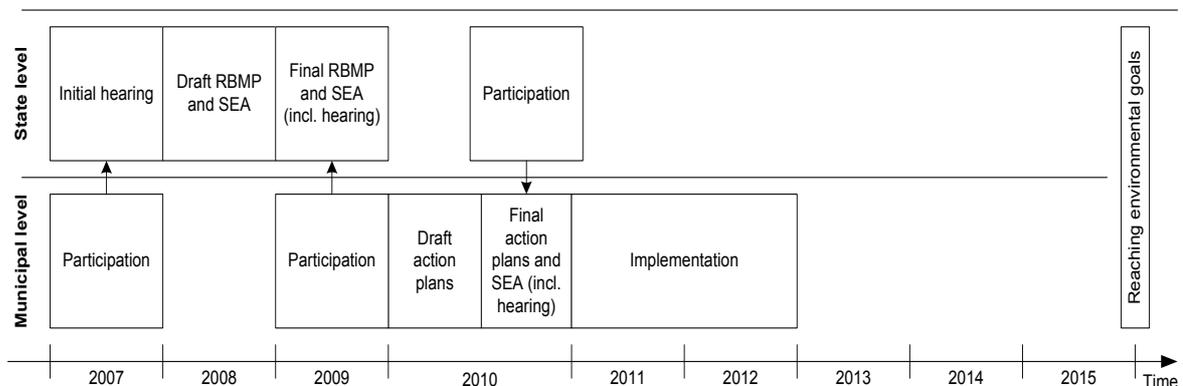


Fig. 2 The planned process of preparing RBMPs in Denmark (based on Danish Ministry of the Environment n.d.a; Danish Ministry of the Environment n.d.c)

The initial hearing, which is shown in Figure 2, was held by the state from June to December 2007. The purpose of the hearing was to have a broad involvement of the public and to provide the possibility for actors with an interest in the RBMPs “*to give input to the state water planning at the earliest possible point in the process*” (Danish Ministry of the Environment n.d.a, 7). Prior to the hearing, background material was published, and a web page was established with information about the WFD, RBMPs, and hearing (Danish Ministry of the Environment n.d.a; Danish Ministry of the Environment n.d.b). Actors were invited to submit their ideas and suggestions for the planning process and the RBMPs. The hearing was a written hearing where the actors sent their input either via the web page or by mail directly to the state’s environmental centres. (Danish Ministry of the Environment n.d.b)

Since the initial hearing, the planning process in Denmark has been delayed compared to the plan in Figure 2. In January 2010 the Danish state released draft RBMPs for a technical pre-hearing in the municipalities. This is more than a year later than planned. The reasoning for the delay is that the government wanted to coordinate the efforts in the RBMPs with other up-coming state environmental initiatives. The pre-hearing and public hearing are set to finish in January 2011; no new deadline for finishing the state RBMPs has been communicated. (Danish Agency for Spatial and Environmental Planning 2008; Danish Agency for Spatial and Environmental Planning 2010a)

3.1 Climate Change in the Danish RBMPs

It has previously been stated that due to the potential of climate change to influence the water environment, climate change is a seemingly relevant factor in the RBMPs. This is supported by the *Common Implementation Strategy for the Water Framework Directive* (2005, p.14), where it is stated that one of the benefits from implementing the Directive is “*Mitigation of impacts from climate change ...*”. Further, in an EU Commission Staff Working Document reporting on the first stages of implementation of the WFD, it is stated that “*As climate change impacts could enhance the risk of non-attainment of the objectives of the WFD, further steps are also needed to include climate change as an additional pressure on the EU waters*” (Commission of the European Communities 2007, p.41). In the EU white paper on adaptation the same point is stressed with the statement that the RBMPs stemming from the WFD “*will take into account the impacts of climate change and the next generation of plans due in 2015 should be fully climate-proofed*” (Commission of the European Communities 2009, p.11).

In spite of the above mentioned linkages between climate change and river basin management planning, the Danish Minister for the Environment has decided that climate change will not be taken into consideration in the first generation of RBMPs in Denmark. This has been announced on several occasions and also at the release of the draft RBMPs in January 2010. According to the Danish Agency for Spatial and Environmental Planning, the reason for the exclusion is that “*there is not yet sufficient knowledge of how climate change will affect the water environment*”. It is further stated that “*as soon as we know, it will be incorporated*”. (Danish Agency for Spatial and Environmental Planning 2010b)

The exclusion of climate change reflects one of the theoretical challenges suggested in Figure 1, because the argument about lack of knowledge is used. This means that in the Danish case, in accordance with theory, uncertainty and lack of knowledge are perceived as challenges and as a barrier to dealing with climate change in the RBMPs. This barrier is also recognised by Adger et al. (2009) and Eisenack et al. (2007). Further, on the basis of theory it can be speculated that integrating climate change in the planning process on a weak knowledge base might open the process up for a larger degree of debate about risk definitions, uncertainty, values, and perceptions. As stated in Figure 1, this contested nature of climate change as a risk can be a challenge, and it can make the planning process increasingly complex, something that is perhaps not in the interest of the state.

So the attitude of the Danish state concerning climate change in the RBMPs is clear. The methodology for investigating the attitudes of other actors in the planning process is outlined in Section 4.

4. Methodology

The study consists of three parts: a document study, interviews, and a survey.

4.1 Document study

Initially, the attitudes of the actors were investigated through a document study of their submissions to the initial hearing held in 2007. The study was carried out in May 2008 after the end of the hearing, by gathering and examining all written input submitted by all actors. The submissions were retrieved from the web page www.vandognatur.dk, where they were made publicly available after the end of the initial hearing. In total 670 documents submitted by 365 different actors were retrieved and analysed.

The submissions analysed came from various types of actors. Figure 3 shows that the state initiated the hearing, as part of the process of preparing RBMPs, and that a number of citizens, regions (authorities on the administrative level between the state and the local municipalities), businesses, NGOs, other state agencies, and municipalities participated in the hearing.

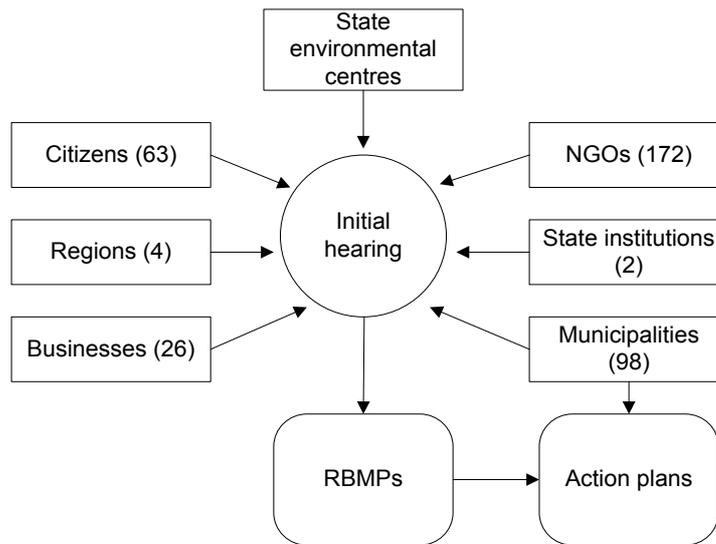


Fig. 3 Overview of the actor groups, and numbers of actors that participated in the initial hearing

Figure 3 illustrates that the municipalities have a special status compared to the other actors, because they will be preparing action plans and thus play an important role in the implementation of the RBMPs. The hearing was open to anyone wishing to participate, and all the submissions are included in the analysis. Of course this means that the analysis is based on the opinions of those that chose to participate rather than a representative segment of possible actors, and as such is not completely unbiased. However, in this case it is relevant to analyse the opinions of those who are interested and intend to take an active part in the process. There are 98 municipalities in Denmark, and it can be seen from Figure 3 that they all participated in the hearing. There are five regions in Denmark and, according to Figure 3, four of these participated. Few state institutions participated, possibly because the plans were prepared by the state in the first place. Also fairly few businesses participated, possibly because few business sectors will be affected by the plans besides agriculture, which is largely represented by NGOs.

The written submissions were analysed in terms of whether or not the actors encourage the state to integrate climate change as a factor in the planning process. The results are shown in Figure 5.

4.2 Interviews

As stated in relation to Figure 3, the municipalities are important actors, because they will be preparing the local action plans implementing the state RBMPs. Because of this the choice was made to focus on the municipalities and carry out interviews to investigate what influenced their attitudes towards climate change in the RBMPs.

The purpose of the interviews was to form hypotheses about the drivers and barriers for suggesting an integration of climate change in the RBMPs, and about the possible challenges of integrating climate change in the municipal action plans. However it was clear from the interviews that the municipalities had not yet begun preparing the action plans, nor had they reflected much upon the

possible challenges of integrating climate change. Thus the interviews were used to hypothesise about drivers and barriers for suggesting climate change in the RBMPs, while the hypotheses on challenges of integrating climate change in the action plans were based solely on the theory presented in Section 2, and particularly Figure 1.

Four interviews were conducted in autumn 2008. For the interviews, four municipalities were chosen so that two of them had encouraged the integration of climate change in RBMPs and two had not. The interviewees comprise both municipalities that are characterised by urban areas and municipalities that are characterised by rural areas, as well as municipalities located on the coast and inland respectively. The respondents were all heads of department in the municipalities. This was the choice of the municipalities, and for the purpose of uncovering the official position of the municipalities, heads of department are also viewed as a good choice by the author. The interviews were open, explorative, and unrelated to the theory. The respondents were asked about what the drivers and barriers were for suggesting an integration of climate change in the RBMPs. Also the respondents were asked about future challenges of integrating climate change in their action plans. However, as stated, the municipalities were not able to answer these questions.

4.3 Survey

The purpose of the survey was to test the hypotheses developed on:

- drivers and barriers for the municipalities in relation to encouraging an integration of climate change;
- the main challenges they could be facing if they integrate climate change in their own action plans.

Specifically, much support each of the hypotheses found in interviews and theory have among the municipalities was tested. A similar methodology was used by Moser and Tribbia (2007) in their study of the coastal managers of California and by Gow and Leahy (2005) in their study of perceptions of environmental risks in the Hunter region in Australia. In each of these studies interviews were conducted and used as inspiration for a more extensive survey. The survey consisted of a questionnaire, with multiple choice questions. The questions were based on the interviews and theory as illustrated in Figure 4.

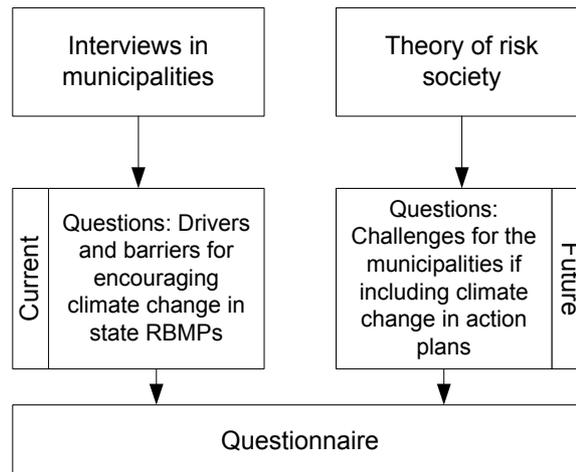


Fig. 4 Overview of the input to and the structure of the questionnaire

All possible drivers and barriers which were mentioned by one or more of the interviewees were included in the questionnaire. The questionnaire was sent in spring 2009 via email to employees in the 98 Danish municipalities. The employees were chosen on the basis of an examination of the homepages of the municipalities, and included directors, heads of department, team leaders, and ordinary employees in the areas of environment, planning, and water. The municipalities chose which employees were most appropriate for answering the survey, and some chose to forward it to more relevant colleagues. Fifty-eight respondents from 50 of the 98 Danish municipalities filled in and returned the questionnaire, giving a response rate of around 50%. The municipalities that have answered have a good geographical distribution with a response rate of around 50% within the five geographical regions in Denmark. Almost 100% of the large municipalities (>100,000 inhabitants) answered, while about 50% of the mid-sized municipalities (25,000 – 5,000 inhabitants) and 30% of the small municipalities (<25,000 inhabitants) participated. In the light of these numbers, only simple analyses are carried out. The relatively small numbers of respondents in total, and thus for each of the different groupings of municipalities, do not warrant more detailed statistical analysis comparing the groups.

5. Actor Attitudes towards Climate Change in RBMPs

Figure 5 shows the percentage of the actors participating in the initial hearing who encourage an integration of climate change in the RBMPs.

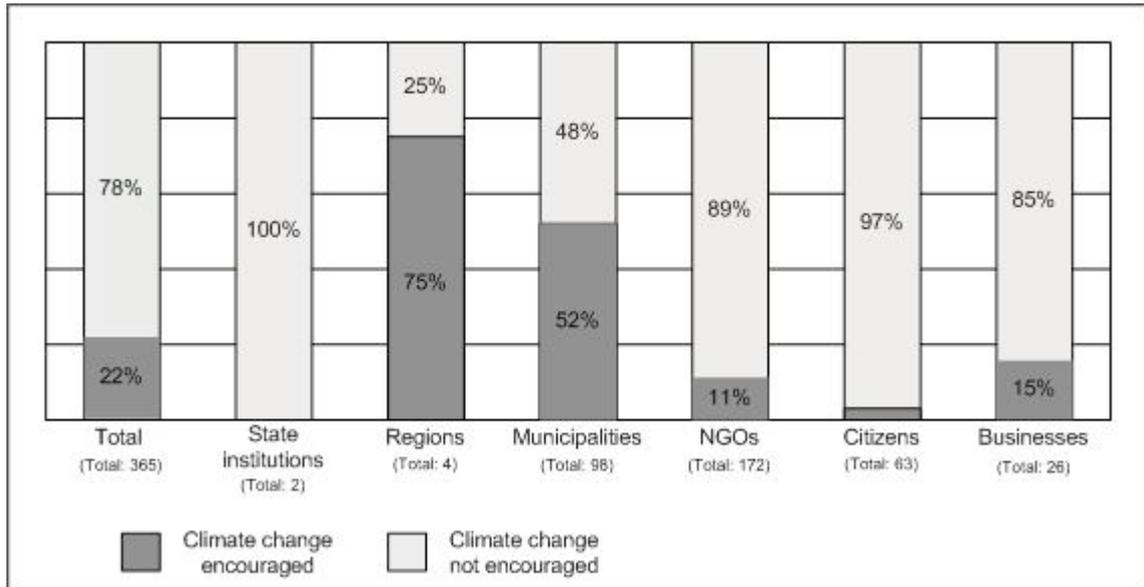


Fig. 5 The percentage of actors (total number of actors 365) encouraging and not encouraging integration of climate change in RBMPs in total and for each group of actors (based on document study)

The results show that in total 22% of the actors participating in the hearing point to climate change as an issue to be dealt with in the RBMPs. This corresponds to 79 out of the 365 actors. So, some of the actors do encourage an integration of climate change in the RBMPs, in spite of the state's decision to exclude it, and thus they disagree with the state. At the same time 78% of the participating actors do not encourage an integration of climate change. This also shows that there is a discrepancy among the participating actors. These circumstances can be interpreted as being in support of the theoretically based notion that climate change is a contested issue, and that decisions and statements on climate change can be challenged: cf. section 3. Apparently, there are many views and perceptions when it comes to climate change and whether or not it is a relevant and important factor.

It can also be seen from Figure 5 that especially the state institutions, NGOs, citizens, and businesses do not encourage a focus on climate change. The reason why the state institutions do not encourage the integration of climate change can perhaps be that they do not want to contradict the Ministry of the Environment. Also as stated in Section 4.1, only two state institutions participated in the hearing, making it difficult to draw conclusions on this basis. Especially the NGOs might have been expected to raise the issue of climate change. However, the NGOs, citizens, and businesses immediately appear to be focused on specific and local issues of interest. This is in contrast to the global nature of climate change, as pointed out in theory and practice in Section 2 and Section 3, and thus the local focus might be part of the reason for the lack of interest in climate change. This reflection is supported by Eisenack et al. (2007), who conclude that the perception that local interests are more important than global can act as a barrier to climate change adaptation.

Among the regions and the municipalities, more than half of the actors encourage integration of climate change in RBMPs. From this it appears that the local authorities are relatively actively encouraging the state to integrate climate change. As an example, the municipality of Aalborg states in its input to the hearing that *“it is the municipality of Aalborg’s recommendation for the RBMPs... that the consequences of climate change should be incorporated in the RBMPs”*. Another example is the municipality of Struer, which states in its input that *“the state is encouraged to take climate change into account when preparing the RBMPs, both when providing the baseline, goals and measures”*. It is interesting that the municipalities are so positive towards an integration of climate change in RBMPs, because they will be continuing the planning process and thus have the opportunity to integrate climate change in their action plans. There appears to be a bottom-up pressure from the municipalities who are more ambitious than the state in this regard. There are examples from other cases of municipalities acting as driving forces in relation to other environmental issues. For instance Lindahl and Söderqvist (2004) show this in the case of Swedish water management.

It is clear from the above that the municipalities in Denmark are among the actors who are most positive towards an integration of climate change in RBMPs. This implies that climate change might have a more dominant role to play later in the planning process when the municipalities prepare their action plans. However, the municipalities also have different attitudes towards climate change as a factor in the RBMPs, since 48% of them do not encourage an integration of climate change. In the following an understanding of the background to these attitudes is sought.

6. Drivers and Barriers in Encouraging Integration of Climate Change in the RBMPs

In the survey, the municipalities were asked which of a range of factors had been the main drivers for those encouraging integration of climate change in RBMPs. The possible drivers used in the survey were derived from interviews, as stated in Section 4.1. The results can be seen in Figure 6.

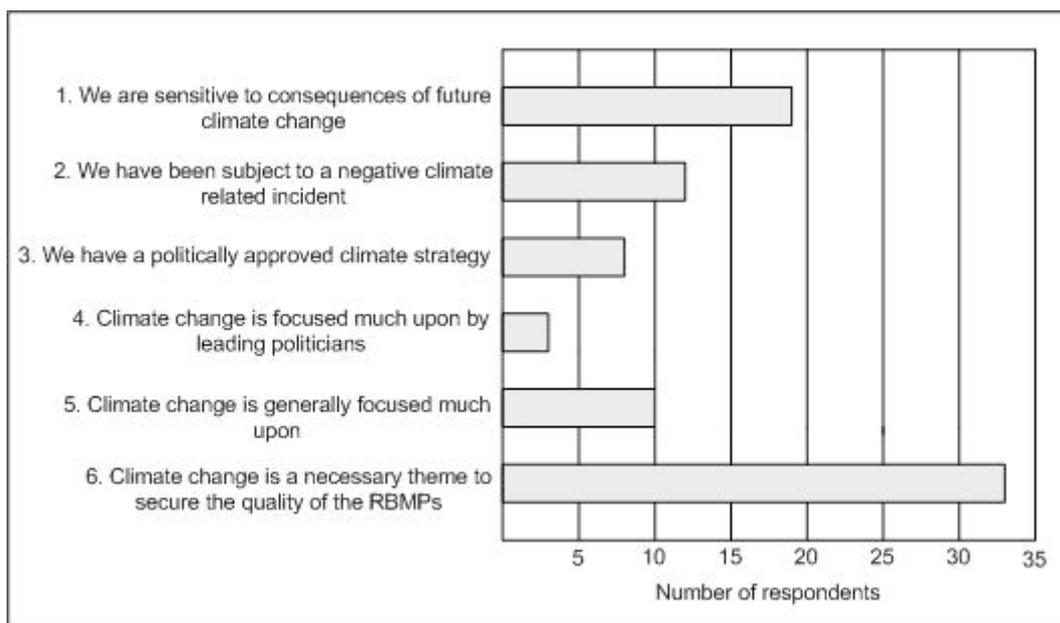


Fig. 6 The number of respondents (total number: 58) in the survey that considered each factor a driver for their encouragement of integration of climate change in the RBMPs. The respondents could choose more than one factor (based on survey)

It can be seen from Figure 6 that the perception that integration of climate change will improve the quality of the RBMPs has been a main driver for the municipalities (item 6). In this regard, the survey also shows that 67% of the respondents consider their technical staff the main driving force behind encouraging integration of climate change in the RBMPs. In addition to this, being exposed to present and future negative consequences of climate change is a key driver for the municipalities (items 1 and 2). Eisenack et al. (2007) also regard this barrier as probable, by pointing to visible and tangible impacts of climate change as drivers for climate change adaptation.

The factors of the least importance to the municipalities are those concerned with the general and political focus on climate change (items 3, 4, and 5). The fact that the focus of leading politicians is not an important driver for the municipalities can seem puzzling, because the survey also shows that 26% of the respondents point to their politicians as the main driving force behind encouraging integration of climate change in RBMPs. It should be noticed that the respondents in the survey are the technical staff in the municipalities. Other results with more focus on the political issues might have been obtained if the politicians had been asked the same questions. The survey also shows that only 2% of the respondents consider the citizens a driving force behind encouraging integration of climate change in the RBMPs. This might reflect that the submission for the initial hearing was prepared as an administrative exercise without public participation. Theoretically it is interesting that the technical arguments and the tangible experiences are important drivers. This does not correspond to the theory of Beck that climate change sparks off a more open process with inclusion of different perceptions and values. On the contrary, it reflects the traditional line of thinking, which is very dependent upon science.

In the survey conducted, the municipalities which have not encouraged integration of climate change as a factor in RBMPs were asked which of a range of factors had been barriers to this. The possible barriers are derived from interviews, as stated in Section 4.1. The results can be seen in Figure 7.

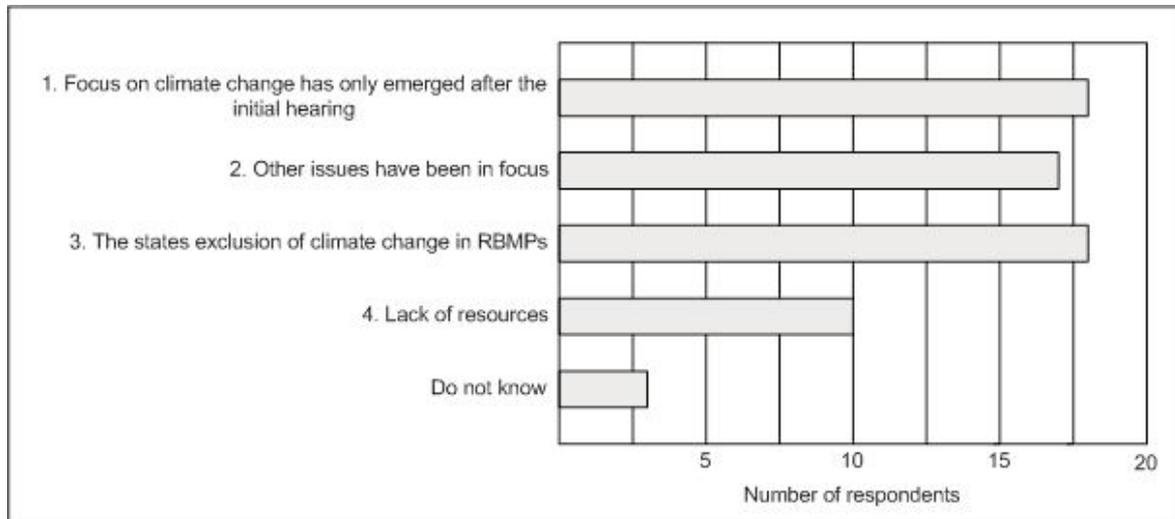


Fig. 7 The number of respondents (total number: 58) in the survey that considered each factor a barrier to their encouragement of integrating climate change in the RBMPs. The respondents could choose more than one factor (based on survey)

It is noticeable that relatively few of the respondents consider a lack of resources a barrier to encouraging an integration of climate change in RBMPs (item 4). Rather the issues of lacking focus on climate change are considered key barriers by respondents (items 1 and 2). This is either because issues other than climate change are in focus (item 2), or because climate change has only gained focus after the initial hearing (item 1). In the theory of risk society it is described how risks such as climate change are dependent on our focus on and awareness of them, something which is reflected in the fact that a lack of awareness or focus acts as a barrier to addressing climate change. This argument is supported by the work of by Moser and Tribbia (2007), who find that other issues overshadowing that of climate change act as barriers to addressing climate change. It is interesting that the political focus was not among the important drivers, while a lack of political focus apparently is an important barrier.

Finally the state's exclusion of climate change as a part of the RBMPs is a key barrier for municipalities (item 3). The decision of the state is perhaps considered by some municipalities to be final, or the municipalities do not want to go against the state and challenge its decision. The fact that the decision by the state is a main barrier to encouraging integration of climate change counters the previously discussed issue of climate change being contested and open for interpretation. Apparently the municipalities see this issue very differently. Other researchers have had similar results. Moser and Tribbia (2007) conclude that a lack of legal mandate can be a constraint on climate change adaptation, and Eisenack et al. (2007) mention an inadequate response

at national level as a constraint on adaptation to climate change. Næss et al. (2005) emphasise the need for collaboration between the national and local levels of authorities in handling climate change. All these aspects support the empirical finding of this article that the state decision can act as a significant barrier.

7. Future Challenges to Integrating Climate Change in Municipal Action Plans

The respondents in the survey were asked which of the theoretical challenges from Figure 1 they considered to be the main challenges for the municipalities if they integrate climate change in their own action plans. The results are shown in Figure 8.

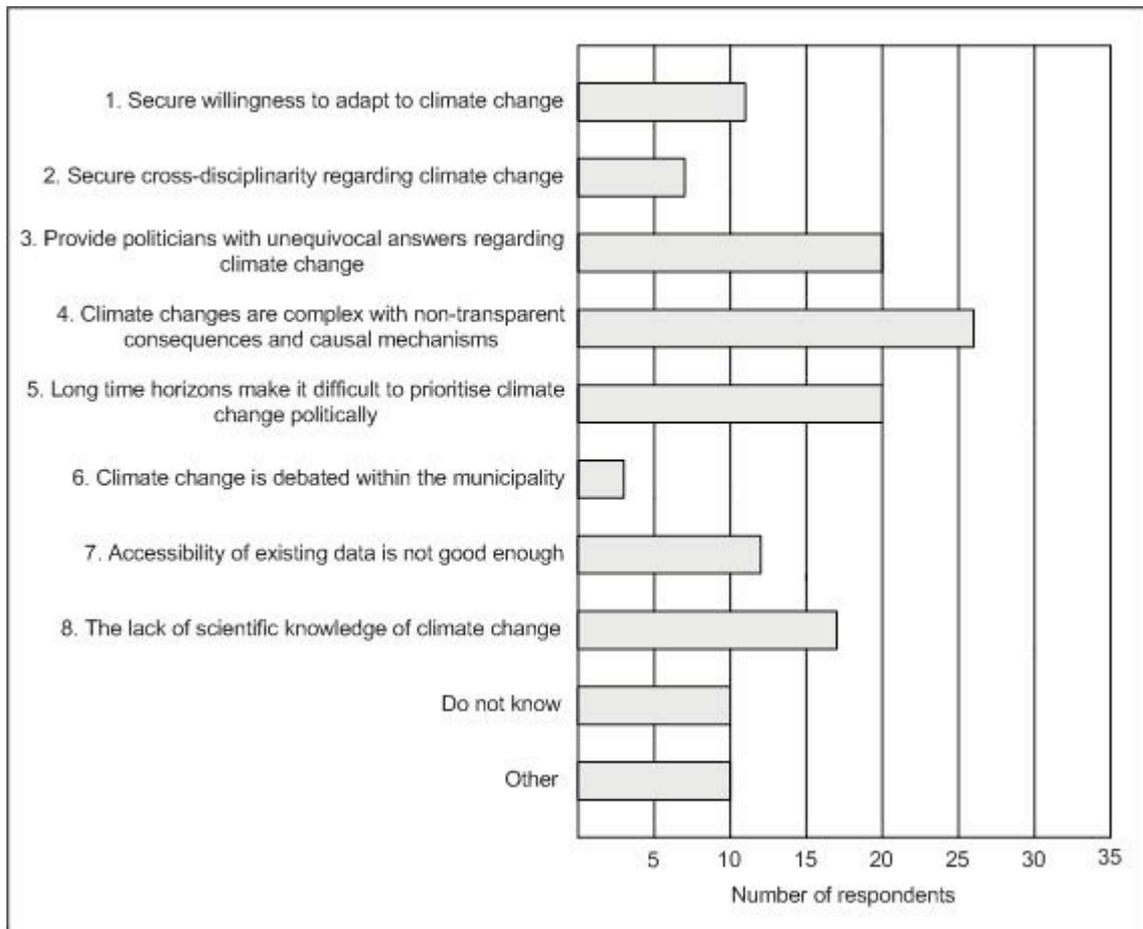


Fig. 8 The number of respondents (total number: 58) in the survey that considered each factor a challenge if climate change was integrated in the municipal action plans. The respondents could choose more than one factor (based on survey)

It can be seen from Figure 8 that the respondents perceive the complexity and non-transparency of climate change (item 4) as the main challenge. Other key challenges are the political difficulties posed by climate change because of the long time horizons and the lack of unequivocal answers (items 3 and 5). The lack of scientific knowledge is also pointed out as a challenge by a fair amount of respondents (item 8). At the lower end of the spectrum some of the more practical matters are found, such as the accessibility of data and securing cross-disciplinary cooperation (items 2 and 7).

Eisenack et al. (2007) in their study also point to uncertainties in the form of lack of information and knowledge, uncertainty in research, and lack of full evaluation of vulnerability as barriers to adaptation. Arnell and Delaney (2006) mention issues of short planning horizons as a barrier to adaptation, because they do not fit the long time horizons of climate change. It can also be seen that the issue of securing willingness to adapt and the issue of climate change being debated internally within the municipalities are not major concerns for the respondents (items 1 and 6). In the light of the previous finding that climate change is contested among the different actors it is interesting that even if this is so, the municipalities do not see it as a potential challenge.

In this case the challenges posed by the theoretical characteristics of new risks are tested as possible challenges of addressing climate change in municipal action plans. The survey shows that characteristics related to uncertainty are those most often considered significant challenges by the respondents.

8. Conclusion and Discussion

This article investigates the attitudes towards an integration of climate change among actors involved in the process of preparing RBMPs in Denmark, specifically which factors are perceived as drivers, barriers, and challenges. For this purpose the support for different hypotheses derived from either theory or practice is tested.

The analysis in Chapter 5 shows that some of the actors have positive attitudes towards integrating climate change in RBMPs, especially municipalities and regional authorities. In contrast, NGOs, citizens, and businesses do not encourage an integration of climate change very actively. This can possibly be attributed to a focus on specific and local issues rather than the global ones such as climate change. In accordance with the theory of risk society, risk such as climate change is contested and debatable. The analysis of attitudes supports this, since the actors apparently do not agree on the importance and relevance of integrating climate change. This contested nature of climate change can be interpreted as a challenge when integrating climate change in a planning process, in accordance with the theoretical issues raised in Figure 1. Theoretically, this challenge complicates the planning process and means that the disputes and, in the terminology of Beck, struggles of risk definitions between the actors need to be handled. However, the analysis of challenges shows that the contested nature of climate change is not actually perceived as an important challenge by the municipalities. As such, the analysis only supports part of the theoretical contemplation.

The participation of the public in decision-making, through the initial hearing, can be discussed in relation to Beck's thesis on subpolitics in risk society. The fact that the public attempts to gain influence in the planning process and attempts to define climate change as a relevant risk despite the decision from the appointed decision maker can be seen as an example of subpolitics. However, the public has not been successful in actually affecting the planning process and having climate

change integrated in the state RBMPs. Also relatively few private citizens participated in the process and as such it does not resemble the public movement that subpolitics can be interpreted as.

Regarding the main drivers and barriers for the municipalities that encourage an integration of climate change in the state RBMPs, a range of issues are pointed out by the respondents in the survey. The main driver for the municipalities encouraging the integration of climate change in the RBMPs is that they consider it necessary for preparing qualified RBMPs. This driver is obvious and not dealt with in the other studies mentioned in this article. Other important issues for the municipalities are their exposure to present and future possible consequences of climate. The main barriers for the municipalities are the state decision to exclude climate change from the RBMPs and a lack of focus on climate change.

The question of what the municipalities consider the main challenges of integrating climate change in their own action plans is also dealt with in the survey. The respondents point to the main challenges of handling the complexity and non-transparency of climate change in the planning process. Also a lack of knowledge, the availability of clear answers to inform decision makers, and issues of handling the long time horizons politically are significant challenges. This supports the theoretical hypotheses that the uncertainty of risks such as climate change becomes integrated in the planning process and constitutes a challenge.

In the case of climate change in Danish RBMPs and municipal action plans, lack of knowledge, uncertainty, and complexity seem to be important barriers and challenges. The problem is reflected both in the arguments of the state for excluding climate change from the plans and in the municipalities' perception of it as the main challenge of integrating climate change in action plans. These results support one of the important theoretical challenges of dealing with climate change in the risk society. For the state, the challenge leads to inaction in the form of excluding climate change. Adger et al. (2009) discuss the validity of lack of knowledge as an argument for inaction. They argue that "*we should not consider uncertainties associated with foresight of future climate change a limit to adaptation*" (Adger et al. 2009, p.342). Among other things, they emphasise the fact that climate predictions are inherently uncertain and should not be the central tool for adaptation, and that instead an approach of robust decision-making should be used (Adger et al. 2009). Ulrich Beck in his theory of risk society also suggests other ways of dealing with the lack of knowledge, increased complexity, differing perceptions and so on. Beck emphasises the need for open criticism of science, knowledge, progress and experts, from science itself and from society at large. Going into detail about these suggestions is outside the scope of this article, but they serve the purpose of indicating that inaction is not the only possible response to problems of the risk society.

In conclusion the process in Denmark reflects parts of the theory of risk society, for example debate about risk and subpolitics as well as uncertainty, complexity, and lack of knowledge. However, it is also clear that when it comes to acting, such as in the case of the state RBMPs, it is

still the mindset of the modern society that prevails, with a dominant perceived need to base decisions on exact scientific knowledge. If this cannot be achieved inaction has been the preferred solution.

Acknowledgements

The author would like to thank supervisors Professor Lone Kørnøv (PhD), Aalborg University and Head of Department Helle Vang Andersen, Rambøll, for their valuable comments on the paper. Thanks are also given to Senior Consultant Henrik Nowak, Rambøll, for the cooperation in setting up and carrying out the survey.

References

- Adger N, Dessai S, Goulden M, Hulme M, Lorenzoni I, Nelson D, Næss L, Wolf J, and Wreford A (2009) Are there social limits to adaptation to climate change? *Climate Change* 93: 335 – 354.
- Arnell N, and Delaney K (2006) Adapting to Climate Change: Public Water Supply in England and Wales. *Climate Change* 78: 227 – 255.
- Bang J, Hårbøl K, Schack J, and Spang-Hanssen H (1999) *Dansk Fremmedordbog*. 2nd edition. Copenhagen: Gyldendalske Boghandel Nordisk Forlag A/S
- Bates B, Kundzewicz Z W, Wu S, and Palutikof J (eds) (2008) *Climate Change and Water - Technical Paper of the Intergovernmental Panel on Climate Change*. IPCC Secretariat, Geneva
- Battaglini A, Barbeau G, Bindi M, and Badeck F (2009) European winegrowers' perceptions of climate change impact and options for adaptation. *Regional Environmental Change* 9: 61–73.
- Beck U (1996) World Risk Society as Cosmopolitan Society? Ecological Questions in a Framework of Manufactured Uncertainties. *Theory, Culture & Society* 13 (1): 1–32.
- Beck U (1997) *Risk Society: Towards a New Modernity*. Sage, London
- Beck U and Willms J (2004) *Conversations with Ulrich Beck*. Polity Press in association with Blackwell, Cambridge.
- Berkhout F, Hertin J, and Gann D (2004) *Learning to Adapt: Organisational Adaptation to Climate Change Impacts*. Working Paper 47, Tyndall Centre for Climate Change Research.
- Bernstein et al. (2007a) *Climate Change 2007: Synthesis Report - Summary for Policy Makers*. Intergovernmental Panel on Climate Change.
- Bernstein et al. (2007b) *Climate Change 2007: Synthesis Report*. Intergovernmental Panel on Climate Change.
- Blennow K, and Persson J (2008) Climate change: Motivation for taking measure to adapt. *Global Environmental Change* 19: 100 – 104.
- Breck T (2001) *Dialog om det usikre: Nye veje i risikokommunikationen*. Akademisk Forlag, Copenhagen.
- Cebulla A (2007) Class or Individual? A Test of the Nature of Risk Perceptions and the Individualisation Thesis of Risk Society Theory. *Journal of Risk Research* 10 (2): 129 – 148.
- Commission of the European Communities (2007) *Commission Staff Working Document Accompanying Document to the Communication from the Commission to the European Parliament and the Council: 'Towards Sustainable Water Management in the European Union' – First stage in the implementation of the Water Framework Directive 2000/60/EC*. Brussels.
- Commission of the European Communities (2009) *White paper – Adapting to climate change: Towards a European framework for action*. COM(2009) 147/4. Brussels.
- Common Implementation Strategy for the Water Framework Directive – Environmental Objectives under the Water Framework Directive* (2005) Policy Summary and Background Document. European Water Directors. www.ec.europa.eu/environment/water/water-framework/objectives/index_en.htm. Accessed 15 December 2008.

- Danish Agency for Spatial and Environmental Planning (2008) *Mere helhed i vand- og naturplaner*. www.blst.dk/Nyheder+-+Presse/naturplaner_groen_vækst.htm. Accessed 3 November 2008.
- Danish Agency for Spatial and Environmental Planning (2010a) *Proces og milepæle*. www.blst.dk/Vandognatur/Vandplaner/Proces_og_milepaele. Accessed 14 February 2010.
- Danish Agency for Spatial and Environmental Planning (2010b) *FAQ om vandplanerne*. www.blst.dk/Vandognatur/Vandplaner/FAQ_om_vandplaner/. Accessed 14 February 2010.
- Danish Ministry of the Environment (n.d.a.) *Ny vandplanlægning i Danmark – Arbejdsprogram, tidsplan og høringsproces*. www.vandognatur.dk/NR/rdonlyres/910B5895-8B52-4A63-A64F-23A93ACBF67D/0/Arbejdsprogramforvandplanl%C3%A6gningen.pdf. Accessed 24 August 2009.
- Danish Ministry of the Environment (n.d.b) *Vand- og naturplaner*. www.vandognatur.dk/. Accessed 15 December 2008.
- Danish Ministry of the Environment (n.d.c) *Arbejdsprogram*. www.vandognatur.dk/Emner/Om+planerne/Arbejdsprogram/. Accessed 12 January 2009.
- Danish Ministry of Finance, Danish Ministry of Defence, Danish Ministry of the Interior and Health, Danish Ministry of the Environment, Danish Ministry of Food, Agriculture and Fisheries, Danish Ministry of Science, Technology and Innovation, Danish Ministry of Energy and Transport & Danish Ministry of Economic and Business Affairs (2007) *Katalog over mulige konsekvenser af fremtidige klimaændringer og overvejelser om klimatilpasning*. www.ens.dk/da-dk/klimaogco2/klimatilpasning/strategiforklimatilpasning/documents/katalog_endelig_udgave07_0910.pdf. Accessed 16 February 2010.
- Directive 2000/60/EC (2000) *Directive 2000/60/EC of the European Parliament and of the Council of 23rd October 2000 establishing a framework for Community action in the field of water policy*. Official Journal of the European Communities.
- Eisenack K, Tekken V and Kropp J (2007) Stakeholder Perceptions of Climate Change in the Baltic Sea Region. In: Schernewski, Fichtner, Glaeser, Konieczny, Scheibe, Sekscinska, and Thamm (eds). *Coastal Development: The Oder/Odra Estuary and Beyond*. Coastline Report No. 8.
- Etkin D, and Ho E (2007) Climate Change: Perceptions and Discourses of Risk. *Journal of Risk Research* 10 (5): 623 – 641.
- Gow J, and Leahy T (2005) Apocalypse probably: Agency and environmental risk in the Hunter region. *Journal of Sociology* 41: 117 – 141.
- Hinchcliffe S (2007) Locating Risk: Energy Use, the ‘Ideal’ Home and the NON-Ideal World. *Transactions of British Geographers* 22 (2): 197 – 209.
- Law on Environmental Goals (2006) *Bekendtgørelse af lov om miljømål m.v. for vandforekomster og internationale naturbeskyttelsesområder*. LBK nr 1756 af 22/12/2006.
- Lindahl T, and Söderqvist T (2004) Building a catchment-based environmental programme: a stakeholder analysis of wetland creation in Scania, Sweden. *Regional Environmental Change* 4: 132 – 144.
- Lorenzoni I, Lowe T, and Pidgeon N (2005) *A Strategic Assessment of Scientific and Behavioural Perspectives on ‘Dangerous’ Climate Change*. Technical Report 28. Tyndall Centre for Climate Change Research.
- Matten D (2004) The impact of the risk society thesis on environmental politics and management in a globalizing economy – principles, proficiency, perspectives. *Journal of Risk Research* 7(4): 377 – 398.
- Moser S, and Tribbia J (2007) *Vulnerability to Coastal Impacts of Climate Change: Coastal Managers’ Attitude, Knowledge, Perceptions and Actions*. California Energy Commission, PIER Energy-Related Environmental Research.
- Næss L, Bang G, Eriksen S, and Veatne J (2005) Institutional adaptation to climate change: Flood responses at the municipal level in Norway. *Global Environmental Change* 15: 125 –138.
- O’Brien K, Eriksen S, Sygna L, and Næss L O (2006) Questioning Complacency: Climate Change Impacts, Vulnerability, and Adaptation in Norway. *Ambio* 35(2): 50 – 56.

- Olofsson A, and Öhman S (2007) Views of Risk in Sweden: Global Fatalism and Local Control – An Empirical Investigation of Ulrich Beck’s Theory of New Risks. *Journal of Risk Research* 10 (2): 177 – 196.
- Politiken (2002) *Politikens store ordbog* (dictionary). Version 3.1. Copenhagen: Politikens Forlag A/S.
- Risbey J (2008) The new climate discourse: Alarmist or alarming? *Global Environmental Change* 18: 26 – 37.
- Sonnenborg T, Christensen B, Roosmalen L, and Henriksen H J (2006) *Klimaændringers betydning for vandkredsløbet i Danmark*. Danmarks og Grønlands Geologiske Undersøgelse Rapport 2006/22. GEUS, Copenhagen.
- Subak S (2000) Climate Change Adaptation in the U.K. Water Industry: Managers’ Perceptions of Past Variability and Future Scenarios. *Water Resources Management* 14: 137 – 156.
- Zehr S (2000) Public representations of scientific uncertainty about global climate change. *Public Understanding of Science* 9: 85 – 103.