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## 2

# Participatory Climate Change Adaptation in Kalundborg, Denmark

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### 2.1 Introduction

The municipality of Kalundborg is situated on the west corner shoreline of Zealand, Denmark. Like many municipalities along the Danish coast, they have only recently started to consider the need to develop adaptation strategies. Municipalities on the west coast of Jutland are used to dealing with storm surges from the North Sea, but coastal areas in the rest of Denmark are better protected from such surges and have dealt with them on a much less regular basis. A change is anticipated.

The municipality of Kalundborg joined the BaltCICA project because their representative in Brussels became aware of the opportunity and because the project could contribute to the increased knowledge of and experience of local climate adaptation in the municipality. Had they not joined, it is safe to conclude that the attention to climate change adaptation among citizens, stakeholders and politicians in the municipality would have been less conspicuous. While Denmark has adopted a national strategy for climate change adaptation, this strategy does not impose any obligation on municipalities to make their own strategies, nor does it provide municipalities with much information on how to proceed with such strategies.<sup>1</sup>

<sup>1</sup>This situation changed somewhat, when a new centre-left government won the general election of September 2011. The new minister for the Environment announced in the autumn 2011 that all municipalities should make a climate

Any obligation would have been met by municipalities with claims of financial support from the Danish state, which has so far been very limited.

Thus, while the municipality of Kalundborg considered making a climate adaptation strategy before joining BaltCICA, they did not plan to make it a very detailed one, and they joined BaltCICA with the purpose of taking a close look at an area located in the south-western part of the municipality. Flooding is already an issue in this area, as it occasionally affects farmers and summer cottage owners. BaltCICA was considered to be one of several ways to gain the required knowledge to draw up a climate adaptation strategy for that particular area, and possibly to provide inspiration for such a strategy covering the entire municipality.

The case study area was selected in cooperation with the Danish Board of Technology (DBT) and the Geological Survey of Denmark and Greenland (GEUS), the two other Danish BaltCICA partners. GEUS became part of the Danish team in order to provide geological data, whereas DBT specializes in the involvement of stakeholders and citizens in political decision-making processes with regards to technological and scientific issues such as energy, biotech, healthcare, IT, biodiversity and climate change (Vig & Paschen, 2000; DBT, 2012). The case study area was

adaptation strategy within the next two years. At the time of writing this chapter, it was still not decided how detailed such strategies should be.



selected, in order to address future problems with flooding caused by storm surges and heavy precipitation. Moreover, it was selected in order to include different and potentially conflicting interests from local inhabitants and stakeholders. The intention was to make a climate adaptation strategy for the area, and at the outset of the project it was decided that DBT would assist the municipality in these efforts by organizing both a scenario workshop and a citizen summit. While the municipality had some preliminary understanding of how these methods work, they later got somewhat surprised by the strain they put on their decision-makers and civil servants.

This chapter presents the implementation of a participatory climate change adaptation process. It focuses on practical issues and experiences in the case study of Kalundborg. For further reading related to the broad scientific and theoretical discussion on citizen participation the literature mentioned in this chapter can serve as a starting point.

## 2.2 Climate data

Solid facts are not abundant in climate change research, and relating to them in a planning perspective involves a number of both practical and political choices.

At the outset of BaltCICA, GEUS made a series of calculations of the expected sea level, storm surges and precipitation patterns in 2090. This year was chosen both because of the availability of climate model figures and because the main interest of the municipality was a long-term planning horizon. The starting point for the calculations was the A2 scenario developed by the Intergovernmental Panel on Climate Change (IPCC, 2000). The A2 scenario is the most pessimistic of the two development scenarios recommended by the Danish government for planning purposes. At that time, though, new research on the ablation of the ice cap on Greenland was emerging with estimates of sea level rise between 90 cm and, worst case scenario, up to two meters for A2 (DMI, 2009). Although those estimates were subject to a great deal of uncertainty, the Danish partners agreed

to choose what we considered a conservative estimate of 80 cm sea level rise in 2090.

On this basis, the municipality itself made some modelling, using advanced 3D software.<sup>2</sup> This led to the production of maps, showing potential consequences of storm surges in the future, partly in combination with incidents of heavy precipitation.

Rather than working with different IPCC scenarios, the Danish partners agreed that it would be better to work only with the one chosen. One might argue that by doing so, the uncertainty of future developments reflected by the different IPCC scenarios was downplayed. The counter argument was that for practical purposes it would be too difficult to relate to multiple scenarios in the decision-making process, and that uncertainties would be a prominent fact, regardless of how many climate scenarios were addressed. Thus, throughout the study, the uncertainties were highlighted while maintaining a combination of the A2 scenario and the latest research on the expected sea level rise.

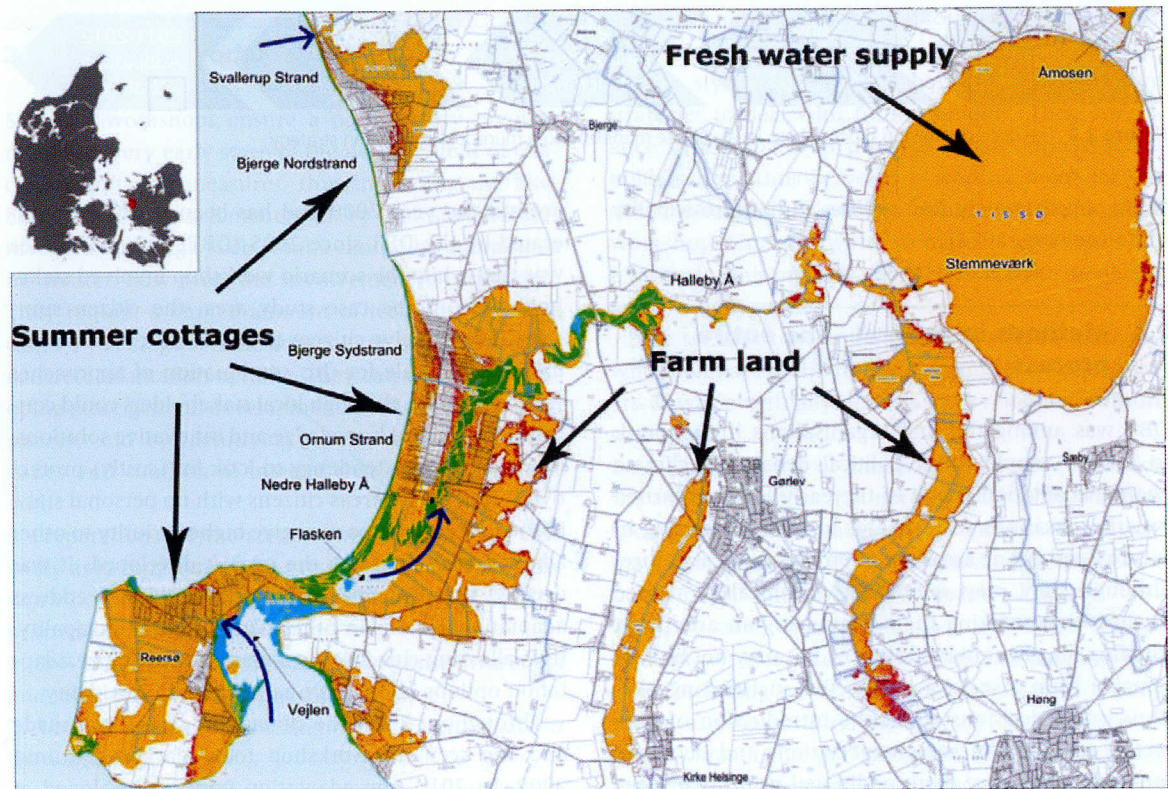
## 2.3 The case study area

The case study area around Reersø and Tissø is an exemplarily Danish rural area, and there are many more like it along the Danish coastline. It is dominated by farmland and to a lesser extent by protected nature areas, scattered settlements and summer cottage areas. It is inhabited by approximately 12 000 residents (out of which 321 live all year round in their summer cottages), including 6839 in the hamlets of Gørlev and Høng, two areas that are not, however, expected to be seriously affected by future floods.

The summer cottages in the low-lying areas by Ornum Strand, Bjerger Sydstrand, Bjerger Nordstrand and on the peninsula of Reersø are expected to get most seriously affected by future floods. Altogether, there are 3036 summer cottages in the area. Equally exposed are some permanent residences, large farmland areas and internationally protected nature areas with meadows, bogs, streams and lakes. The area around Flasken and Vejlen is particularly vulnerable,

<sup>2</sup>Encom Discover 3D – extension module for MapInfo.





**Figure 2.1** Salt water flooding in 2090.

Source: Map produced by the Municipality of Kalundborg.

Notes: <sup>a</sup>light blue: (80 cm above current sea level) areas expected to be permanently flooded by 2090.

<sup>b</sup>green: (150 cm above current sea level) areas currently flooded at 100-year incidents.

<sup>c</sup>yellow: (210 cm above current sea level) areas expected to be flooded at 20-year incidents in 2090.

<sup>d</sup>red (230 cm above current sea level) areas expected to be flooded at 100-year incidents in 2090.

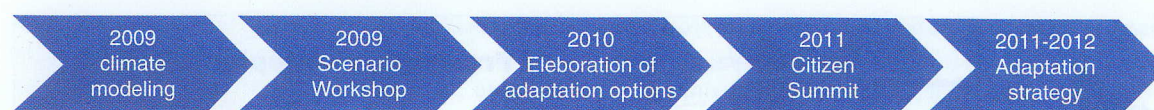
<sup>e</sup>blue arrows: point at the locations where the water will enter first.

at the mouth of the stream called Nedre Halleby Å, currently almost unregulated and with a delta and lagoon-like character.

The infrastructure in the area holds public roads, sewage systems, electrical supply, water supply and drainage. It holds groundwater supplies for drinking water and fresh water from Tissø Lake (the source of Nedre Halleby Å) is used for industrial purposes in Kalundborg. The area is somewhat important for tourism in the municipality of Kalundborg and includes several locations of interest with regards to cultural heritage. A large part of the rain falling on the middle and western parts of Zealand flows through this area before reaching the sea.

The map above shows how the case study area is foreseen to be affected in 2090 (Figure 2.1). In particular, residences in the town of Reersø and summer cottages on the peninsula of Reersø, Ornum Strand, Bjerger Nordstrand and Bjerger Sydstrand are exposed to future floods. In a situation of flooding from the sea combined with heavy precipitation, low-lying summer cottages at Bjerger Sydstrand will be particularly exposed, because rain water from a large catchment area in the hinterland will flow in that direction and meet salt water from the flooding. This scenario is not pictured on the map below, though. The accumulated cost of damages to private properties by 2090 is estimated by a private consultancy, NIRAS,





**Figure 2.2** The decision-making process from local climate modelling to a municipal adaptation strategy.

to be approximately 242 million Euro (Municipality of Kalundborg, 2011).

## 2.4 Methods in general – the entire process

DBT was among the first organisations in Denmark to initiate a public and political debate on climate change adaptation.<sup>3</sup> One of the early lessons learned was that decisions with regards to spatial planning in future flood-prone areas are often of a political nature, although they may seem only technical in nature to the people making them. Protecting an area from flooding may benefit landowners, but may not be sustainable from a societal perspective in the long run. Thus, small decisions about the introduction of protective measures increase expectations and demands for future decisions about additional protective measures and exclude a democratic debate on alternative possible futures, for example on whether one should continue protecting current land use or let nature take its course. The methods chosen for the decision-making process in Kalundborg were designed to stimulate such democratic debate.

Two specific methods were chosen in combination in order to build up a deliberative decision-making process: A scenario workshop and a citizen summit. The scenario workshop was designed to involve local stakeholders in the development of different possible future land uses and adaptation measures. The scenario workshop method was first developed in the early 1990s to find ways of developing urban ecology (Andersen & Jæger, 1999). The citizen summit was designed to consult ordinary citizens about their views on the abovementioned possible futures, adaptation measures and principles for an adaptation strategy. The methodology was developed by America Speaks

around the year 2000 and has been used and moderated by the DBT since 2005 (DBT, 2006). The idea was that while the scenario workshop involved stakeholders from the case study area, the citizen summit should involve citizens from the entire municipality. The rationale for this combination of approaches was partly that, although local stakeholders could contribute with local knowledge and innovative solutions, they may have a tendency to look for (costly) protective solutions, whereas citizens with no personal stake in the case study area may give higher priority to other adaptation options. As the project developed, it was decided that the citizen summit should also address adaptation options in other parts of the municipality, thus allowing citizens to compare and prioritize adaptation options in different parts of the municipality.

Throughout 2009, the climate modelling was made and the scenario workshop took place in autumn 2009. In 2010, the adaptation options developed at the scenario workshop were further elaborated by DBT and Kalundborg. Through dialogue with the administration and the politicians, adaptation options for other parts of the municipality vulnerable to future flooding (including the city of Kalundborg) were developed, and alternative (sometimes conflicting) guidelines for an adaptation strategy were identified. In March 2011, a citizen summit with 350 participants took place, in which citizens deliberated and voted for general adaptation guidelines and for different adaptation options for both the case study area (developed by the scenario workshop) and for other parts of the municipality. In 2011, the results were analysed, debated by the politicians, and the administration started drafting up an adaptation strategy, based partly on the results from the citizen summit, partly on further assessments of climate impacts in the municipality, and partly on fairly general guidelines from government agencies and ministries. The whole decision-making process is illustrated in Figure 2.2. The following part of the chapter describes the different project phases and the methodological approach in more detail.

<sup>3</sup>Read more about DBT climate change adaptation scenario workshops in 2003 at <http://www.tekno.dk/subpage.php3?article=10896&toppic=kategori11&language=uk>



## 2.5 Scenario workshop – in detail

Scenario workshops ensure a participatory involvement at a very early stage of the development of concrete adaptation measures, thus increasing the likelihood of their implementation by the stakeholders involved, although such results cannot be guaranteed no matter how well the involvement is organized. They require a limited amount of technical data and can set the stage for the subsequent development of concrete adaptation options. They can do so by developing more general developmental visions for the local society, and by identifying more concrete technical issues and conflicts of interest that need to be dealt with.

Preparations for the scenario workshop in the case study area commenced four to six months prior to the workshop and included two main tasks besides the practical preparations:

1. Development of future scenarios to raise awareness and to provoke creativity at the workshop.
2. Identification of local stakeholders to participate in the workshop.

### 2.5.1 Development of scenarios

The starting point of the scenarios was the preparation of maps pointing out the effects of severe floods and other climate change impacts in 2090. As described above, it involves a number of practical and political choices to choose data, but making the maps also requires a significant amount of local knowledge; for example, knowing the precise height of various infrastructural constructions (roads, sluices, dykes, etc.).

After the maps had been created, the consequences for the local community became clearer, and preparations of the scenarios, to be presented to the stakeholders at the scenario workshop, began. These preparations involved telephone interviews with local stakeholders who would presumably be affected by future floods, and they involved extensive discussions among the Danish BaltCICA partners. Local stakeholders had knowledge about previous flood events and the possible effects of future flooding, and they had experience in and ideas of how to meet the challenge. This knowledge was used to develop the scenarios (DBT, 2009).

The scenarios used at the scenario workshop are short (two to four pages each) and explain in a journalistic style the effects of having chosen different strategies to deal with future flooding. They are science fiction made to provoke debate among stakeholders and, thus serve as a starting point for the development of adaptation options at the scenario workshop. Thus, the word 'scenario' is used rather differently for this method, than it is in climate modelling and foresight studies.

The scenarios were written by a science journalist who took part in the research among local stakeholders. It was eventually decided to develop three future scenarios:

1. A basic scenario or 'laissez-faire' scenario based on the assumption that it is not desirable to do anything special in advance to alleviate the impact of future climate changes, beyond what is within immediate economic reach. Initiatives will be taken ad hoc.
2. A so-called 'protection scenario' based on an attempt to protect current land uses as much as possible, including residential areas, infrastructure, commerce and agriculture, against the consequences of future climate changes. Initiatives will be launched in order to protect existing economic interests, even if this has negative consequences for the environment and nature.
3. A so-called 'adaptation scenario' based on the need to adapt to future climate changes rather than fight against them. Current land uses, such as farming practices, will be re-evaluated and adjusted to the changing environment, and more space will be allocated to wetlands. The scenario also assumes that much consideration will be given to environment and nature.

Each of the three scenarios is an attempt to describe the pros and cons of the different adaptation options involved as well as the possible effect of these options on the local stakeholders and community at large. Approximately three weeks prior to the workshop, the scenarios were sent to the participating stakeholders.

### 2.5.2 Identification of stakeholders

While researching for the development of the scenarios, a simultaneous research was carried out to identify potential participants in the scenario workshop. Participants should be local stakeholders with an interest likely to be affected by climate change and with a position in the local community investing them with



the power required to push for the implementation of adaptation measures, if needed. Thus, a 'stakeholder' can be more narrowly or broadly defined depending on what one would define as a relevant stake in the future development of the area in question. The DBT are strong advocates of a rather broad and inclusive definition, for both practical and principled reasons (Bedsted, 2007).

The key to a successful involvement process is to consider carefully, when and how to involve who and to communicate precisely and up front about, what kind of influence those involved will have on the decision-making process. Eventually, 28 participants<sup>4</sup> were invited to participate in the scenario workshop, including local politicians, local and regional officials (technicians, civil servants), farmers and representatives from home owners' associations, nature and environmental organizations, outdoor organizations, harbour authorities, youth (from secondary school), the tourist and business committee, the water supply sector, dyke and pump associations and the archaeological society. They all received written invitations and were contacted by telephone in order to explain to them the kind of process they were invited to take part in. Only a few declined, and if so, pointed to a more relevant participant. Great care was taken both before and during the workshop to explain to the participants what their input would be used for in the decision-making process. They were told explicitly that they would have no privileged say in the future decision-making process, but that most of their suggestions for adaptation measures would be discussed at a citizen summit.

### 2.5.3 The scenario workshop programme

The scenario workshop took place over two days with three weeks in between in the autumn of 2009. The working method alternated between group work and plenaries. The programme was structured around three consecutive phases: the *Critical analysis phase*, the *Visionary phase* and the *Implementation phase*. Groups of four to six participants were brought together representing different and presumably conflicting interests. One could also choose to make the groups including members with similar, rather than conflicting inter-

ests. One could also choose to alternate between these two group constructions throughout the workshop. There are many pros and cons of each procedure, the description of which exceeds the limits of this article.

The scenario workshop form and rules are there to ensure that everyone is heard, that all ideas are included in the debate and that participants work towards formulating an action plan.

- *Critical analysis phase* (day 1)

The task of the critical analysis phase is to criticize the scenarios – to provide both positive and negative criticism based on the views, knowledge and experiences of the participants. The scenarios represent different possible futures. They are not predictions, and the task does not involve choosing the preferred scenario or assessing which is the most probable. The scenarios are there to inspire criticism, which can lead to the development of new visions and adaptation measures.

- *Visionary phase* (day 1)

Using the knowledge gained from the critical analysis phase, the purpose of the visionary phase was to have the groups develop their own visions for the future. Participants could include elements of the pre-constructed future scenarios and make up their own. Groups were allowed to come up with more than one vision for the future.

In the time span of three weeks in between day one and day two, the results of the first workshop day were analysed and the visions developed in the different groups merged into four different visions. These four visions were sent to the participants prior to day two, and they were invited to state in advance which of the visions they would prefer to elaborate on during the second day of the workshop. Day two started with corrections and acceptance of the merged visions.

- *Implementation phase* (day 2)

The purpose of the implementation phase was an action plan for the implementation of each of the four visions. Taking into consideration how to implement a vision in real life, a number of barriers became apparent. These barriers may be economic, cultural, social, organizational, political or technical (for a discussion of barriers specific to climate change adaptation see, for example, Adger et al., 2009). Dealing with these barriers may lead to adjustments of the vision to be elaborated on. The action plans were drawn out along a timeline displaying who was responsible for what

<sup>4</sup>The ideal number of participants for a scenario workshop is between 25 and 40.



and when, that is, responsibilities of the landowners and the municipality, respectively.

The outcome of the scenario workshop was four different visions, arguments for and against these visions, plans for their implementation, a long list of technical issues to be clarified and a clearer sense of the political choices involved in the identification and implementation of adequate adaptation measures.<sup>5</sup>

The four different visions developed were:

1. Transforming the area into a nature area.
2. Phasing out vulnerable properties but allowing interim protection.
3. Establishment of onshore dykes and river dykes.
4. Construction of large offshore dykes.

Of the four visions, protection based on offshore dykes and transforming the area into a nature area seemed the most radical and controversial in the eyes of the Kalundborg administration, the former probably most so. It was fairly evident that these two visions had not been among the first considered had the administration made the decision according to regular procedures. There was agreement, though, among the Danish partners to stick to the four visions and thus fulfil the promise made to stakeholders at the scenario workshop that their ideas for the future would be put to a vote later on the citizen summit.

## 2.6 Transnational cooperation

The scenario workshop methodology was presented and debated at several meetings with BaltCICA partners, and it was applied in both Klaipeda City, Lithuania and Hamburg, Germany. Because the practical and political context differed in both places, so did the method, and the project partners had extensive exchanges (including study trips) in order to determine how to put the methodology to best use (for a discussion of the importance of adjusting participatory methodologies to the political context, see Klüver et al., 2004). In Klaipeda City, it was a given premise that some kind of protection should be implemented in order to prevent flooding in parts of the city from

the Smeltale River. It was just not clear how to do it exactly, and therefore the scenario workshop was able to focus more closely, than was the case in Kalundborg, on a few alternative options to choose from. In Hamburg, a much larger area than Kalundborg was the object of interest, and it therefore involved an increased multitude of interests. Not directly integrated with the ongoing decision-making process in Hamburg, the scenario workshop offered stakeholders the opportunity to explore adaptation measures in a new and innovative setting.

Other BaltCICA partners used parts of the scenario workshop methodology in their countries. A survey among the partners shows that the two most appealing elements seem to have been the use of future scenarios as a starting point for discussions and the efforts made to involve a wide variety of stakeholders in such discussions.

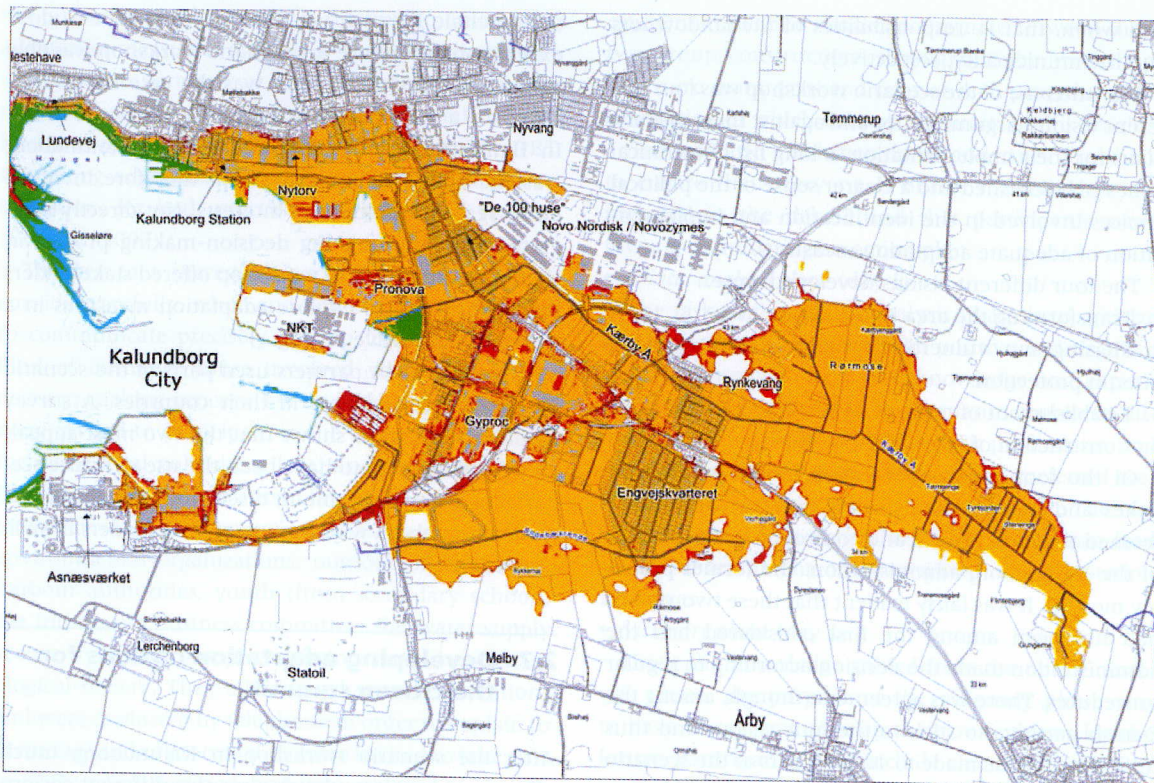
## 2.7 Developing adaptation options for the citizen summit

After the scenario workshop in Kalundborg, much effort was put into developing the different visions drawn out by the stakeholders. A consultancy firm, NIRAS, was involved in order to estimate the practical viability, the environmental consequences and economical costs of implementing the adaptation options in those visions. Assessments were also made by technical experts within the municipality.

At the same time, discussions began between the municipality and DBT about adaptation challenges and options in other parts of the municipality. Flood scenarios were modelled (Figure 2.3) for other areas in the municipality, and alternative adaptation options identified. DBT's role in this process was partly to assist the administration with a clarification of the adaptation options available, but mostly to identify the political choices involved in choosing one adaptation measure over the other. Such choices may seem obvious at the outset but could change once further examined. For example, it seemed obvious that the municipality has a responsibility to protect the city of Kalundborg from storm surges, and therefore the question seemed to be, if it should be protected one way or the other. When further examined, though, it turned out that a more pertinent question was whether or

<sup>5</sup>Rather than ending up with alternative solutions, the scenario workshop can also be designed to target a consensus-oriented output, helping participants reach an agreement on one joint vision for the future.





**Figure 2.3** Anticipated flooding in Kalundborg City.

Source: Map produced by the Municipality of Kalundborg.

Notes: <sup>a</sup>blue: (80 cm above current sea level) areas expected to be permanently flooded by 2090.

<sup>b</sup>green: (150 cm above current sea level) areas currently flooded at 100-year incidents.

<sup>c</sup>yellow: (210 cm above current sea level) areas expected to be flooded at 20-year incidents in 2090.

<sup>d</sup>red: (230 cm above current sea level) areas expected to be flooded at 100-year incidents in 2090.

not one should make private companies on the waterfront co-responsible for protecting the city. Thus, what seemed at first sight to be a technical issue turned out to be equally relevantly dealt with as a political one, which is a point often made in literature about technical changes (e.g. Winner, 1986).

In general, it became the role of DBT to encourage the municipality to identify and make clear the most pertinent political decisions that had to be taken in order to make an adaptation strategy, even if such decisions could cause controversy. The process included discussions with the political Committee for Technical and Environmental Issues ('Udvalget for Teknik og Miljø'). The politicians were presented to the citizen summit concept and gave their input to relevant questions to address. They fully accepted the idea that citizens could be consulted, when it came to

political decisions they were responsible for. They also saw such a consultation as a possibility to examine public acceptance of political actions that were expected to be unpopular, such as implementing regulations for handling rain water on private properties.

## 2.8 Citizen summit – in detail

A citizen summit allows a large number of citizens to deliberate on a set of questions with fellow citizens and vote individually on alternative answers. Contrary to other methods of involving citizens in a decision-making process (such as consensus conferences and interview meetings) a citizen summit leaves little room for citizens to develop their own suggestions for dealing with a certain challenge (for



an overview of different participatory methods, see Steyaert & Lisoir, 2005). It is a method often used at the stage of a decision-making process, in which clear political choices have already been identified, and decisions should ideally be made in the near future.

A citizen summit can involve from 100 to many thousand citizens, and the large number of participants contributes to making it an effective tool at the political level. Unlike conventional opinion polls, it aims at providing the participating citizens with balanced and science-based information, as well as the opportunity to deliberate for a full day with other citizens prior to rendering their judgement. It thus allows for detailed questions and well-considered responses. In spite of this, the municipality was worried about putting sensitive issues to the vote. They feared that citizens would mostly have their own private interests in mind and show less concern for the kind of priorities the administration would have to make.

### 2.8.1 The citizens

In Kalundborg, 350 citizens participated in the citizen summit on 5 March 2011. They were chosen to reflect the demographic distribution in the municipality with regards to age, gender and geographical residency. An invitation to the citizen summit was sent to 7000 randomly selected citizens in the municipality. Five hundred were selected out of the positive responses. Out of those, some cancelled well in advance of the summit and others cancelled a few days before, that is, due to illness. Because the statistical validity of results from citizen consultations like this one is the source of much discussion, suffice it to say that the sample of citizens is large and diverse enough to give a sense of the general trends in the opinions of the citizens of Kalundborg (for a discussion of representativeness and citizen consultations, see Agger, Jelsøe, Jæger & Phillips, 2012).

### 2.8.2 The questions

The questions were prepared in 2010. As described above, the questions should reflect the most pertinent political decisions that need to be taken in order to develop an adaptation strategy. Identifying such questions can be a long process, and it is closely related to the development of the information material for the citizens, because the research involved can lead to new questions.

Eventually, a set of 19 questions was developed. It was divided into six thematic subjects:

1. Personal experiences with flooding and demographic data.
2. Vulnerable rural areas (such as the case study area).
3. Kalundborg City.
4. Dividing responsibilities between citizens and authorities.
5. General climate adaptation strategy.
6. Involvement of citizens in planning for climate adaptation.

For example, citizens were asked what kind of development they preferred for the case study area:

1. Transforming it into a nature area.
2. Phasing out vulnerable properties but allowing interim protection.
3. Establishment of onshore dykes and river dykes.
4. Construction of offshore dykes.

Different financing mechanisms were discussed and voted on as well.

Another question was:

Should the municipality have the authority to alter the status of exposed summer cottage areas, so they can be transformed, in the long term, into nature areas with periodic and permanent flooding?

- Yes
- No
- Don't know

### 2.8.3 Information material

The information material for a citizen summit must provide the participating citizens with background information enabling them to answer the questions. It aims at providing both facts and unbiased discussions of the pros and cons of voting one way or another. It also includes ethical and political arguments for voting one way or the other, thus giving citizens a starting point for their deliberations (Gudowsky & Bechtold, 2012).

For example, the material provided information about potential economic and environmental consequences of the different adaptation options. It provided support to see such options from the perspective of different stakeholders (farmers, nature conservationists, tax payers etc.) in order to make their own assessments of what a fair and reasonable solution should look like.





**Photo 2.1** Citizen Summit in Kalundborg on 5 March 2011.

Source: Photo by Jørgen Madsen, DBT.

An information booklet of 32 pages was developed by DBT in close cooperation with the Kalundborg administration (Municipality of Kalundborg, 2011). It was sent to the citizens three weeks prior to the summit, whereas the questions were not made publicly known in advance in order to avoid the fact that citizens could make up their minds prior to the deliberation. At the citizen summit, different speakers were invited to introduce the main discussions presented in the information material in order to prompt deliberation among the citizens.

#### 2.8.4 Deliberation and voting

The 350 citizens, divided into tables of five to seven people (Photo 2.1), were led by a head facilitator and group moderators through a programme divided into six thematic sessions. During the thematic sessions, citizens voted on alternative answers to a total of 19 questions, and each thematic session was introduced by the facilitator and a short presentation (five minutes) by an invited speaker. Also, computer animations of potential future flooding, produced by the Municipality of Kalundborg, were presented.<sup>6</sup> The participants then engaged in moderated discussions at their tables, the purpose of which was to give all participants time to listen to other opinions and reflect prior to voting. Depending on the number of questions and the complexity of the issues, each thematic session lasted between 35 and 75 minutes. Modera-

tors were trained in advance to provide facilitation at the tables and included several local politicians. Each thematic session concluded with citizens casting their votes anonymously on one to five questions. Electronic voting equipment allowed the results to be presented instantaneously on a large screen.

Contrary to the scenario workshop method, the citizen summit methodology was not applied by other BaltCICA partners. In practical terms it is a more complex, time consuming and expensive method, which made it a difficult one to apply after the BaltCICA budget was approved. A similar method was, however, applied in a number of countries in 2009 for the first ever global citizen consultation, World Wide Views on Global Warming, leading up to the climate COP15 in Copenhagen in November 2009 (WWViews, 2009; Rask, Worthington & Lammi, 2012).

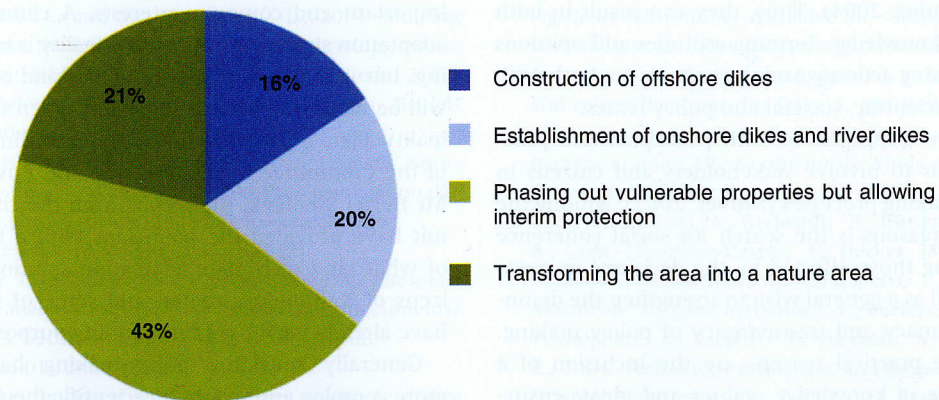
#### 2.9 Interpretation of results – in details

Citizens left the summit with a copy of the voting results, some of which were reported the following days in both local and national media. Although the voting results were immediately obvious to the average person, an analysis of the political implications was produced by DBT (DBT, 2011a; DBT, 2011b) and subsequently discussed with the municipal Committee for Technical and Environmental Issues at a joint meeting.

To the question about the preferred development for the case study area, two thirds of citizens (Figure 2.4) voted in favour of making a decision now that will allow the coastline to move further inland,

<sup>6</sup>Computer animations of potential future flooding, produced by the Municipality of Kalundborg: [http://www.kalundborg.dk/Til\\_borgeren/Klima/Borgertopm%C3%B8de.aspx](http://www.kalundborg.dk/Til_borgeren/Klima/Borgertopm%C3%B8de.aspx)





**Figure 2.4** Voting results to four alternative development solutions for the case study area.

and thereby eventually discontinue current activities in these areas such as summer cottages and farming. About one third of the participants wanted a collective solution based on dykes. This result differs significantly from the results from the scenario workshop. Here, local stakeholders were more supportive of various dyke solutions. These results point to the importance of careful consideration as to when and how which citizens and stakeholders should be included in a planning process.

To the question; 'Should the municipality have the authority to alter the status of exposed summer cottage areas, so they can be transformed, in the long term, into nature areas with periodic and permanent flooding?', 85% of the participants answered in favour, 10% against, and 5% 'don't know'. Three quarters of the participants felt that private industry at the harbour area in Kalundborg City shares the responsibility of protecting it from future floods; almost all participants voted in favour of letting the municipality make heavier demands as to the handling of precipitation on private properties; three quarters voted in favour of not establishing new infrastructure (such as sewer systems) in areas prone to future flooding; eight out of ten authorised the municipality to earmark farmland for occasional flooding in the event of heavy precipitation, in order to protect other vulnerable areas such as Kalundborg City and summer cottage areas from flooding; nine out of ten wanted coastal planning to be more centralized; and nine out of ten wanted the municipality to make a long-term climate adaptation strategy based on the

current expectations of climate change, rather than acting only when problems arise or legal obligations to act are imposed.

Thus, the general trend was that citizens authorized the municipality to engage more actively in climate change adaptation and make decisions that could overrule and disregard the interests of private property owners for the sake of the common interest.

## 2.10 Towards a climate strategy and its implementation

At the time of finishing this article (June 2012), the Kalundborg administration was in the process of drafting a climate adaptation strategy. The strategy will include an analysis of expected climate impacts and vulnerable areas in the municipality. It will also include priorities and guidelines with regards to adaptation measures. Once the strategy is completed, it is to be agreed upon among the politicians, and it can then be implemented in the Municipality Plan 2013–24, which is the legal document for future initiatives in the municipality.

## 2.11 Discussion

When assessing the effects of participatory processes like the one described in this chapter, one should take several parameters into consideration (Cruz-Castro &



Snz-Menéndez, 2004). Thus, they can result in both increasing knowledge, forming attitudes and opinions and initializing actions. And they can do so, both with regards to scientific, societal and policy issues.

There are a number of both principled and practical reasons to involve stakeholders and citizens in decision-making processes (Klüver, 2002). Among the principled reasons is the search for social coherence by involving those affected by the decisions in question, as well as a general wish to strengthen the democratic legitimacy and transparency of policy making. Among the practical reasons are the inclusion of a wider range of knowledge, values and ideas; ensuring higher credibility and sustainability of decisions made; and easier implementation of those decisions by people who have participated in a fair and open process (for examples of how citizen participation leads to greater legitimacy and better implementation of decisions, see Goodin and Dryzek, 2006). In short, the involvement of stakeholders and citizens in decision-making processes gives promise of higher legitimacy and effectiveness.

## 2.12 Conclusions

In Kalundborg, knowledge of climate change and adaptation options has increased considerably among the politicians, stakeholders and citizens.<sup>7</sup> As a result of the BaltCICA project, climate adaptation is now more widely recognized in the municipality as not merely a technical issue but also a political question about future land use, sharing responsibilities and priority of interests. Citizens and stakeholders want decisions to be taken soon. Property owners want to know if their assets will be protected in the future or not, and the administration will think twice before making infrastructure investments in areas prone to future flooding if their future protection is unrealistic or unwished for.

The citizens gave the municipality a broad mandate to make political decisions about long-term strategies for climate change adaptation, even if such strategies would disregard private interests for the sake of more

important and common interests. A climate change adaptation strategy for the municipality is in the making, but it remains to be seen what kind of decisions will be made and actions initialised when the Municipality Plan is adopted in 2013. According to Head of the Committee for Engineering and Environment, Mr Bertel Stenbæk, the results from the citizen summit have provided the politicians with a better idea of what kind of climate adaptation solutions the citizens of Kalundborg prefer, and some of the results have already been used for planning purposes.<sup>8</sup>

Generally speaking, policy-making has become more complex and reliant on scientific theory, knowledge and models, some of which are more disputed than others. Stakeholders offer their advice, but have their own interests in mind, and opinion polls are too superficial to give politicians a sense of public opinion on complex issues. It is therefore increasingly important to make use of the many tools available for participatory decision-making both on a local, national and global scale. Climate adaptation is a good example of this, and we expect the municipality of Kalundborg to benefit from having applied such tools in their management of an uncertain future.

## References

- Adger, N.A., Dessai, S., Gouliden, M., Hulme, M., Lorenzoni, I., Nelson, D.R., Naess, L.O., Wolf, J. and Wreford, A., 2009. Are there social limits to adaptation to climate change? *Climatic Change*, 93, pp.335–354.
- Agger, A., Jelsøe, E., Jæger, B. and Phillips, L., 2012. The creation of a global voice for citizens: The case of Denmark. In: Rask, M., Worthington, R. and Lammi, M., eds. 2012. *Citizen Participation in Global Environmental Governance*. London: Routledge, pp.45–69.
- Andersen, I.-E. and Jæger, B., 1999. Danish participatory models – Scenario workshops and consensus conferences: towards more democratic decision-making. *Science and Public Policy*, 26 (5), pp.331–340.
- Bedsted, B. ed., 2007. *Enablers of Science-Society Dialogue*. [pdf] Available at: <[http://www.tekno.dk/pdf/projekter/forSociety/p07\\_ForSociety.Task\\_2-2.Final\\_Report\\_110707.pdf](http://www.tekno.dk/pdf/projekter/forSociety/p07_ForSociety.Task_2-2.Final_Report_110707.pdf)> [Accessed 01 June 2012]

<sup>7</sup>The municipality also informs about the project on its webpage (in Danish only): <http://www.kalundborg.dk/Tilborgeren/Klima/BaltCICA.aspx>

<sup>8</sup>Video about the participation process in Kalundborg, available at <http://www.tekno.dk/subpage.php3?article=1595&topic=kategori11&language=uk&category=11>



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- Cruz-Castro, L. and Snz-Menéndez, L., 2004. Shaping the impact: the institutional context of technology assessment. In: Decker, M. and Ladikas, M., eds. 2004. *Bridges between Science, Society and Policy*. Berlin, Heidelberg: Springer-Verlag GmbH, pp.101–127.
- DBT (Danish Board of Technology), 2006. Citizens' Summit. [online] Available at: <<http://www.tekno.dk/subpage.php3?article=1232&toppic=kategori12&language=dk>> [Accessed 01 June 2012]
- DBT, 2009. *Three future scenarios for the Kalundborg case study*. [pdf] Available at: <<http://www.baltcica.org/documents/BaltCICA%20scenariosENG-with%20logos.pdf>> [Accessed 01 June 2012]
- DBT, 2011a. *Analysis of results from citizen summit on climate change adaptation, in Kalundborg on the 5<sup>th</sup> of March 2011*. [pdf] Available at: <<http://www.tekno.dk/pdf/projekter/baltcica/p12%20Analysis%20of%20results%20from%20citizens%20summit%20on%20climate%20change%20adaptation%20in%20Kalundborg%20on%20the%205th%20of%20March%202011.pdf>> [Accessed 01 June 2012]
- DBT, 2011b. *Results from the citizen summit on climate change adaptation – Saturday, the 5<sup>th</sup> of March, 2011, Kalundborg*. [pdf] Available at: <<http://www.tekno.dk/pdf/projekter/baltcica/p11.BaltCiCa.-citizen-summit.pdf>> [Accessed 01 June 2012]
- DBT, 2012. *Teknologirådet*. [online] Available at: <[www.tekno.dk](http://www.tekno.dk)> [Accessed 08 June 2012]
- DMI (Danish Meteorological Institute), 2009. *Fremtidige havniveaueændringer – Et resumé af den aktuelle viden i foråret 2009*. [pdf] Available at: <<http://www.dmi.dk/dmi/dkc09-07.pdf>> [Accessed 08 June 2012]
- Goodin, R.E. and Dryzek, J.S., 2006. Deliberative impacts: The macro-political uptake of mini-publics. *Politics & Society*, 34 (2), pp.219–244.
- Gudowsky, N. and Bechtold, U., (in press) The role of information in public participation. *Journal of Public Deliberation*. (Submitted)
- IPCC, 2000. *IPCC Special Report on Emissions Scenarios: Summary for Policymakers – A Special Report of IPCC Working Group III*. [online] Available at: <[http://www.grida.no/publications/other/ipcc\\_sr/](http://www.grida.no/publications/other/ipcc_sr/)> [Accessed 20 June 2012]
- Klüver, L., 2002. Project management – a matter of ethics and robust decisions. In: Joss, S. and Bellucci, S., eds. 2002. *Participatory Technology Assessment – European Perspectives*. London, UK: Centre for the Study of Democracy, University of Westminster, pp.179–208.
- Klüver, L., Bellucci, S., Berloznik, R., Bütschi, D., Carius, R., Cope, D., Cruz-Castro, L., Decker, M., Gram, S., Grunwald, A., Hennen, L., Karapiperis, T., Ladikas, M., Machleidt, P., Sanz-Menendez, L., Peeters, W., Staman, J., Stephan, S., Szapiro, T., Steyaert, S. and Van Est, R., 2004. Technology assessment in Europe: Conclusions & wider perspectives. In: Decker, M. and Ladikas, M., eds. 2004. *Bridges between Science, Society and Policy*. Berlin, Heidelberg: Springer-Verlag GmbH, pp. 88–98.
- Municipality of Kalundborg, 2011. *Baggrundsmateriale til borgertopmøde om klimatilpasning*. [pdf] Available at: <<http://www.tekno.dk/pdf/projekter/baltcica/p11-Kalundborg-web.udgave%20baggrundsmateriale%202011%2021%20feb.pdf>> [Accessed 08 June 2012]
- Rask, M., Worthington, R. and Lammi, M. eds., 2012. *Citizen Participation in Global Environmental Governance*. London: Routledge.
- Steyaert, S. and Lisoir, H. eds., 2005. *Participatory Methods Toolkit – A practitioner's manual*. [pdf] Available at: <[http://www.kbs-frb.be/uploadedFiles/KBS-FRB/Files/EN/PUB\\_1540\\_Participatoty\\_toolkit\\_New.edition.pdf](http://www.kbs-frb.be/uploadedFiles/KBS-FRB/Files/EN/PUB_1540_Participatoty_toolkit_New.edition.pdf)> [Accessed 20 June 2012]
- Vig, N.J. and Paschen, H., 2000. *Parliaments and Technology: The Development of Technology Assessment in Europe*. New York: State University of New York Press.
- Winner, L., 1986. Do artifacts have politics? In: Winner, L., 1986. *The Whale and the Reactor: A Search for Limits in an Age of High Technology*. Chicago: University of Chicago Press, pp.19–39.
- WWViews (World Wide Views), 2009. *World Wide Views on Global Warming – The Project*. [online] Available at: <<http://www.wwviews.org/node/259>> [Accessed 20 June 2012]