

Policy Brief

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Challenges to planning climate adaptation strategies in Europe

Key messages

- *A key limitation to planning climate change adaptation strategies stems from uncertainties and insufficient knowledge on the spatial and temporal patterns of climate change impacts, as well as uncertainty regarding socioeconomic trends and changes.*
- *Improved knowledge, such as a more systematic and complete information base for costs and benefits of adaptation and effectiveness strategies is needed to support policy making.*
- *Synergies and trade-offs with existing policies must be identified and exploited as the majority of climate change adaptation actions are embedded in policies and strategies seeking other objectives.*
- *Participatory approaches that involve stakeholders in the research process can support policy making yet it remains a challenge to link different levels of participation and policy design and implementation.*

1. Introduction

Adaptation is necessary to limit climate change impacts, but confronted by challenges.

There is broad consensus that climate change impacts may lead to serious ecological, economic and social impacts across Europe, with some regions and sectors more deeply affected than others (EEA, 2012). Appropriate adaptation can reduce these impacts and, in some cases, yield benefits and business opportunities, but this often requires a multi-scale and multi-sector exercise in complex decision making across multiple levels of government. Decision makers at all levels in Europe currently face a number of significant challenges when devising appropriate and sustainable adaptation strategies.

This policy brief is an output of the EU FP7 project 'Bottom-up Climate Adaptation Strategies Towards a Sustainable Europe' (BASE). It summarises the key challenges, highlighting their implications for adaptation strategies and measures and pointing to avenues of research that could facilitate enhanced adaptation decision making. Broadly speaking, these challenges, addressed in turn over the following three sections, can be categorised as follows:

- Uncertainties and insufficient knowledge
- Need to improve assessments
- Need to improve mainstreaming of adaptation in policy

As addressing these challenges forms one of the main aims of the BASE project, the policy brief concludes with a larger view towards future research, including the role that BASE aims to play.

2. Uncertainties and insufficient knowledge

Adaptation planning occurs in face of uncertainty about future conditions

Decision making processes in the EU Member States are typically contingent upon consensus and availability of information to provide impetus. The development of effective climate adaptation strategies is hampered by uncertainty and ambiguity in our understanding of future conditions. Oftentimes, existing knowledge is scattered, poorly integrated, difficult to access, or is framed towards an exclusively scientific audience. The resulting information may therefore lack saliency for many decision makers, limiting their ability to successfully develop adaptation strategies.

Uncertainty and insufficient knowledge is a broad issue, extending beyond the natural sciences to encompass socioeconomic factors, as well as our understanding of the costs and benefits of adaptation measures themselves. The full picture of climate change risks, vulnerability and resilience is therefore a dynamic one that requires careful consideration of many types of issues.

2.1. Physical changes

Understanding of future climate change impacts is limited by several factors.

A key limitation in our ability to design climate change adaptation strategies stems from uncertainties and insufficient knowledge on the spatial and temporal patterns of climate change impacts. These uncertainties involve not only the data themselves, but uncertainties related to our underlying assumptions and limitations to our understanding. These stem from a variety of factors, but can largely be grouped into three main categories (Morgan et al., 2009).

- Natural variations occur in climate for reasons outside anthropogenic influences, including events like volcanic eruptions or solar activity.
- Uncertainty exists about the extent of future greenhouse gas emissions, and the consequent degree to which they will impact the climate.
- Uncertainties exist in our understanding of the functioning of climatic systems, but particularly in terms of their interactions with biological and social systems, limiting our ability to model future scenarios.

The time horizon affects the uncertainty. In the short term, a key challenge for adaptation decision-making regards uncertainties in the downscaling of climatic conditions from the large-scale predictions of global or regional models to the local scale. Furthermore, short-term adaption planning is largely concerned with extreme weather events (such as heavy rainfall or storms), which are less predictable than average climatic conditions.

In light of these uncertainties, there is the need to consider alternative decision-making approaches, such as adaptive management, incremental adaptation, and the adaptation pathway approach, as well as better understand the sensitivity of different adaptation options and decisions to uncertainty.

2.2. Socioeconomic trends and processes

Socioeconomic issues create a dynamic big picture

Beyond physical changes, uncertainty regarding socioeconomic trends and changes impair our ability to plan adaptation strategies. Socioeconomic changes are often more difficult to predict than physical changes, and policy responses to particular environmental events and trends may influence future options to react to climate change. A key question for planning adaptation is, therefore, how to take into account the dynamic interactions between environment, society, and adaptation. Over time, society can learn and adapt to changes and events. Policy responses are about coping with uncertainty about the future.

There is recognisable two-way connection between development and adaptation/adaptive capacity (Burton, 2009; Schipper, 2007, McGray et al., 2007). This applies to both developing and developed countries. Adaptation, in addition to damage reduction, can exert positive effects on social-economic variables, such as employment, technological development or, more broadly speaking, welfare. At the same time conflicts are also possible between adaptation and growth or between growth policies which do not mainstream climate change vulnerability reduction in planning and adaptation. Nonetheless, both sides of this relation are poorly investigated quantitatively (Bowen et al., 2012).

In terms of future research (including that of BASE), structured and systematic work is needed to explore how adaptation expenditures can support sustainable growth and to quantify potential positive effects on or trade-offs with economic development. Of particular importance are the financial aspects and the selection of priorities for adaptation action (e.g., Is it better to invest first in adaptive capacity building or in adaptation measures? Where? When?). It is also important to investigate how adaptation is best coordinated and who will carry the burden and who will benefit from adaptation.

2.3. Costs and benefits of adaptation

Additional effort is needed to improve the knowledge of the costs and benefits of adaptation measures in many areas. These include health impacts, impacts on ecosystems, and more broadly the consequences of extreme weather events.

In addition to purely economic considerations, other insufficiently studied issues that affect human behaviour in the context of climate change adaptation includes the role of risk and uncertainty (Bosello and Chen, 2010, Hallegatte et al., 2012) and the role of societal intertemporal preferences and inequality aversion. An important question is also how to deal with the asymmetries of impacts and adaptation across different income classes or other groups within a country.

The uncertainties and the multidimensional nature of both costs and benefits suggest that there are not well defined optimal solutions. Instead there is a need to search for robust decisions in the presence of uncertainty, which means a mainstreaming of concepts of precaution, flexibility, reflexivity and option values. Methods to deal with such complexities are emerging (Haasnoot et al., 2013, Hallegatte et al., 2012, Golub et al., 2011).

The aim of adaptation research is to assist policy making by compiling a more systematic and complete information base for adaptation costs and effectiveness. It may lead to a set of relatively simple and operational evaluation methodologies that can support decision-making by offering “stakeholder friendly” and transparent versions of cost benefit and cost effectiveness analyses.

3. Need to improve assessments

Climate adaptation strategies and measures are currently being designed and implemented across Europe, spanning numerous sectors and impacts. Assessments of these activities can lead to the identification of best practices and lessons learned that can be incorporated into future adaptation activities. However, there are limitations to our current ability to assess climate adaptation in Europe.

Adaptation is a process whose characteristics are sector-specific, scale-specific, society-specific, and ultimately time-specific. A strategic view is necessary to avoid mal-adaptation and incoherent approaches within and between sectors. At the same time, the policies necessary to promote successful adaptation need to consider both the impacts and the related adaptive responses from a ‘ground level’, highly differentiated perspective. Integrated Assessment Models attempt to incorporate both these perspectives by deriving long-term quantitative insights on the optimal mix between mitigation and different adaptation “types”, dynamics, and regional distribution. Research on Integrated Assessment Models is still limited, however, and is undercut by the need to improve the design of ground level case study analyses.

3.1. Integrated assessment models

The assessment of adaptation options needs to recognise and deal with different spatial and temporal scales. A country or regional perspective is needed to define strategic priorities for adaptation, while a regional, spatially-explicit detail is necessary for the assessment of environmental impacts and cost-effectiveness of specific adaptation measures. A solid integration of ‘top-down’ and ‘bottom-up’ activities is thus crucial in adaptation research (Pat et al., 2010). Current aggregated models analysing adaptation (see e.g. Agrawala et al., 2010, Banh et al., 2010, de Bruin et

Need to enhance ability to make robust decisions incorporating precaution, flexibility and option values

Assessments of existing adaptation key to successful future implementation

Co-production of assessments between scientists and policy makers would increase salience

al., 2009, Hof et al., 2009), are able to highlight trends and rough ‘orders of magnitude’, but do not offer particularly informative quantitative insights into the opportunities offered by adaptation strategies. On the other hand detailed analyses of specific adaptation actions are still largely scattered and incomplete (Agrawala et al., 2011). Further systematisation of the rapidly expanding information base is likely to yield useful insights for how to proceed with adaptation assessments.

To this end co-production of assessments by researchers and policy developers are likely to produce salient results. This would also contribute to methodologies that link aggregated model analyses and detailed case specific studies of implementation, including considerations of costs and benefits and cost-effectiveness ratios.

3.2. Analysis of cases

By analysing specific cases of implemented climate adaptation, insights can be drawn about practical opportunities and stumbling blocks. Bottom-up analysis is at the core of the BASE project, with approximately 20 case studies spread across Europe, including cases studies covering aspects such as coastal zones, agriculture and forestry, water resources, human settlements and infrastructure, biodiversity and ecosystems, and health.. The cases in BASE aim to achieve the following:

- Improve knowledge of the full consequences (economic, social and ecological) of adaptation to future climate change scenarios.
- Better assess local and regional perspectives on climate change impact and societal/ecological vulnerabilities, as well as their potential and challenges to adapt to those changes.
- Provide unique opportunities to test and improve methodologies that enhance interactions between different levels of adaptation from the broad policy level to the local implementation level.

In this way, the BASE case studies can provide insights that are needed for the implementation of European and national adaptation strategies and actions.

4. Mainstreaming climate adaptation in policy

The majority of adaptation actions do not arise from policies devoted to climate change, but are embedded in policies and strategies that are implemented for other reasons. Therefore, the challenge is to identify needs and opportunities for adaptation considering the broader social and policy context, and identifying synergies and trade-offs with existing policies. This is the essence of mainstreaming.

4.1. Synergies and conflicts across sectors

The OECD (2005) has suggested that policy coherence “means different policy communities working together in ways that result in more powerful tools and products for all concerned” and “looking for synergies and complementarities and filling gaps among different policy areas so as to meet common and shared objectives.”

The concept of policy coherence highlights that successful adaptation depends on synergies and conflicts across sectors. Enhancing adaptation therefore means:

- Identification of “adaptation relevant” aspects in different sectors.
- Recognition and a strengthening of those regulatory, institutional or economic mechanisms that can contribute to effective adaptation in the policy areas affecting the sectors.
- Identification and removal of barriers to adaptation in the relevant policy areas.

The identification of what is relevant from the point of view of adaptation starts with a broad view of potential impacts and vulnerabilities. A general risk assessment can identify those aspects of a sector that are likely to suffer in a changing climate or affect the ability of society to cope with a changing climate. For example activities dependent on major abstraction of water clearly make societies vulnerable to

Improving knowledge base of ground level case studies will enhance assessments

Most adaptation arises from policies not targeted at climate change.

Successful adaptation hinges upon synergy across sectors

droughts. The solution may be in a combination of policies that encourage innovations that reduce water demand and also alternative economic activities that depend less on abundant water resources.

In developing adaptation it is important to recognise barriers to adaptation. Such barriers can be the consequence of path dependent processes which maintain or even encourage the expansion of activities and assume climatic premises that are no longer valid. In this context the identification of potential maladaptation is also important.

Detailed case studies are an important approach to the analysis of synergies and conflicts. The cases are local or regional expressions of the policies that are European wide or national. Through careful examination of how these policies play out in practical implementation it is possible to gain relevant understanding of why conflicts emerge and how positive synergies can be encouraged.

4.2. Participatory approaches

Participatory approaches key to successful adaptation, but selection and implementation must be improved

Participatory approaches involve stakeholders in the research process. In the past decade, these approaches have been broadly used in research areas concerned with sustainability and climate change mitigation and adaptation. Challenges still remain on how to link different levels of participation and policy design and implementation.

It is not possible to precisely forecast the evolution of policies and their outcomes when integrated in the complex web of social practices taking place at the 'ground level'. Daily practices often embody new policy designs in ways that are unforeseen and may even distort the intended effects of those policies. Consultation and engagement of different stakeholders from the beginning of the process can help in foreseeing tensions and in timely reaction to them, as well as ensuring that the views of different societal groups are heard. Participation is at the core of research in BASE. BASE will explore new ways to use participation to support effective sustainability and adaptation policy design, and examine how participation can inspire new dynamics and transformative societal change.

A challenge and opportunity for current research is to better systematize the selection and implementation of participatory methods and tools. This requires a more thorough assessment of their efficiency, strengths and weaknesses, as well as testing where the methods can be used, controlling for the context. Combinations of qualitative and quantitative data are also likely to offer new insights. BASE will develop participatory approaches further as tools for adaptation policy design and implementation.

5. Conclusion

Research under BASE project will address the challenges identified in this brief

An array of challenges faces decision makers planning climate adaptation strategies in Europe, including elements whose interactions create a dynamic and complex picture. Yet, the need for carefully planned and implemented adaptation in Europe is clear: it is an important way of reducing the disruptions of future climate impacts, while potentially generating positive outcomes. The BASE project aims to address the challenges identified in this policy brief over the course of four years (2012-2016).

Through representative case studies organised by themes (such as water management, agriculture and coastal cities) across the EU, BASE will identify critical lessons and practices that can be replicated in other regions and scaled to other levels. BASE will also produce and utilise empirical information to generalise and model costs and benefits of adaptation strategies and options. Through tools to assess physical changes, this information will be placed within a cross-cutting policy context. The needs of decision makers in Europe are diverse, but the need to find sustainable solutions is common across sectors and regions. Through the provision of a suite of integrated data and analyses, current research on adaptation will improve possibilities to deliver sustainable adaptation strategies to climate change in Europe.

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