

National adaptation policy processes in European countries — 2014

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Annex 1 'Self-assessment of the adaptation policy process in EEA member countries' is available at: <http://www.eea.europa.eu/publications/national-adaptation-policy-processes>

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Executive summary

This report provides a Europe-wide state of play for adaptation activities. It offers up-to-date and targeted information to support the development, implementation and evaluation of national adaptation policies and measures addressing climate change.

The intended users are policymakers and decision-makers coordinating adaptation across or within particular sectors. It is also of relevance to practitioners such as public authorities and utility providers (water, energy, transport).

This report draws on the results of a self-assessment survey conducted on national adaptation policy processes in Europe. In May 2013, the survey was sent out by the European Environment Agency (EEA) to authorities in countries responsible for coordinating adaptation at national level (the 32 EEA member countries, and in Croatia in July 2013 as a new EU Member State and EEA member country). Thirty EEA member countries provided their responses on a voluntary basis. Thanks to the high response rate and the wealth of information provided by these European countries, this report presents a unique collection of information and the largest and most comprehensive analysis of national adaptation policy processes in Europe, to date.

In the context of this report, 'adaptation' refers to actions taken in response to current and future climate change impacts and vulnerabilities (as well as to the climate variability that occurs in the absence of climate change) in the context of ongoing and expected socio-economic developments. It involves not only preventing negative impacts of climate change, but also building resilience and making the most of any benefits it may bring. The earlier adaptation responses are planned, the better equipped society will be to cope with climate change — and socio-economic — related challenges.

Collecting and analysing information on adaptation policy processes in European countries is essential in order to evaluate the extent to which actions are effective, efficient and equitable. It allows us to understand and determine which adaptation

actions work, in what contexts, and why, and to share lessons learned across countries. However, measuring progress in adaptation (e.g. through indicators) is challenging for several reasons: adaptation, context specific and cross-cutting all sectors of the economy, is characterised by long time-frames and uncertainty, and does not have agreed targets. Thus, it will be important in coming years to share experiences across countries, and also to monitor and evaluate the progress, effectiveness and efficiency of ongoing and planned EU and national actions.

In 2013, the European Commission adopted the communication 'An EU Strategy on adaptation to climate change' (EC, 2013a) (also commonly known as the EU Adaptation Strategy), which includes several elements to support Member States in adaptation: providing guidance and funding, promoting knowledge generation and information-sharing, and enhancing resilience of key vulnerable sectors through mainstreaming. In addition, the EU has also agreed that at least 20 % of its budget for the 2014–2020 period should be spent on climate change-related action, including mitigation and adaptation.

The EU Adaptation Strategy also proposes monitoring and evaluating the status and progress of adaptation in the EU, based on the following: (a) member countries' reporting (e.g. via the EU Monitoring Mechanism Regulation due in March 2015, and national communications to the United Nations Framework Convention on Climate Change (UNFCCC)); (b) an adaptation preparedness scoreboard including indicators for measuring member countries' level of readiness; and (c) other sources of information, such as this report or other country surveys recently conducted by the Organisation for Economic Co-operation and Development (OECD) (e.g. the survey 'Approaches and tools used to support decision-making for climate change adaptation') or the World Health Organization (WHO) Europe ('Implementing the Commitment to Act in the area of climate change'). In 2017, the European Commission will report to the European Parliament and the Council on the state of

implementation of the EU Adaptation Strategy, and propose its review, if needed.

The advancement of adaptation across Europe and the implementation of the EU Adaptation Strategy call for more work to be carried out on existing knowledge gaps. The current report aims to support this process, and constitutes input for the European Union's 7th Environment Action Programme (7EAP) to 2020, and particularly for Priority Objective 5, 'To improve the knowledge and evidence base for Union environment policy'. This report is also a key element in the implementation of the EEA's road map for adaptation (EEA, 2013).

With climate change expected to increase in future (IPCC, 2013; IPCC, 2014) and European countries expected to be exposed to projected effects (depending on climate, geographic and socio-economic conditions) (EEA, 2012b; EEA, 2013), public authorities play an important role for adaptation action. They hold a key position for protecting our societies and economy from negative effects of climate change and for making the most of opportunities that may arise for our benefit.

European countries are aware of the need for adaptation to climate change: to date, 21 European countries have adopted a national adaptation strategy (NAS) and 12 have developed a national adaptation plan (NAP). More than half of European countries have made progress in identifying and assessing adaptation options, and 13 report that they are in the implementation or the monitoring and evaluation stages of the adaptation policy process. Table ES.1 provides an overview of national and sectoral adaptation strategies and plans in Europe.

The analysis of the 30 European countries' responses to the self-assessment survey led to the following findings. These results are further described in Chapter 2 of this report under eight key topics.

Findings from self-assessment surveys submitted by European countries

- **Awareness of adaptation and stakeholder involvement**

Respondents report an increase in the public and policy awareness of adaptation, progress in the development of the knowledge base, and involvement of stakeholders. The importance of stakeholder involvement throughout the adaptation process is widely recognised. There is, however, scope for collecting and sharing more experiences of active forms of involvement.

There is also, so far, limited experience in involving stakeholders in the implementation, monitoring and evaluation of adaptation policies.

- **Assessing risks and vulnerabilities**

The sectors that have attracted the greatest attention throughout Europe in terms of risk and vulnerability assessment at national level are agriculture, water, forestry, human health and biodiversity.

- **Implementing measures**

Adaptation is most often implemented by applying 'soft' measures (e.g. providing information or mainstreaming). Project-based support was shown to be the most important financing mechanism currently in place for implementing adaptation. In those cases where funds from government budgets have been explicitly earmarked for adaptation, these funds have been allocated principally to the water and agriculture sectors.

- **Sectoral implementation**

The water, agriculture and forestry sectors are reported to be the most advanced in terms of implementing portfolios of adaptation measures at all administration levels. Countries were also asked the policy areas for which they were currently planning for adaptation (e.g. identifying options) and the biodiversity area was reported as the one most frequently addressed.

- **Coordination of adaptation**

Working groups and task forces are commonly used to coordinate adaptation action across sectors and levels of governance. Countries can improve their coordination of adaptation further by learning about the diversity in coordination mechanisms across countries, and by sharing experiences and lessons learned.

- **Monitoring and evaluation**

Seven countries are currently implementing a monitoring, a reporting or an evaluation (MRE) scheme, and many more countries are initiating MRE schemes. A variety of approaches have been used in MRE, e.g. with reviews by independent bodies and self-assessment by sectors, as well as indicators. Countries are planning to use information gained from their monitoring and evaluation schemes to revise either their national strategies or plans. This suggests that countries have recognised that adaptation is an iterative process whereby

Table ES.1 Overview of national and sectoral adaptation strategies and plans in Europe

EEA member countries	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Adaptation policy progress as reported by European countries to Question 12 of the self-assessment survey
Austria											Implementation
Belgium											Implementation
Bulgaria											Formulation
Croatia											n/a
Cyprus											Formulation
Czech Republic											Formulation
Denmark											Implementation
Estonia											Formulation
Finland											Monitoring and evaluation
France											Monitoring and evaluation
Germany											Implementation
Greece											Agenda setting
Hungary											Decision
Iceland											n/a
Ireland											Decision
Italy											Formulation
Latvia											Formulation
Liechtenstein											Formulation
Lithuania											Monitoring and evaluation
Luxembourg											n/a
Malta											Implementation
Netherlands											Implementation
Norway (*)											Monitoring and evaluation
Poland											Decision
Portugal											Decision
Romania											Decision
Slovakia											Formulation
Slovenia											Formulation
Spain											Implementation
Sweden											Formulation
Switzerland											Implementation
Turkey											Decision
United Kingdom											Implementation

Note: ☐ No policy

☒ National adaptation strategy (NAS) in place

☒ National adaptation strategy (NAS) and national and/or sectoral adaptation plans (NAP/SAP) in place

(*) Norway had a NAP before a NAS.

Question 12 of the self-assessment survey was formulated as follows:

In what stage of the adaptation policy process is your country?

☐ ...Adaptation process has not started

☐ ...Agenda-setting (i.e. adaptation is politically recognised as important)

☐ ...Formulation (i.e. responsible actors respond by formulating adaptation policies)

☐ ...Decision (i.e. policymakers have adopted an adaptation policy)

☐ ...Implementation (i.e. measures foreseen in the policy are being implemented)

☐ ...Monitoring and evaluation (i.e. review and updates of policy/actions)

Sectors within countries are at various levels of advancement. This diversity is not reflected by the responses provided by European countries to Question 12 of the self-assessment survey as shown in Table ES.1. Adaptation is an iterative process for the sectors involved, and calls for consideration of 'Agenda-setting', 'Formulation', 'Decision', 'Implementation' and 'Monitoring and evaluation' issues, at various levels of advancement.

More information on the levels of advancement within sectors can be found in Key topic 6 (cf. Section 2.6).

learning from planning, implementation, MRE schemes and new information from research are fed back into the process, in order to improve adaptation interventions.

- **Transnational cooperation**

Half the European countries report considering transnational cooperation in national adaptation policy processes. Transnational cooperation in adaptation has often been developed with the support of European funding instruments, and in the context of established cooperation forums such as European regional conventions.

- **Success factors for adaptation**

Progress in adaptation depends on a number of success factors and their interconnection. For example, effective coordination among authorities supports the involvement of a wide range of stakeholders by ensuring the availability of consistent and reliable information, and by ensuring clarity with respect to roles and responsibilities.

- **Barriers to adaptation**

Barriers to adaptation are not simply the inverse of success factors. Lack of resources (e.g. time, money and equipment), and uncertainties are viewed by European countries as the most

important barriers. Uncertainties are a common feature across all levels of advancement in policymaking. Policymaking can benefit from embedding processes that focus on learning from experiences, reviewing progress and policy objectives, and encouraging innovative experimentation.

- **Knowledge gaps**

To support adaptation further in European countries, more information is needed on costs and benefits of adaptation, as well as on risks and uncertainties, vulnerability at local level, and availability of data for monitoring and evaluation purposes.

Beyond these findings, this report briefly reviews a number of issues that will shape the future of adaptation at national levels across Europe. Specific and dedicated attention is needed in order to further improve our understanding of governance approaches at national level, and of implementation processes. A common understanding of monitoring and evaluation schemes and of available appraisal tools would also facilitate learning across countries. Finally, capacity-building and advanced communication methods also feature as key elements for fostering adaptation policy at national level in future.

Objectives and intended users

The objective of this report is to provide up-to-date, reliable and targeted information to support the development and implementation of adaptation policies and decision-making across all levels of governance in Europe ⁽¹⁾. European countries are eager to learn from each other in this context. The EEA used this opportunity to facilitate such learning and further strengthen the knowledge base by sharing experiences, lessons learned and good practices in adaptation. By expanding the knowledge base for policy development and implementation, it is intended that this report will inform decision-making processes across Europe and contribute to discussions on long-term transitions ⁽²⁾ and systemic change towards a more resilient Europe ⁽³⁾.

Thanks to the high response rate from European countries, this report is based on a unique collection of information, and it offers the largest and most comprehensive analysis of national adaptation policy processes in Europe, to date. It aims primarily to inform and support the work of policymakers and practitioners who are developing, coordinating or implementing adaptation policies across or within particular sectors. It is therefore of particular relevance to national, regional and local authorities, but is also of interest to utility providers (e.g. water, energy, transport) and to other private stakeholders involved in adaptation actions.

This overview of information complements the information on adaptation activities in European countries available on the European Climate Adaptation Platform (Climate-ADAPT; see <http://climate-adapt.eea.europa.eu/countries>) and web sites available at national level. It also builds on recently published EEA reports: *Adaptation in Europe* (EEA, 2013), *Urban adaptation to climate change in Europe* (EEA, 2012a) and *Climate change, impacts and vulnerability in Europe — An indicator-based report* (EEA, 2012b), which provided scientific and analytical background information on climate change risks across European regions, as well as policymaking and empirical perspectives on adaptation.

The EEA intends that the compact information collected and presented in this report, alongside member countries' efforts to provide coordinated responses and additional feedback through consultation on draft versions, can offer synergies for use for other purposes (e.g. forthcoming reporting on national adaptation policies under the Monitoring Mechanism Regulation (due in March 2015), the requirements under international processes (UNFCCC and OECD), and the updating of country profiles on Climate-ADAPT). In addition, the experiences and lessons learned shared in this report may help define future EEA assessments on adaptation, and support Member States and the European Commission with the forthcoming adaptation preparedness scoreboard.

⁽¹⁾ This report includes a glossary providing definitions of key terms used.

⁽²⁾ There are several key goals of the EEA's Multiannual Work Programme 2014–2018:

(a) to be the prime source of knowledge at European level informing the implementation of European and national environment and climate policies;

(b) to be a leading knowledge centre on the knowledge needed to support long term transition challenges and objectives; and

(c) to be the lead organisation at European level facilitating knowledge-sharing and capacity-building in the field of environment and climate change.

⁽³⁾ The EU 7th Environment Action Programme's 2050 vision 'to live well within the planet's ecological limits' can be accessed at <http://ec.europa.eu/environment/newprg/index.htm>.

Outline of this report

This report provides a description of the Europe-wide state of play for adaptation activities, presented in three chapters.

Chapter 1 frames the issue of adaptation to climate change within the context of policymaking, and provides an overview of the rationales for public intervention on adaptation.

Chapter 2 presents the main findings stemming from the self-assessment survey sent to the European countries in May 2013. The chapter is structured under eight key topics (Sections 2.1 to 2.8), which are illustrated below.

Findings for each key topic are presented as follows.

- **Key messages:** this section summarises the findings in the form of short messages.
- **What does this key topic include?** This section defines the scope of the key topic within the context of this report, and lists the relevant questions from the self-assessment survey.
- **Findings from the self-assessment survey:** this section reports the main findings from the self-assessment survey under a series of sub-headings reflecting the key messages.
- **Country examples:** the self-assessment survey allowed countries to submit information about examples that they consider good adaptation practices, and this section reports some of these examples relevant to the key topic.
- **Discussion of findings:** the self-assessment survey's findings are put in perspective and discussed within the context of the latest

available sources of information, such as from the IPCC, the European Commission and the EEA (EEA, 2013; EC, 2013a; EC, 2013b; IPCC-WG II 2014).

Key topics can be read independently, depending on the reader's main interests. The complete set, however, provides a broad overview of the state of play of adaptation in European countries.

Chapter 3 highlights issues that are likely to shape the future of adaptation in Europe. It builds on all previous chapters and also reflects on gaps in our understanding of how adaptation proceeds and how it could be supported further.

Overview of the report's key topics

2.1 Public and policy awareness of the need for adaptation

2.2 Knowledge generation and use

2.3 Planning adaptation

2.4 Coordination of adaptation

2.5 Stakeholder involvement

2.6 Implementation of adaptation

2.7 Transnational cooperation

2.8 Monitoring, reporting and evaluation

Methodological approach

This report is primarily based on findings from a self-assessment survey on adaptation policy processes originally sent by the EEA to its 32 member countries in May 2013 (and to Croatia in July 2013 as a new EU Member State and EEA member country). Specifically, authorities responsible for coordinating adaptation at national level were contacted (i.e. members of the former European Commission Adaptation Steering Group and the EEA's National Focal Points (NFPs)/National Reference Centres (NRCs)) with an invitation to coordinate nationally their response to the self-assessment survey. They were explicitly encouraged to involve all relevant stakeholders (e.g. all levels of government, environment protection agencies (EPAs), researchers, associations, and non-governmental organisations (NGOs)) in completing the self-assessment survey in order to ensure that the experiences and views of all were taken into account. One coordinated response per country was requested.

The self-assessment survey was set up as an online questionnaire with 44 questions (see details in Annex 1). The main areas addressed included the following: the adaptation policy process; level of adaptation and policy instruments in sectors; involvement of stakeholders; next steps for the future. Thirty countries ⁽⁴⁾ sent their responses to the self-assessment survey ⁽⁵⁾ (see the map on the following page) and the resulting data set formed the basis for the report.

The main findings stemming from the self-assessment survey are presented under eight key topics. The choice of the key topics followed three main objectives.

- (1) To be informative and succinct. To communicate the results of the self-assessment

survey in an effective way, these have been clustered and presented under a number of overarching headings.

- (2) To be useful to policymakers and practitioners, the key topics had to match their interests in relation to the main aspects of adaptation policymaking.
- (3) For ease of reading and to facilitate the comprehension of important findings, the key topics had to be in themselves distinct, with limited overlaps, whilst linking together and jointly providing a basis for fostering future adaptation actions.

Through a series of technical and writing workshops, key topics were selected and drafts of the report were produced and made available to countries for commenting. Additional direct contact with countries was made when issues needed to be further clarified. A preliminary draft of the report was provided for initial comments in February 2014 and the revised draft of the report was provided for European Environment Information and Observation Network (Eionet) consultation in June 2014.

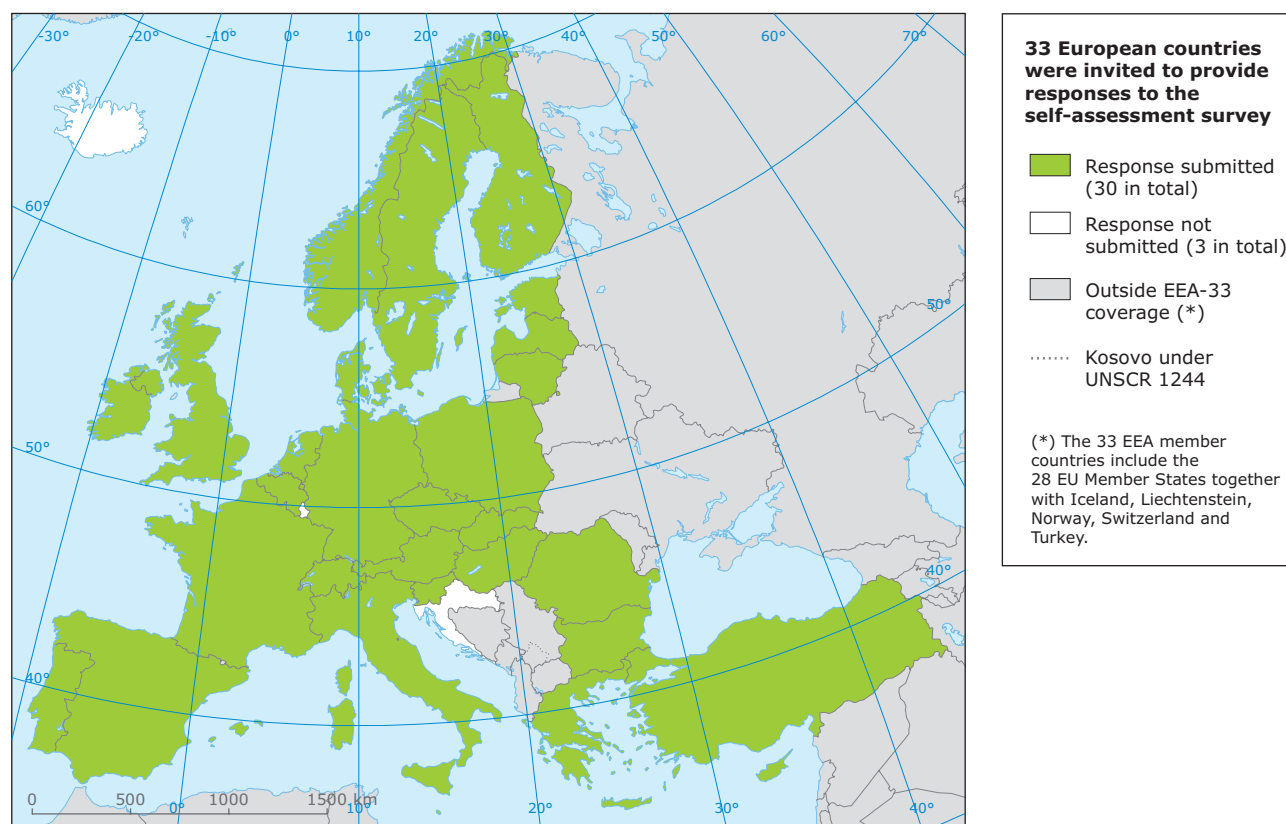
Methodological limitations

A number of caveats should be applied to this report and its findings. While responses from countries have been submitted by national bodies coordinating adaptation activities (primarily by ministries for the environment and/or environment agencies), the time schedule of the self-assessment survey was not necessarily sufficient for an in-depth and extended consultation with all stakeholders, including the private sector.

⁽⁴⁾ Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Liechtenstein, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

⁽⁵⁾ The responses of countries to the self-assessment survey are publicly available and can be accessed at <http://www.eea.europa.eu/publications/national-adaptation-policy-processes>.

Self-assessment survey response from 30 European countries



For countries with much information already available and accessible, e.g. from national surveys and/or assessments, it was easier to provide a coordinated response than for others with comparatively limited overviews.

As the self-assessment survey was filled in by organisations responsible for coordinating adaptation activities at national level, results may reflect primarily the experiences, expertise and views of the department and/or organisations that provided the response. Thus, they do not provide an exhaustive country assessment addressing all governance levels and private sector engagement.

The technical details of the survey may also have affected the results. The terms used in the self-assessment survey, although supported by a glossary, may have been interpreted in different ways by the respondents, as the use of terms is not systematically standardised across Europe.

In addition, most of the questions of the self-assessment survey were designed as closed questions (including multiple-choice options),

which were used in the survey to restrict the time needed to respond and to facilitate the analysis of results. This may have prevented some countries from providing more nuanced answers, but there were also a series of open-ended questions that provided countries with opportunities to elaborate information and add details.

Finally, the time it took to carry out the survey and process the results may also have resulted in some imprecisions, as adaptation is in a stage of rapid development in many European countries.

Notwithstanding these limitations, the report provides a unique collection of information and the largest and most comprehensive analysis of national adaptation policy processes in Europe, to date.

Reflections on the methodological approach

The experience of collaborating with the European countries through the development of the self-assessment survey on national adaptation policy

processes — the first of its kind — revealed the following:

- In responding to the self-assessment survey, member countries demonstrated a willingness to share information and intense interest in learning from each other. Overall, 30 countries of the 33 EEA member countries returned the self-assessment on a voluntary basis.
- Although the self-assessment responses were country-based, contact with individuals within the responsible departments and/or organisations is likely to have increased the response rate, and allowed for easier communication.
- Member countries provided insightful examples illustrating the progress being made in developing and implementing adaptation policies.
- The self-assessment survey, which was identical for all European countries, allows a Europe-wide overview of adaptation that takes into account differences across countries, for example in terms of governance and administrative structures or climate and socio-economic circumstances.
- It proved to be challenging to design a unique self-assessment survey to cover all European countries with their differing governance and administrative structures, climate and socio-economic circumstances, sets of stakeholders, approaches to adaptation and degrees of advancement.
- Formulating unambiguous questions proved demanding, and resulted at times in both apparent and real inconsistencies in the responses, as well as in missing and uneven information.
- Consultation with European countries and their feedback on the first drafts of the report helped to clarify some of the issues left pending by the survey.
- Consultation with European countries also showed, for some countries, that progress in adaptation policy is developing rapidly but unequally across countries and sectors over time. Therefore, adjustments to the original answers to the survey were made during the consultation process, highlighting the challenge in providing an up-to-date overview of the state of implementation in European countries.

1 Setting the scene for public intervention on adaptation

Key messages

- Adaptation by societies and economies alone (autonomous adaptation) is not considered to be sufficient to address the complexity, range and magnitude of risks and opportunities associated with climate change.
- Public intervention is needed to complement and support adaptation activities taken by private actors, and to ensure due consideration of climate risks for public-sector decision-making.
- A wide range of policy instruments to identify appropriate policy responses is at hand.
- In the last 10 years, many policy frameworks have been developed to help improve the capacity of societies and economies to adapt.

Observed climate change impacts and related costs as initial drivers for public intervention

Significant changes in climate and its impacts are already visible in Europe today. Increasing temperatures, rising sea level, melting of glaciers and ice sheets as well as more intense and frequent extreme weather events are among the challenges already driven by climate change. IPCC AR5 (IPCC WGII, 2014) confirms an increase of key risks for Europe, with climate change projected to have adverse impacts in nearly all sectors and across all subregions, albeit with large differences in impact types. Regional variations have been shown by the EEA (2012) mapping the observed and projected climate change and impacts for the main biogeographical regions in Europe. Further climate change impacts are projected for the future, which can increase existing vulnerabilities and aggravate socio-economic imbalances in Europe (EEA, 2012). However, adaptation prospects exist that have the potential to lower projected risks.

Impacts of climate change that are already observed (in particular damages and related direct and indirect costs caused by extreme weather events) are often the initial driver for public authorities to act on adaptation. Adaptation involves reducing risk and vulnerability, seeking opportunities, and building the capacity of human and natural systems to cope with climate impacts, as well as mobilising that capacity by implementing

decisions and actions (Tompkins et al., 2010). Over the last decade, significant progress has been made in developing policy to adapt to climate change. This progress is connected to the growing awareness that it is necessary to deliberately plan adaptation to proactively address potential risks and opportunities, and take into account the wider socio-economic dimensions.

Concerted action is needed to comprehensively address the spectrum of climate change risks

Further to the clear recognition that conditions have changed or are about to change, efforts in developing and implementing adaptation policies are also driven by the fact that autonomous action by economies and societies is expected to remain insufficient to address the complexity, range and magnitude of risks associated with climate change and socio-economic developments. Public intervention can thus be considered as a strategic and collaborative effort in coping with existing and future climate risks and exploiting opportunities. This is particularly relevant for an interdisciplinary arena like climate change adaptation, where a multitude of actors need to join forces for concerted action. Governments therefore have the important role of supporting society, by intervening with a mix of policies and action for certain negative effects and opportunities of climate change that cannot be addressed by private actors and market forces alone.

Public authorities (national, regional and local) are thus challenged with building the policy competence to take up this responsibility under the condition that any public intervention shall complement the market and individual activities, and not replace or duplicate them (Edquist and Chaminade, 2006).

Aims and objectives of public intervention on adaptation

The approaches for public intervention are mainly driven by the aim to take decisions that remain both robust (to cover a broad spectrum of plausible climate change scenarios) and flexible (so the measures can be changed if conditions change) to cope with an uncertain future (Schauser et al. in Prutsch et al., 2014). In this regard, results from scientific research can additionally highlight areas where public intervention is needed or needs to be adjusted, and thus inform decision-making with evidence.

Public intervention on adaptation is therefore framed around the general objectives of avoiding adverse effects of climate change on the environment, society and the economy, and of making the best use of potential opportunities, as well as building adaptive capacity to address the associated challenges. This includes supporting a productive, healthy and resilient society that is well-informed and prepared for the challenges and opportunities associated with a changing climate. More specifically, a mix of policies and action will foster well-targeted and concerted adaptation initiatives that enable and stimulate individual actors to proactively cope with changing conditions.

Making adaptation operational

There is an array of policy instruments, both regulatory and non-regulatory, which can be made operational for public intervention on adaptation. These include initiatives to build adaptive capacity, enhance knowledge generation and dissemination, facilitate mainstreaming, set new or amend existing regulations and standards, provide financial support (e.g. incentives, subsidies and taxes), and make use of insurance schemes. Consideration of a wide range of potential policy instruments is essential if policymakers are to identify the best — most efficient, effective, equitable, acceptable (to authorities, society and the market) — options for public intervention (Australian Government, 2009). The choice of suitable

policy instruments shall clearly respond to the perceived problems and risks, and will need to be geared towards being complementary and supportive of adaptation activities taken by all stakeholders, including private actors. This will depend on various conditions, such as the political system of a country, coordination and consultation mechanisms and existing instruments relevant for adaptation. The choice of policy instruments is also often invariably constrained, to some extent, by the existing array of public interventions. Thus, an assessment of current policy instruments already operating in the policy spaces relevant to adaptation is a prerequisite for a good policy design process (Australian Government, 2009). In addition, heterogeneity in the choice of policy instruments is related to the context-specific nature of adaptation (differences in resources, values, needs and perceptions among and within societies) that governments need to take into account (IPCC, 2014). Thus approaches for public intervention vary, reflecting different governance and societal systems and policymaking practices.

Adaptation policy developments across territorial levels

Significant advancements have been made in establishing policy frameworks at different levels of governance that share the overarching intention to support societies to adapt.

International (UNFCCC)

At international level, the UNFCCC agreed that adaptation is imperative as a second element of climate policy (complementary to mitigation). European countries and the European Commission, being parties to the Convention, have committed themselves to 'formulate, implement, publish and regularly update national and, where appropriate, regional programmes [...] and measures to facilitate adequate adaptation to climate change' (Article 4, paragraph 1 of the UNFCCC Convention). This commitment has been refined under the Cancun Adaptation Framework (CAF) with Decision 5/CP.17 on NAPs (National Adaptation Plans ⁽⁶⁾). Here, the Conference of Parties acknowledged 'that national adaptation planning can enable all developing and developed country parties to assess their vulnerabilities, to mainstream climate change risks and to address adaptation'. By the end of 2015, a new international climate change agreement should

⁽⁶⁾ See <http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf>.

be negotiated within the UNFCCC. Several topics are being discussed as potential elements of such an agreement, relevant for adaptation: long-term and collective aspects of adaptation, NAPs, institutional arrangements, financing, incentivising private sector investment, technology transfer, capacity-building, and transparency of action and support (through monitoring, reporting and verification).

European Union

Since planning for adaptation requires a strategic approach at European level, the European Commission has prepared an adaptation framework for Europe to ensure timely, efficient and effective adaptation actions coherently across sectors and levels of governance.

The European Commission and EEA (EEA, 2013) highlighted five main reasons for the EU to take action on climate change adaptation:

- many climate change impacts and adaptation measures have cross-border dimensions;
- climate change and adaptation affect EU policies;
- solidarity mechanisms between European countries and regions might need to be strengthened because of climate change vulnerabilities and adaptation needs;
- EU programmes could complement Member State resources for adaptation;
- economies of scale can be significant for research, information- and data-gathering, knowledge-sharing and capacity-building.

The development process for an EU adaptation framework first led to the adoption of the 2007 Green Paper 'Adapting to climate change in Europe — options for EU action', recognising that all parts of Europe will increasingly feel the adverse effects of climate change. In 2009 the White Paper 'Adapting to climate change: Towards a European framework

for action' set out concrete steps to be taken, including mainstreaming in EU policy areas.

In April 2013, the EU strategy on adaptation to climate change (EC, 2013) ⁽⁷⁾, was adopted. Commonly known as the EU Adaptation Strategy, it is based on three objectives.

First, Member States are encouraged to adopt comprehensive adaptation strategies, in order to achieve coordination and coherence at the various levels of planning and management. In order to help EU Member States with national adaptation planning processes, the EU Adaptation Strategy provides guidelines ⁽⁸⁾.

Second, the strategy promotes better-informed decision-making by addressing gaps in knowledge about adaptation, through the EU research and innovation programme ⁽⁹⁾ and by further developing the European Climate Adaptation Platform ⁽¹⁰⁾ (Climate-ADAPT) as the 'one-stop shop' for sharing adaptation information in Europe.

Third, it promotes adaptation in key vulnerable sectors by integrating its consideration in EU policies, programmes and funds. It builds on the mainstreaming already being addressed after adoption of the White Paper in 2009, including in policy areas such as agriculture, inland water, forestry, biodiversity and transport. The 2013 strategy specifically addresses agriculture and fisheries policies; it aims not only to ensure that Europe's infrastructure is made more resilient, but also to involve private actors in adaptation by encouraging the use of insurance and financial products so as to increase resilience in investment and business decisions.

The EU has also agreed that at least 20 % of its budget for the 2014–2020 period should be spent on climate change-related action, including mitigation and adaptation ⁽¹¹⁾. Adaptation actions are mainstreamed (integrated) throughout EU sectoral policies, using a range of EU funding mechanisms, including the financial instrument for the environment, LIFE ⁽¹²⁾, five European Structural and Investment Funds ⁽¹³⁾ as well as funding research and innovation through the

⁽⁷⁾ See http://ec.europa.eu/clima/policies/adaptation/what/documentation_en.htm.

⁽⁸⁾ See http://ec.europa.eu/clima/policies/adaptation/what/docs/swd_2013_134_en.pdf.

⁽⁹⁾ See <http://ec.europa.eu/programmes/horizon2020/en>.

⁽¹⁰⁾ See <http://climate-adapt.eea.europa.eu>.

⁽¹¹⁾ See http://ec.europa.eu/clima/policies/adaptation/financing/index_en.htm.

⁽¹²⁾ See <http://ec.europa.eu/environment/life>.

⁽¹³⁾ See http://ec.europa.eu/clima/policies/adaptation/financing/funds/index_en.htm and <http://climate-adapt.eea.europa.eu/web/guest/eu-adaptation-policy/funding/esi>.

Horizon 2020 programme, with 35 % dedicated to climate-related research.

It will be important in the coming years to monitor and evaluate the progress, effectiveness and efficiency of ongoing and planned EU and national actions. Regarding actions by EU Member States, the EU strategy mentions that the European Commission will develop in 2014/2015 an adaptation preparedness scoreboard that includes indicators for measuring member countries' level of readiness. In 2017, the European Commission will report to the European Parliament and the Council on the state of implementation of the EU Adaptation Strategy, and propose its review if needed.

Countries

National adaptation strategies (NASs) and plans provide a general and mostly non-binding policy framework for guiding adaptation activities of government authorities and non-state actors. As for other policy domains, policymaking at national level has a key role in creating an enabling environment for planning and implementing concrete actions. It is at this level that medium- to long-term adaptation objectives need to be formulated and gain political support, and where coordination mechanisms are to be established in order to secure engagement of key actors. Overall, the development of a national adaptation policy (strategy and/or plan) serves as an instrument that provides the necessary frame for adaptation through coordinating the consideration of climate change across relevant sectors, geographical scales and levels of decision-making. Analyses in the EU project BASE (Bottom-up climate Adaptation Strategies towards a sustainable Europe ⁽¹⁴⁾) have shown that national adaptation strategies are very diverse, but the process of developing them has put adaptation on the political agenda (Hildén et al., 2014; Russel et al., 2014).

Twenty-one EEA member countries have adopted a NAS, to date. Most of the existing strategies include limited information on implementation (e.g. monitoring and financing of adaptation action) and therefore, 12 countries in total have set out more detailed national adaptation plans (NAPs). Table 1.1 provides an overview of all EEA member countries with NASs/NAPs in place, consolidating information derived from the country pages on Climate-ADAPT, responses to the self-assessment and further feedback from the Eionet consultation on the draft version of this report.

The commitments to establish and adopt policy frameworks for adaptation at international, EU and national levels, as well as ongoing activities at regional and sectoral levels, confirm the deliberate intention of public authorities to help improve the capacity of societies and economies to adapt. Yet, for policies to become effective, collaborative effort is needed for implementation. Enhancing awareness and building trust and cooperation between actors in public administrations, the civil society and private businesses promotes the sustainability and legitimacy of any adaptation policy process.

⁽¹⁴⁾ See <http://base-adaptation.eu>.

Table 1.1 Status of national adaptation strategies and national adaptation plans in European countries

EEA member countries	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Austria										
Belgium										
Bulgaria										
Croatia										
Cyprus										
Czech Republic										
Denmark										
Estonia										
Finland										
France										
Germany										
Greece										
Hungary										
Iceland										
Ireland										
Italy										
Latvia										
Liechtenstein										
Lithuania										
Luxembourg										
Malta										
Netherlands										
Norway (*)										
Poland										
Portugal										
Romania										
Slovakia										
Slovenia										
Spain										
Sweden										
Switzerland										
Turkey										
United Kingdom										

Note: ☐ No policy

☒ National adaptation strategy (NAS) in place

☒ National adaptation strategy (NAS) and national and/or sectoral adaptation plans (NAP/SAP) in place

(*) Norway had a NAP before a NAS.

Sectors within countries are at various levels of advancement. This diversity is not reflected by the responses provided by European countries to Question 12 of the self-assessment survey. Adaptation is an iterative process for the sectors involved, and calls for consideration of 'Agenda-setting', 'Formulation', 'Decision', 'Implementation' and 'Monitoring and evaluation' issues, at various levels of advancement.

More information on the levels of advancement within sectors can be found in Key topic 6 (cf. Section 2.6).

2 Findings on national adaptation policy processes across Europe

2.1 Key topic 1: Public and policy awareness of the need for adaptation

Key messages

- According to the respondents to the self-assessment survey, there is a growing awareness of the importance of adaptation among policymakers and the public. Some 21 of 30 European countries have indicated that during the past five years, the level of public awareness of the need for adaptation has increased. Some 24 countries out of 30 reported that adaptation has reached the national political agenda.
- Adaptation has been prompted by different 'triggers', including extreme weather events, estimates of current and future damage costs, EU policies and pertinent results from scientific research.
- Countries that have progressed in the adaptation policy process are typically those that also have high levels of awareness of the need for adaptation. However, there are other factors alongside awareness of adaptation that determine a country's stage in the adaptation process.
- Enhancing awareness of the need for adaptation requires a wide variety of information, drawing on the best available scientific evidence. This information should be presented in a way that acknowledges the diverse needs of different audiences.

2.1.1 *Awareness of the need for adaptation: what does this entail?*

Analysis under this key topic draws on responses to the self-assessment survey to provide insight into how far adaptation has entered the general public consciousness and the policy agenda in reporting European countries. It also provides insights into how these countries see the role of visibility as an integral part of making progress on

adaptation. Awareness of the need for adaptation is recognised as fundamental to delivering informed and appropriate adaptation (EC, 2013a). Enhancing awareness of the need for adaptation, through building awareness and addressing knowledge gaps, is also recognised as a keystone aspect of building the adaptive capacity required to implement adaptation actions as reflected in Step 1 of the guidelines on developing adaptation strategies (EC, 2013b).

Definition of key terms

Awareness of the need for adaptation as a response to climate change

Awareness of the need for adaptation has a public dimension, and is reflected in public awareness at large, including within communities, business and organisations. It also has a political dimension that is reflected in adaptation reaching the national political agenda and in the willingness to take adaptation actions. In addition, public and policy awareness of the need for adaptation is also reflected by the need for and the provision of scientific evidence.

For further definitions and sources, see the glossary at the end of this report.

2.1.2 Self-assessment survey findings

The self-assessment survey included requests for information on four different but related questions that provide insight into the visibility of adaptation across Europe. All of these questions included multiple choice options, with one (Q3) requesting that respondents identify from a list of options the three that they consider the most important. The self-assessment survey also included a number of open-ended questions requesting examples or more details and, although not directly related to visibility, some of the responses included information relative to visibility, and these have been considered in this analysis. The following table presents the four questions specifically referenced, and indicates the number of countries providing a response.

Question from self-assessment survey (including question numbers)	Number of countries having answered this question (including % of total number)
In my country, in the past five years, the level of public awareness of the need for adaptation as a response to climate change has increased (Q1)	30/30 (100 %)
In my country, the need for climate change adaptation has reached the national political agenda (Q2)	30/30 (100 %)
In my country, the following aspects have triggered adaptation (Q3)	30/30 (100 %)
In my country, the willingness to develop policies and to take adaptation actions at national level is (Q4)	30/30 (100 %)
In my country, the following barriers for adaptation have been identified (Q11)	29/30 (97 %)
In what stage of the adaptation policy process is your country? (Q12)	30/30 (100 %)

Countries reported an increasing public awareness of the need for adaptation, and that adaptation has reached the national political agenda

The responses suggest that the level of public awareness of the need for adaptation as a response to climate change has increased during the past five years (20 agree or strongly agree, with 9 providing a neutral response (i.e. neither agree nor disagree)), and that adaptation has reached the national political agenda (25 agree or strongly agree), with only one strongly disagreeing.

Identified triggers for adaptation included those that would increase awareness of the need for adaptation, publicly and politically

Each country was requested to select (from a provided list) what they believed were the three most important triggers for action on adaptation (note that five countries identified four triggers). As illustrated in Figure 2.1, common triggers identified for action on adaptation were extreme weather events (28 of 30), development of EU policies (19 of 30), estimates of current and future damage costs (17 of 30) and pertinent results from scientific research (14 of 30).

Exploring these responses further, it is useful to consider the responses to the questions on public

awareness and adaptation on the political agenda, and the reported triggers for action on adaptation.

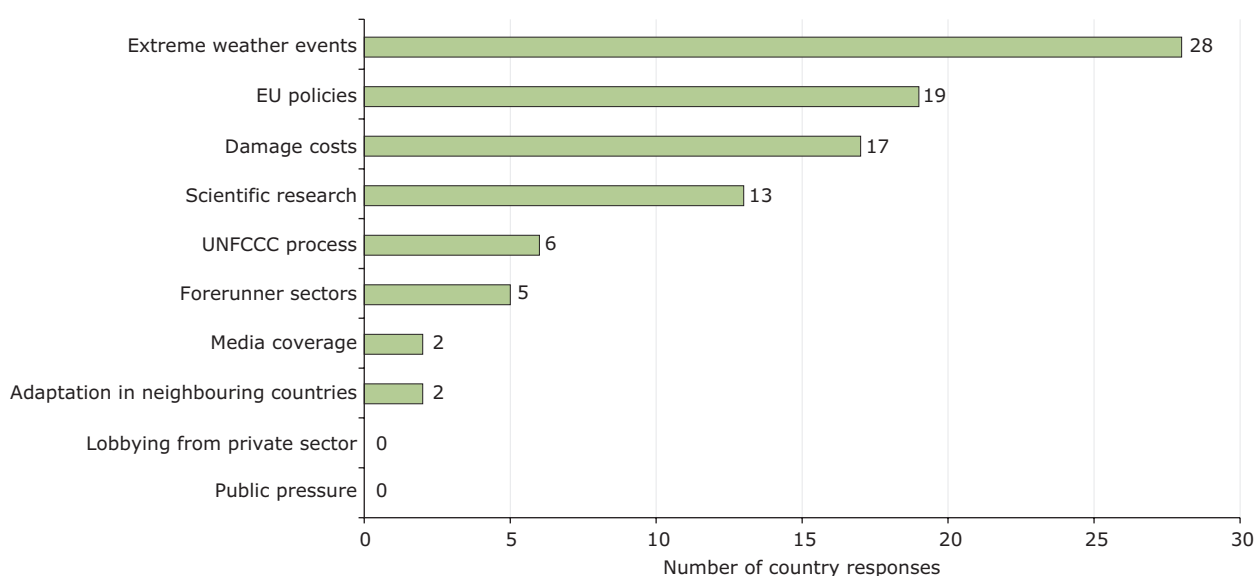
In terms of the triggers, for those countries agreeing or strongly agreeing (20 of 30) that the level of public awareness of the need for adaptation as a response to climate change has increased:

- more of these countries (10 of 14) identified scientific research and forerunner sectors (i.e. sectors taking a lead on adaptation) (4 of 5) than those that neither agreed nor disagreed (i.e. responded neutrally) with the statement that public awareness had increased.

For those countries that agreed or strongly agreed that adaptation has reached the national political agenda (24 of 30), scientific research was identified as a trigger for adaptation by 13 such countries, compared to 1 that responded neutrally or that they strongly disagreed.

There is a willingness to develop policies and to take adaptation action at national level

As shown in Table 2.1, out of 30 countries 12 reported a high and 2 a very high willingness to develop policies and to take adaptation action at national level. Some 13 countries reported that such

Figure 2.1 Triggers of adaptation (Question 3; 30 responding countries; five countries identifying four triggers instead of three as requested)

willingness within their countries could be ranked as medium, and 3 reported a low ranking.

The role of awareness of the need for adaptation in determining the willingness to develop policies and to take adaptation action at national level can be explored by examining the responses to this question and the responses to two other questions within the survey. The first explores the responses to this question and to whether public awareness of adaptation as a response has increased (Table 2.1). Of the 14 countries, 11 that ranked willingness to develop policies and to take adaptation action at national level as high or very high also responded that public awareness as a response had increased (compared with 4 of 13 who responded that they

neither agreed nor disagreed that public awareness had increased). Similarly, of those countries that ranked willingness to develop policies and to take adaptation action at the national level as medium (13 countries), more countries (8) agreed with the statement that public awareness of adaptation as a response has increased than those countries that neither agreed or disagreed with this statement (5 countries).

The second subject concerns responses to the question of whether the need for climate change adaptation has reached the national political agenda (Table 2.2). All countries (14) that responded that willingness to develop policies and to take adaptation action at the national level is

Table 2.1 Reported willingness to develop policies and take adaptation action at national level, and level of public awareness of need for adaptation (30 responding countries)

Willingness to develop policies and to take adaptation action at national level	Public awareness of adaptation as a response has increased	
	Agree (19)/strongly agree (1) (*)	Neutral (9)
Low willingness (3 countries) (*)	Slovenia	The Czech Republic
Medium willingness (13 countries)	Belgium, Finland, Greece, Lithuania, Portugal, Romania, Slovakia, Sweden	Estonia, Hungary, Ireland, Poland, Latvia
High (12 countries)/very high willingness (2 countries)	Austria, Bulgaria, Cyprus, Denmark, France, Italy, Malta, Norway, Spain, Turkey, the United Kingdom	Germany, the Netherlands, Switzerland

Note: (*) One country's responses are not included here — Liechtenstein reported 'not known' in response to the question on the level of public awareness of adaptation.

Table 2.2 Reported willingness to develop policies and take adaptation action at national level, and reported agreement that the need for adaptation reached the national political agenda (30 responding countries)

Willingness to develop policies and to take adaptation action at the national level	The need for climate change adaptation has reached the national political agenda (*)	
	Agree (20)/strongly agree (5) (*)	Neutral (4)
Low (3) (*)	Slovenia	The Czech Republic
Medium (13)	Finland, Hungary, Ireland, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia, Sweden	Belgium, Estonia, Greece
High (12)/very high (2)	Austria, Bulgaria, Cyprus, Denmark, France, Germany, Italy, Malta, Norway, the Netherlands, Spain, Switzerland, Turkey, the United Kingdom	

Note: (*) Liechtenstein strongly disagreed that adaptation had reached the national political agenda, and reported a low willingness to develop policies and to take adaptation action at the national level.

high or very high also responded that the need for climate change adaptation has reached the national political agenda. Similarly, of those countries that ranked willingness to develop policies and to take adaptation action at the national level as medium (13 countries), more (10 countries) agreed with the statement that the need for climate change adaptation has reached the national political agenda than neither agreed nor disagreed with this statement (3 countries).

These responses call for further analysis, particularly those from countries reporting that they neither disagreed nor agreed with the statements that the public awareness of adaptation as a response has increased or that the need for climate change adaptation has reached the national political agenda, and their implications for the role of awareness of the need for adaptation (and other drivers) in willingness to act at the national level.

Selected barriers to adaptation are related to the lack of financial and human capacity and of political will, and uncertainties

Countries were asked to select the three most important barriers to adaptation from a list of potential barriers. The three most commonly reported barriers selected were the lack of financial/human resources (selected 25 times), followed by uncertainties and unclear responsibilities (selected 12 times each) and the lack of political commitment/will (selected 10 times) (cf. Figure 2.2).

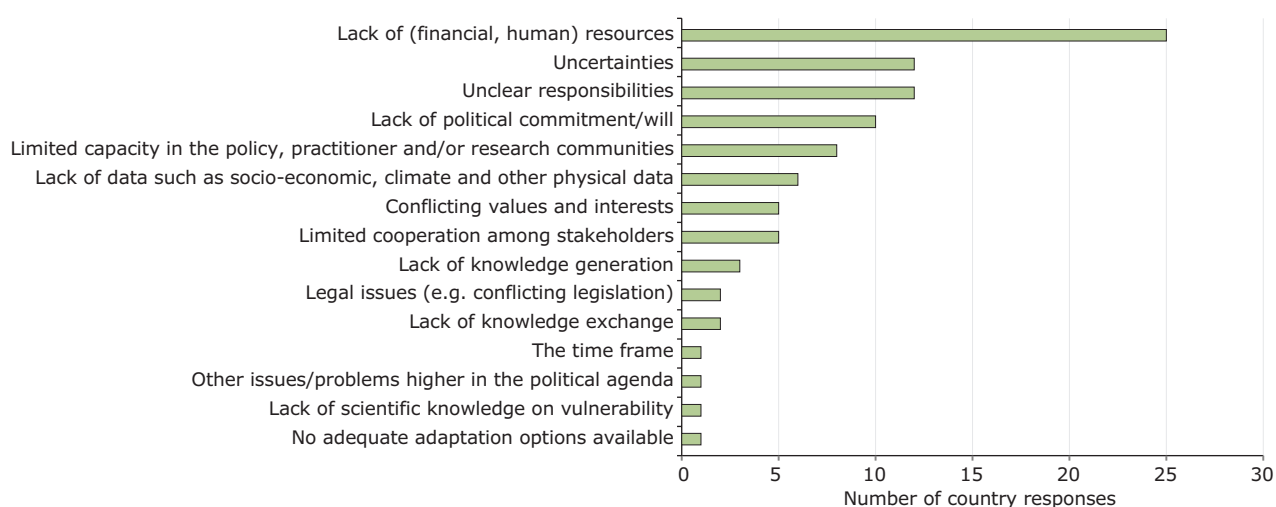
It is worth noting that barriers related to insufficient capacity (lack of financial/human capacity; limited

capacity in the policy, practitioner and/or research communities; and lack of knowledge exchange) was selected by 28 of 30 countries. This can be compared with those barriers related to the lack of information or knowledge (selected by 16 of 30 countries) — uncertainties was selected as a barrier 12 times, lack of data (such as socio-economic, climate and other physical data) was selected 7 times, lack of knowledge exchange 3 times and lack of knowledge generation 2 times. Dealing with these latter barriers may enhance capacity or increase political commitment/will, but the responses suggest that barriers related to capacity and political commitment/will are considered more important than barriers related to lack of information and knowledge.

The reported stage in the adaptation policy process does appear to be directly related to reported awareness of the need for adaptation

In response to the question asking countries to identify which stage of the adaptation policy process they were in (Table 2.3), none of the 30 countries indicated that their adaptation policy process had not started, 1 indicated that they were in the agenda-setting stage, 10 that they were in the formulation stage, 6 that they were in the decision stage, 9 that they were in the implementation stage and 4 that they were in the monitoring and evaluation stage.

Exploring the above responses further, it is useful to consider the responses to questions of whether public awareness of the need for adaptation has increased, and whether adaptation has reached the

Figure 2.2 Barriers to adaptation (Question 11; 29 responding countries)

national political agenda with the reported stage in the adaptation policy process.

As illustrated in Figure 2.3, those countries agreeing or strongly agreeing (20 of 29) that the level of public awareness of the need for adaptation as a response to climate change has increased, are also the countries that identified themselves as being at the decision (3 of 6), implementation (6 of 9) and monitoring and evaluation (4 of 4) stages of the adaptation policy process. Greece reported that public awareness of the need for adaptation as a response to climate change has increased over the past five years, and that their adaptation policy process is at the agenda-setting stage.

For those nine countries that neither agreed nor disagreed that the level of public awareness of the need for adaptation as a response to climate change has increased (i.e. neutral response), three identified

themselves as being at the implementation stage, and none identified themselves as being at the monitoring and evaluation stage.

Further observations can be made on the importance of factors related to awareness of the need for adaptation and the reported stage in the adaptation process, based on the responses to the two related questions (see Figure 2.4).

- Those countries that reported a low willingness to develop policies or take adaptation action at national level (Slovenia, the Czech Republic and Liechtenstein) all reported that they were at the formulation stage of the adaptation process. It is also interesting to note that these same countries identified as triggers for adaptation extreme weather events and damage costs, and either EU policies (two of these three) or adaptation in neighbouring countries.

Table 2.3 Adaptation policy progress as reported by European countries (Question 12; 30 responding countries)

Stage in the adaptation policy process	Countries
Adaptation process has not started	
Agenda-setting	Greece
Formulation	Bulgaria, Cyprus, the Czech Republic, Estonia, Italy, Latvia, Liechtenstein, Slovakia, Slovenia, Sweden
Decision	Hungary, Ireland, Poland, Portugal, Romania, Turkey
Implementation	Austria, Belgium, Denmark, Germany, Malta, the Netherlands, Spain, Switzerland, the United Kingdom
Monitoring and evaluation	Finland, France, Lithuania, Norway

Figure 2.3 Stages in the adaptation policy process and public awareness of the need for adaptation as a response to climate change (Questions 1 and 12; 29 responding countries)

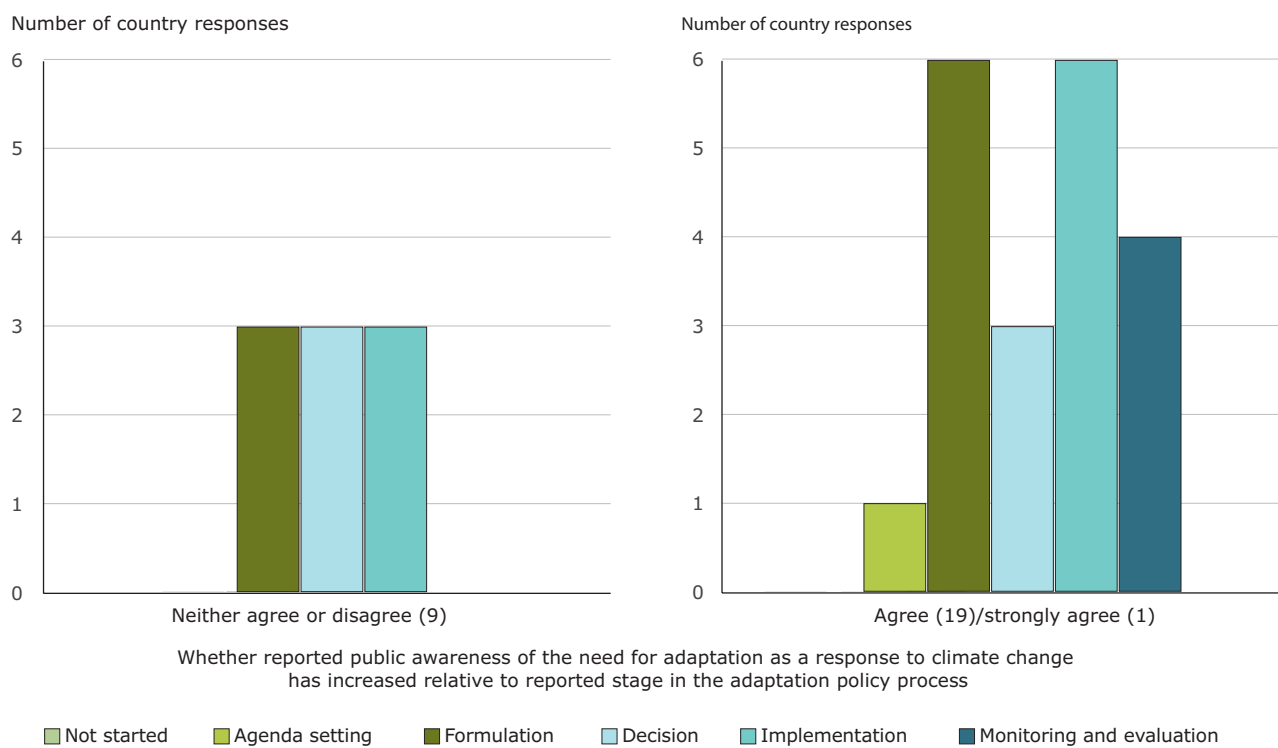
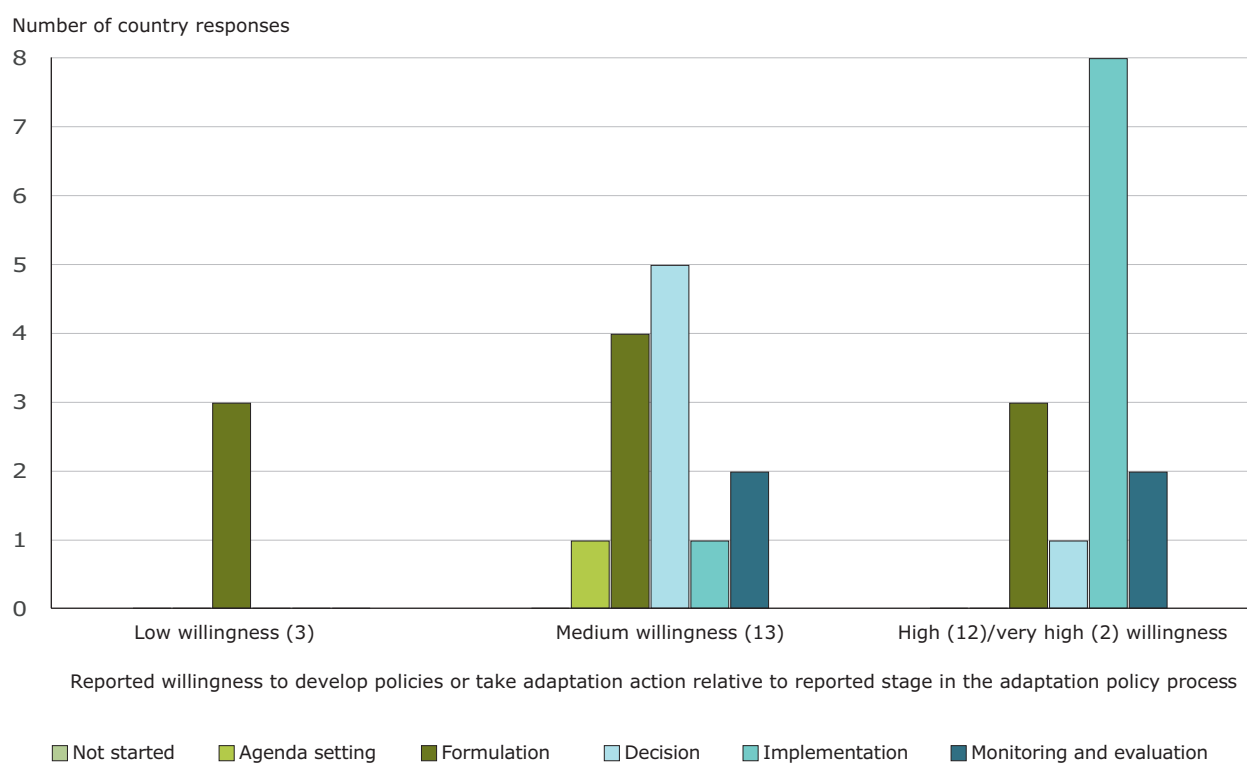


Figure 2.4 Stages in the adaptation policy process and willingness to develop policies and to take adaptation action at national level (Questions 4 and 12; 30 responding countries)



- Of the 14 countries that reported high or very high willingness to develop policies and to take adaptation action at national level, 8 reported that they were at the implementation stage and two reported that they were at the monitoring and evaluation stage in the adaptation policy process.

Together, these observations suggest that willingness to develop policies and to take adaptation action at national level is an important factor in determining the stage in the adaptation policy process, but also point to the presence of other determinants.

Adaptation has reached the political agenda through introduction of legislation and national adaptation strategies (NASs)

Responses to some of the open-ended questions within the self-assessment survey can provide further insight into the reported awareness of the need for adaptation in European countries. For example, 30 countries responded to the question regarding planned next steps, and of these, 21 countries reported next steps with respect to legislation to support adaptation.

Their responses provide some insight into the reported awareness of the need for adaptation in the political agenda:

- of these 21 countries, 7 reported that legislation was being planned, with 2 additional countries reporting that legislation already existed;

- of these 21 countries, 5 indicated that a NAS was planned or under development;
- of these 21 countries, 6 reported that legislation to support adaptation was being integrated into sectoral legislation to support mainstreaming;
- of these 21 countries, 3 indicated that legislation was not yet being considered;
- awareness of the need for adaptation in the context of the political agenda is also apparent from the reported next steps relative to updating the strategy/plan;
- of the 21 countries reporting next steps related to updating their NAS/NAP, 16 indicated a planned or continuous process of updating of their strategies/plans, and of these 16, 5 countries indicated that updates were required regularly.

For example, in Germany, a progress report on the German adaptation strategy and action plan is under preparation. In Ireland (and similarly in the Netherlands), the adaptation actions will be informed by the outcomes of Phase 1 (focused on increasing understanding of national impacts and vulnerabilities) and will build on progress made in terms of adaptation awareness and integration, and increased experience in handling adaptation issues. In Hungary, the consultation process of the NAS has been completed. It is expected that parliament will approve the document (as part of the Second National Climate Strategy) by autumn 2014.

2.1.3 Country examples

Acknowledging the importance of the need for adaptation within the policy process

A number of countries provided some information in their responses that indicates the importance of public and policy awareness of the need for adaptation in supporting the adaptation policy process.

Latvia

Latvia recognises the importance of the visibility of adaptation in the policy process.

Several elements relate to visibility:

- raising awareness of ongoing adaptation activities and projects — creation of a national internet portal on climate and adaptation to climate change, to raise awareness of specialists as well as of the general public;
- stakeholder mapping and cooperation — regular communications within the frame of two re-established work groups (one of experts and one of ministerial specialists) with targeted round-table discussions and expert meetings on specific topics, with all relevant stakeholders being invited;
- Ministry capacity-building — the need to increase the number of staff in the ministry within the climate and environmental policy integration department who are able to deal with climate change adaptation issues at national level.
- Preparation of a national policy-planning document — the process recognises the need for regular communications and consultations with specialists and stakeholders (2013–2016) on, for example, the selection of indicators for a detailed assessment of impacts and risks for various sectors, with elaboration of the national climate change adaptation strategy (2015–2016).

This roadmap addresses the barriers to adaptation identified by Latvia — lack of political commitment/will, unclear responsibilities and lack of (financial, human) resources. The roadmap is also consistent with the reported importance within the self-assessment survey of targeting discussions with stakeholder groups on climate change risks and possible adaptation measures, national coordination of activities and raising the importance of climate change and adaptation in the eyes of all stakeholders. As indicated within the roadmap, these challenges are considered particularly acute, considering that various sectors and municipalities often have different priorities (e.g. social issues, economic recession, business development, and quick solutions to infrastructure issues). Towards addressing these challenges, the roadmap includes elements targeted at increasing the visibility of adaptation, particularly the added value of considering adaptation.

Turkey

Turkey indicated in its response that awareness of adaptation to climate change is very important and part of good practice. From this perspective, it reported that public awareness of climate change and its impacts, and the need for adaptation is a project for the education sector.

Croatia

Croatia has not responded to the self-assessment, but provided information on the adaptation policy process separately. It reported that the need for adaptation has been recognised. This is reflected in the National Air Protection Act, which regulates the development and implementation of a NAS and a NAP.

Adaptation platforms across Europe

The number and scope of web-based platforms in Europe providing information on adaptation is increasing. These go beyond those identified within the self-assessment survey and, in addition to national platforms, include transnational platforms and the European Climate Change Adaptation Platform. At the recent CIRCLE2/EEA Workshop, 'Adaptation Platforms in Europe: Addressing challenges and sharing lessons' (Vienna, November 2013), those managing or considering developing such platforms came together to share experiences, lessons learnt and challenges. The adaptation platforms available in Europe are presented below.

Adaptation platforms across Europe

Country	Title	Web-link
Austria	The Austrian Platform on Climate Change Adaptation	http://www.klimawandelanpassung.at
	Ministerium für ein Lebenswertes Österreich	http://www.klimaanpassung.lebensministerium.at
Denmark	Danish National Adaptation Platform	http://www.klimatilpasning.dk
Finland	Climate Guide (both mitigation and adaptation)	http://www.climateguide.fi
France	WIKLIMA	http://wiklimat.developpement-durable.gouv.fr/index.php/Wiklimat:Accueil
	The French Observatory	http://www.developpement-durable.gouv.fr/The-Observatory-ONERC.html
Germany	Germany: KomPass	http://www.umweltbundesamt.de/en/topics/climate-energy/climate-change-adaptation/kompass
Hungary	Climate Dialogue Forum	http://klimadialogus.mfgi.hu
Ireland	Climate Ireland	http://www.climateireland.ie
Norway	Norway Adaptation Platform	http://www.klimatilpasning.no
Poland	KLIMADA	http://klimada.mos.gov.pl
Spain	Spanish Adaptation Platform	http://www.adaptecca.es
Switzerland	Swiss Information Platform on Adaptation to Climate Change	http://www.bafu.admin.ch/klimaanpassung
Sweden	Swedish Portal for Climate Change Adaptation	http://www.klimatanpassning.se
Transnational	Title	Web-link
Pyrenees	OPCC Pyrenees	http://www.opcc-ctp.org
Alps	Alpine Convention	http://www.alpconv.org/en/climateportal/default.html
Europe	Climate-ADAPT	http://www.climate-adapt.eea.europa.eu

The role of scientific research in contributing to adaptation, including its public and policy awareness

Of 27 countries, 13 identified scientific research as a trigger for adaptation (Figure 2.1). In addition, in the open-ended responses of the self-assessment survey related to planned next steps (Question 42 on risk or vulnerability assessments), 11 of the 21 countries reported that risk or vulnerability assessments are either under way or planned; 6 of the 21 countries reported that risk or vulnerability assessments were being conducted for specific sectors or specific subnational regions or local authorities. Scientific research and these assessments can increase scientific visibility of the need for adaptation and, when and if made available, can increase public and political awareness of the need for adaptation as a response to climate change.

Austria

In 2014 at the latest, an Austria-related assessment report on the topic of climate change will be released by the Austrian Climate Research Network as a contribution to the discussion on impacts, mitigation and adaptation. In addition, the study 'Current state of adaptation to climate change in Austria' (Gingrich et al., 2008) commissioned by the Ministry of Environment, provided a first overview on research projects with a focus on climate change adaptation. The results of this study were entered into a data bank (available at <http://www.klimawandelanpassung.at/datenbank>) that is being continuously enhanced and updated. Furthermore, since most adaptation actions are to be implemented at provincial, regional and local levels, the research project FAMOUS will support the adaptation process by establishing tailor-made decision-support tools (published in spring 2014) in close cooperation with key stakeholders and potential users.

Belgium

The evidence presented as a result of the research (modelling) on water courses by the CCI-Hydr research project (funded by the Belgian Science Policy Office (Belspo)) was a trigger for initiating the adaptation process in Belgium. Earlier available information, such as that based on the report by J.-P. Van Ypersele, did not have a similar affect. The CCI-Hydr became available at the right time, and was included within Belgium's Fifth National Communication (2009) and in some regional reports.

Italy

Both political and public visibility play a role in moving forward the adaptation agenda in Italy. In its response, Italy indicated that willingness to develop adaptation policies in Italy is quite high and is increasing. In recent years, Italian universities, national research centres, public and private institutions and foundations have intensified their efforts for climate change adaptation with the intention of closing the communication and knowledge gaps between science and policymaking. For example, in elaborating the Italian national adaptation strategy, the involvement of the national scientific community was identified as crucial. This included the establishment of a scientific panel of about 100 national scientists and sectoral experts from national scientific institutions and universities.

Throughout the consultation process and public participation that is part of the development of the national adaptation strategy, the inherent uncertainties have been considered. This included informing the main stakeholders of uncertainties: (a) of future projections concerning climate variability; (b) related to future socio-economic development and mitigation commitments, and hence emission scenarios; and (c) concerning the implementation of adaptation measures and policies and their impact on the climate change impacts projections. The ultimate purpose of providing this information is to raise the visibility of adaptation and of the need for more flexible approaches to deal with the challenges associated with adaptation.

Portugal

The Climate Change in Portugal Scenarios, Impacts and Adaptation Measures (SIAM I and II) projects (<http://www.siam.fc.ul.pt/SIAMExecutiveSummary.pdf>) were the trigger in Portugal for the National Adaptation Strategy.

Providing up-to-date information on impacts and vulnerability and on adaptation policies and actions

There are specific references within the self-assessment survey response to the need to provide information on adaptation policies and activities as the basis for adaptation action. This aspect of visibility is particularly recognised within the EU Adaptation Strategy and is behind the European Climate Adaptation Platform (Climate-ADAPT) that aims to support Europe in adapting to climate change by providing access to and sharing information and support tools. Specific reference to the existence or development of such platforms in responses within the self-assessment survey is made by the following countries.

Hungary

Within the development of the National Climate Change Strategy, it is reported that there is a need for an intersectoral platform to support the next phase in which concrete suggestions for implementing adaptation measures can be made. This expert exchange and negotiation platform (Climate Dialogue Platform) provides up-to-date information on policies, activities and research results, and a place where researchers, governmental organisations, NGOs and stakeholders can discuss climate issues and objectives.

Estonia

With its adaptation strategy to be completed by March 2016 at the latest, Estonia reported that the Estonian climate change adaptation information web portal will be ready by 2015 at the latest.

Ireland

The Environment Protection Agency (EPA) will continue to lead in the development of a web-based tool known as Climate Ireland. The platform will include details of all EPA-funded research on adaptation, and the associated findings. Other state bodies will also provide specifics of their adaptation research for publication on the platform.

Portugal

The development of a national platform is foreseen within the national strategy. This platform is already under development as a project (to be completed in March 2016) that is developing for dissemination via the proposed platform: information on past trends and local level climate change using the latest IPCC climate change scenarios; and climate indicators for specific sectors.

See also Table 2.3.

EU support for developing national adaptation strategies

Various EU Member States have used EU-funded projects to support the development of national adaptation strategies. They have held activities such as workshops between scientists, policymakers and other stakeholders, covering awareness-raising of climate change impacts and vulnerabilities and identification of knowledge gaps, and discussing possible ways and approaches for achieving a national strategy and mainstreaming in sectoral policies.

Examples include Croatia using funds under the Instrument for Pre-Accession Assistance (IPA) and Cyprus using LIFE funding (<http://uest.ntua.gr/cypadapt>). In addition DG Climate Action funded 'science/policy' forums, bringing together relevant national stakeholders on climate change adaptation. Eight workshops were held between April and September 2014, covering 12 countries (Bulgaria, Croatia, the Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia).

Furthermore, the ECRAN project (2014–2016) supports development of national adaptation strategies, mainstreaming of actions in sectoral policies and addressing knowledge gaps in six West Balkan countries, Croatia and Turkey. A high-level conference was held on 2 and 3 July 2014 in Skopje.

A range of further EU funds are available for climate change adaptation strategies, policies and actions, including European Structural and Investment Funds, LIFE Climate Action and Horizon2020 regarding research and innovation. The first LIFE call for action grants under the climate change subprogramme (2014) includes many areas of interest regarding climate change adaptation.

More information

Overview on EU funding for adaptation: <http://climate-adapt.eea.europa.eu/eu-adaptation-policy/funding>

IPA: http://ec.europa.eu/regional_policy/thefunds/ipa/index_en.cfm

LIFE: <http://ec.europa.eu/environment/life/funding/life2014/index.htm>

ECRAN: <http://www.ecranetwork.org/Events/21>

Health and climate in the WHO Europe region: a brief overview

The policy and technical work to protect health from climate change in the WHO European Region (encompassing 53 countries, including all EEA member countries; list available at <http://www.euro.who.int/en/countries>) is supported by the European Environment and Health Process policy statements. These call upon the WHO Regional Office for Europe and other partners to strengthen their collaboration to ensure progress in environment and health implementation in the region. As a result of such collaboration, a Regional Framework for Action (RFA) for implementation was developed in 2010, outlining strategic policy objectives in this area (document available at http://www.euro.who.int/__data/assets/pdf_file/0005/95882/Parma_EH_Conf_edoc06rev1.pdf). Three years after the signing of the original policy document, the WHO Regional Office for Europe set out to measure the level of implementation of the policy commitments, by sending a comprehensive questionnaire to member states, organised around eight thematic areas: (a) Governance, (b) Vulnerability, impact and adaptation (health) assessments, (c) Adaptation strategies and action plans, (d) Climate change mitigation, (e) Strengthening health systems, (f) Raising awareness and building capacity, (g) Green health services, and (h) Sharing best practices.

Responses to that questionnaire suggest that strong areas of implementation on average across the countries include governance, the development of vulnerability and impact assessments (VIAs), strengthening of health systems and raising awareness. The progress in these activities may in part reflect extended UNFCCC reporting requirements as well as some country-specific WHO activities on communication and capacity-building and training in these areas. Efforts towards reduction of greenhouse gas emissions in other sectors are also a relatively strong area of implementation. While any cut-off point in positive response rates is bound to be arbitrary, areas where implementation would seem to benefit from further support are the development of NASs, green health and environmental services, and sharing best practices.

Responding countries also provided a wealth of information regarding mechanisms, practices and strategies for implementation of policy commitments, as well as activities for protection from health impacts and in general adaptation and mitigation in climate policy.

The main policy-relevant conclusions from this additional information are:

- There is a high level of awareness about climate change in the responding countries, although awareness of its health implications is lower.
- Most VIAs are relatively recent, and there are gaps in translating scientific evidence into action. Moreover, key areas like the economic consequences of inaction in climate policy are still rare in VIA materials and communications.
- There is room for improvement regarding governmental approval and uptake of national health adaptation plans. Executive support can dramatically improve the implementation rate of plans, particularly when multiple partners are involved.
- Important areas remain lacking in health systems strengthening against climate change, for example the development of integrated climate, environment and health surveillance, or building climate-resilient health infrastructures. Moreover, health sector engagement in emergency planning remains low.
- Financial and human resources for climate-change health adaptation are mainstreamed into ongoing activities and respective resource planning. While health adaptation should focus on strengthening existing systems, there is a need to account for the additional burden of health impacts brought about by climate change.
- There are a growing number of activities to reduce the carbon footprint and improve environmental sustainability of health services. However, a better evaluation of the effectiveness of the measures taken is needed.
- Regional platforms and the internet seem to be the preferred channels for the sharing of good practices in climate and health policy in responding countries.

Overall, whereas implementation has progressed, much remains to be done, both in terms of policy commitment and action, and in the related technical and scientific support to both. The WHO will continue to assist Member States in these areas, within the mandate of its own regulations and the relevant regional policy commitments.

2.1.4 Discussion of findings

The role of extreme events: enhancing awareness of the need for adaptation and triggering adaptation

As summarised in Figure 2.1, common triggers for action on adaptation selected by reporting countries were extreme weather events, damage costs, EU policies and scientific research. Given the nature of the climate change adaptation issue, extreme events have played a particularly significant role in defining adaptation as a problem (Keskitalo et al., 2012). Climate-related events such as floods and droughts, as well as events such as the 2003 European heat wave, have played a significant role in pushing the adaptation agenda forward. While drawing attention to the weather events themselves, these events have been increasingly linked to climate change and socio-economic developments (EEA, 2013). These events, along with statements linking extremes to anthropogenic climate change from the scientific community, such as the IPCC SREX and IPCC AR5 (IPCC, 2012; IPCC WGI, 2013; IPCC, WGII, 2014), have raised awareness of the need for action on climate change and also awareness that this action needs to include adaptation.

The political awareness of the need for adaptation has been enhanced by these extreme events, and the resulting concerns related to avoiding high future costs like those identified in the Stern Report (2006). These events can provide windows of opportunity during which policy and programmes can be introduced; support for a responsive policy intervention is increased based on the perceived associated benefits and costs. Keskitalo et al. (2012) highlighted the benefits arising for policy agendas at national and local levels when, as a result of concerns often triggered by observations and an increased understanding of the implications and science, there is a strongly integrated, multi-participant group united in its calls for action.

At national and subnational (provincial, regional and local) levels, the social, economic and environmental costs of these extreme events are reported by media and are impacting national and subnational budgets. As such, these extreme events increase public awareness of the need and public demand for action with consequences for political awareness. The fact that many governments at both national and subnational levels are particularly focused on economic (and social) growth and development (and jobs), political awareness of the need for action is enhanced as these extreme events can have significant negative implications relative to meeting desired outcomes. Political awareness

is also enhanced by the increased recognition that taking such actions, including adaptation, can also positively impact on economic (and social) growth and development, and provide jobs.

Enhancing awareness of the need for adaptation requires information that recognises the diversity of the audiences and is consistent with an environment for open-minded, unbiased consideration of the best available scientific information

Concerns have recently been raised that although levels of concern and awareness about, and the scientific basis for, climate change have been increasing over the past 20 years, progress on mitigation and adaptation is less than would have been expected (Pidgion, 2012). Possible explanations cited are issues of fatigue, the impact of the global financial crisis, distrust and the influence of climate sceptics, and the deepening politicisation of climate change. Pidgion (2012) also noted that other global/societal, environmental or personal issues occupy the 'finite pool of worry', and what matters most in citizen engagement is the expressed 'issue importance' (Nisbet and Myers, 2007) rather than their basic levels of expressed concern.

Social science theory and much empirical research show that links between information and behaviour can be tenuous at best (Chess and Johnson, 2013). Information is not entirely inconsequential, but it is overrated as the prime driver for change.

Traditional approaches when supplying information to support action often include a focus on simplifying the information, including avoiding overly technical language, providing more information and using 'trusted' communication channels and parties. Best practices, however, also recognise the diversity of audiences, and the need for dialogue rather than just supplying information, the need to provide information about the harmful outcomes along with actions to avoid or reduce those impacts, and the evaluation of communication impacts (Chess and Johnson, 2013).

People's grasp of scientific debates such as climate change can improve if the information they receive builds on the fact that cultural values influence what and whom they believe (Kahan, 2010). This suggests that enhancing visibility with the aim of stimulating action requires a move beyond just providing more information on climate change and adaptation information and going beyond the traditional conception of risk communication such

that what is provided is more closely aligned to the cognitive and emotional needs of both policymakers and the public. In so doing, this would lead to creating an environment for open-minded, unbiased consideration of the best available scientific information.

Understanding the role of awareness of the need for adaptation requires further work

The analysis of the responses to the self-assessment survey reconfirms that adaptation can be motivated by a number of factors, including awareness of the need for adaptation. Our understanding of the role of this awareness as a contributing factor is in part compounded by the complex nature of adaptation. For the most part, adaptation actions are not isolated from other decisions and policies. They are developed, delivered and evaluated in a specific context (e.g. socio-economic, cultural and political, local, regional, national or multinational scales). They are also influenced by international factors, such as financial markets, international politics and trade.

There are also a number of triggers for adaptation and, as suggested in the above analysis of the self-assessment survey responses, many of these can play a role in enhancing public and political awareness of the need for adaptation. They are in themselves also reflective of the complex nature of adaptation. Figure 2.5, taken from the PEER report

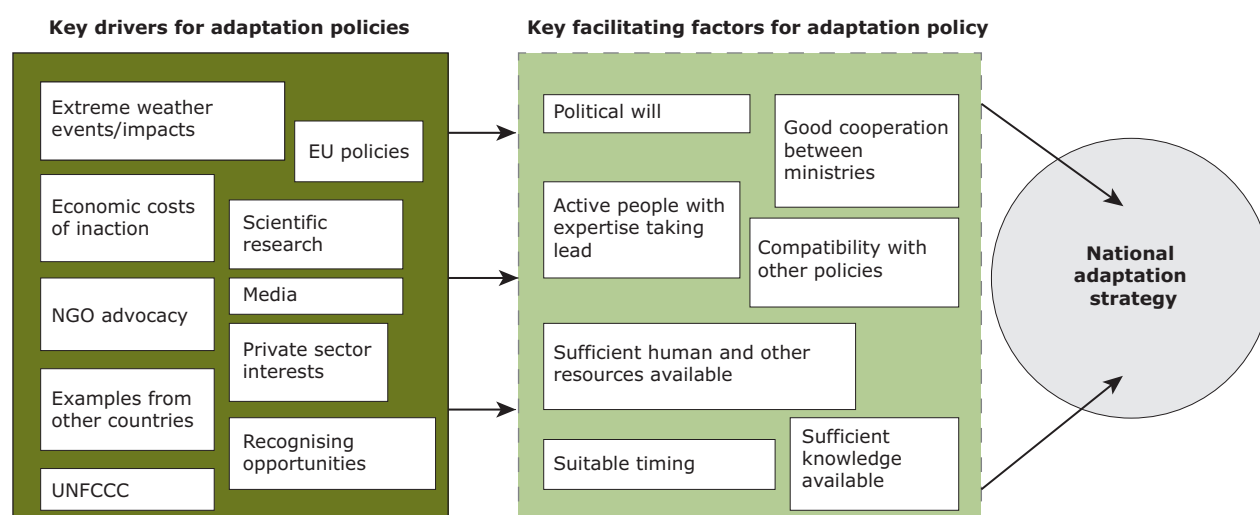
(Swart et al., 2009), provides an illustration of key drivers and facilitating factors.

Similar to the PEER report, in responding to the self-assessment survey, extreme weather events, together with estimates of current and future damage costs, development of EU policies and pertinent results from scientific research were commonly selected influences for triggering adaptation. In the context of awareness of the need for adaptation, these identified triggers can lead to an increase in public awareness of the need for adaptation and can also raise adaptation on the political agenda (as a political response to the trigger, including as a response to public demand).

The complexity of the role of these drivers/triggers is reflected in the responses to other questions related to adaptation at the national level (Table 2.4). For those 24 countries that agreed or strongly agreed that the need for adaptation has reached the national political agenda, selected triggers are extreme weather events (selected by all 24 of these countries), EU policies (selected by 15 countries), damage costs (selected by 14 countries) and scientific research (selected by 13 countries).

For those 27 countries that reported a medium, high or very high willingness to develop policies and to take adaptation actions at the national level, important triggers for adaptation selected were the same — extreme weather events (selected by all but 3 countries), EU policies (selected by 16 countries),

Figure 2.5 Key drivers and facilitating factors of national adaptation strategy



Source: Swart et al., 2009.

damage costs (selected by 14 countries) and scientific research (selected by 14 countries). The selected drivers suggest that an important trigger for adaptation is responding to extreme weather events and damage costs, and in response to EU policies. Scientific research is an important trigger, but selected less often than those previously mentioned.

The complexity and effectiveness of these triggers for adaptation becomes apparent when examining the responses of the countries that reported a low willingness to develop policies and to take adaptation actions at the national level, or reported that they neither agreed nor disagreed that the need for adaptation has reached the national political agenda (Table 2.4).

The selected triggers are similar in both cases, suggesting that understanding the nature and

effectiveness of what triggers adaptation is complex, and identifying the specific nature of the factors motivating adaptation and analysing these drivers/triggers and the specific circumstances is desirable.

Another point requiring further investigation is whether or not 'sufficient knowledge available' is a key facilitating factor for adaptation policy. The responses to the self-assessment survey considered under this topic suggest that while it is necessary, there is a need to move beyond attributing the lack of adaptation action solely to the amount of knowledge (and information) available to considering what aspects of that knowledge (and information) triggers the required actions. Although somewhat more difficult to identify, the potential benefits would suggest that understanding this aspect of knowledge and information as a trigger for adaptation would be worthwhile.

Table 2.4 Selected triggers for adaptation and responses to questions related to adaptation at national level

Triggers for adaptation	Willingness to develop policies and to take adaptation actions			Need for adaptation has reached the national political agenda	
	Low	Medium	High/ very high	Neutral	Agree/ strongly agree
Extreme weather events	3	13	12	4	23
UNFCCC process	0	4	2	2	4
EU policies	2	10	7	4	15
Damage costs	3	9	5	2	14
Forerunner sectors	0	1	4	1	4
Adaptation in neighbouring countries	1	0	1	0	1
Scientific research	0	8	6	2	12
Media coverage	0	0	1	0	1

2.2 Key topic 2: Knowledge generation and use

Key messages

- Adaptation knowledge informing policymaking is reported to have increased in the last five years.
- Risk or vulnerability assessments are available for 22 of the responding 30 European countries.
- 18 countries report that uncertainties in future climate-change projections have been explicitly addressed in adaptation policy processes.
- In relation to national risk or vulnerability assessments, most European countries report that more information is needed about the estimation of costs, benefits and uncertainties.
- Risk and vulnerability assessments are still needed at local level.

2.2.1 Knowledge generation and use: what does this entail?

There has been considerable research on adaptation in recent years. Climate change adaptation has become the core theme in many EU and national research programmes (e.g. CIRCLE-2 ⁽¹⁵⁾; CLIMSAVE ⁽¹⁶⁾; KLIMZUG ⁽¹⁷⁾; Knowledge for Climate ⁽¹⁸⁾; SIAM I; II ⁽¹⁹⁾; SNAC ⁽²⁰⁾) and will continue to be the focus of future research (e.g. Horizon 2020 will address climate change adaptation namely in terms of the societal challenges 'Climate action, environment, resource efficiency and raw materials'). Moreover, important adaptation information has been delivered through risk or vulnerability assessments that have been conducted in an increasing number of countries across Europe, covering multiple sectors mainly at the national and subnational level. Also, Cohesion Policy plays a key role in the generation and use of knowledge, and many relevant activities have been funded by the European Regional Development Fund through the European Territorial Cooperation programme ⁽²¹⁾.

Research activities generate robust and reliable scientific evidence, which forms the knowledge base needed for well-informed policy decisions. The importance of having 'better informed decision-making' is highlighted in the EU Climate Change Adaptation Strategy, which includes this as

one of its three main objectives (EC, 2013). Scientific knowledge, however, needs to be combined with practical and bureaucratic knowledge (Edelenbos et al., 2011). Cooperation between scientists, policy actors and other stakeholders such as civil and business NGOs is fundamental — not only to ensure that researchers generate the scientific-technical information needed primarily by policy actors, but also to support the effective communication, dissemination and finally use of the relevant knowledge.

To date, several examples illustrate collaboration between scientists and other actors in jointly developing adaptation policies and defining risk and vulnerabilities through assessments (e.g. Mitter et al., 2014). Nevertheless, there is still a range of factors that may restrict coproduction of adaptation knowledge (Edelenbos et al., 2011) and its integration into policies. These include, but are not restricted to, the diverse backgrounds and interests of the actors involved in the production of scientific-technical information relevant to climate change adaptation (hereafter referred to as 'knowledge generation') and the utilisation of such information to inform policy decisions (hereafter termed 'knowledge use'), the nature of scientific information and other constraints (e.g. cognitive, institutional or legal) (Clar et al., 2013; Moss et al., 2013; Fussler and Hildén, 2014) ⁽²²⁾. This suggests that

⁽¹⁵⁾ See <http://www.circle-era.eu/np4/home.html>.

⁽¹⁶⁾ See <http://www.climsave.eu/climsave/index.html>.

⁽¹⁷⁾ See <http://www.klimzug.de/en>.

⁽¹⁸⁾ See <http://knowledgeforclimate.climate-research-netherlands.nl>.

⁽¹⁹⁾ See <http://www.siam.fc.ul.pt>.

⁽²⁰⁾ See <http://www.cmcc.it/projects/snac-elements-to-develop-a-national-adaptation-strategy-to-climate-change>.

⁽²¹⁾ For example, the Pyrenees Observatory for Climate Change was founded in the context of the European Territorial Cooperation Programme Spain-France-Andorra (2007–2013), aiming to produce and integrate scientific-technical knowledge into the decision-making level and promote the awareness and capacity building of all local stakeholders.

⁽²²⁾ For a systematic literature review on the factors that might constrain the development and implementation of climate change adaptation strategies, see Biesbroek et al., 2013.

knowledge generation alone may not adequately support implementation of adaptation, and thus its

influence on adaptation action needs to be assessed cautiously (see Key topic 1).

Definition of key terms

- In the context of this section, knowledge refers mainly to scientific and technical evidence relating to risk, vulnerability and adaptation to climate change.
- Knowledge generation refers to the production of scientific-technical evidence relevant to climate change adaptation, such as research programmes and risk/vulnerability assessments (based on Weichselgartner and Kasperson, 2010; Dilling and Lemos, 2011; Edelenbos et al., 2011).
- Knowledge use refers to the application of scientific-technical evidence relevant to climate change adaptation in support of well-informed policy decision-making (based on Weichselgartner and Kasperson, 2010; Dilling and Lemos, 2011; Edelenbos et al., 2011).

For further definitions and sources, see the glossary at the end of this report.

2.2.2 Self-assessment survey findings

In this section, we describe the current status of knowledge generation and use in European countries, with a focus on risk and vulnerability assessments and adaptation to climate change. This is based on information compiled from answers to nine questions referring to this topic. All the questions except numbers 18 and 19 were close-ended, with predefined multiple choices. In certain closed questions, respondents were given the chance to provide additional information in a dedicated space provided under the multiple choices ('Other' category).

Question from self-assessment survey (including question numbers)	Number of countries having answered this question (including % of total number)
In my country, in the past five years, there has been an increase in the amount of adaptation-related knowledge (e.g. in relation to vulnerabilities, adaptation options) generated with the aim of informing policymaking? (Q5)	30/30 (100 %)
In my country, uncertainties in future projections (e.g. uncertainties regarding climate change) are explicitly addressed in the adaptation policy process (Q6)	30/30 (100 %)
In my country, adaptation objectives are based on an understanding of the impacts, risks and/or vulnerabilities to climate change (Q7)	29/30 (97 %)
In my country, integration of adaptation into sectoral policies and programmes is increasing (Q8)	30/30 (100 %)
Are risk assessments or vulnerability assessments available for your country? If yes: available at national, sub-national, transnational, regional, local level (Q16)	30/30 (100 %) 28/30 (93 %)
In relation to the risk and vulnerability assessment available which of the following [sectors] have been covered: • at national level? • at sector-based — assessment led by ministries in charge of the sector? • at sector-based — led by private sector or industry groups? (Q17)	27/30 (90 %) 19/30 (63 %) 7/30 (23 %)
In relation to the national assessment, how is/was the risk or vulnerability assessment process coordinated? What methodological approach has been used? How have uncertainties been addressed? (Q18)	28/30 (93 %)
In relation to the national assessment, have you identified the costs of climate change impacts, and the costs and benefits of adaptation? (Q19)	29/30 (97 %)
In relation to the national assessment, what kind of information is still needed for risk or vulnerability assessments? Please select the three most important issues (Q20)	26/30 (87 %)
In relation to the national assessment, do you plan to update the risk or vulnerability assessments? (Q21)	29/30 (97 %)

Adaptation knowledge informing policymaking is reported to have increased in the last five years

Of the 30 responding countries, 27 either agree (20) or strongly agree (7) (Austria, Belgium, Finland, Germany, Ireland, Norway and Spain) with the statement that the amount of adaptation-related knowledge to inform policy has increased in their countries during the last five years. Two countries (the Czech Republic and Estonia) indicate that there had been no change in the production of adaptation knowledge during this period, while one indicates lack of knowledge (Liechtenstein), but none of the responding countries disagrees. For 25 of 29 countries, understanding of the impacts, risks and/or vulnerabilities to climate change forms the basis for developing adaptation objectives in their countries, with the remaining ones indicating either a neutral opinion (Estonia and Latvia) or lack of knowledge on this topic (Liechtenstein and Norway).

Risk or vulnerability assessments are available for 22 countries across Europe

Risk/vulnerability assessments are already available for 22 of the 30 responding countries. Referring to assessments that have been already undertaken (22 countries ⁽²³⁾) or are currently under development (Cyprus, Hungary, Latvia, Poland, Slovakia and Turkey), 26 countries ⁽²⁴⁾ report that these cover a national scale, 16 countries ⁽²⁵⁾ report subnational assessments, while much fewer countries report transnational assessments (Belgium, France, Lithuania, Slovakia and Slovenia). With reference to national, subnational and transnational assessments, one country reports that these are not available yet but work has been planned (Romania) and in total only one country indicates lack of knowledge on this topic (Liechtenstein).

Figure 2.6 provides an overview of the sectors that are reported to have been covered (or that will be covered, for Romania) in national and sectoral risk and vulnerability assessments. Sectoral assessments are divided into those led by the ministries in charge of the relevant sector, hereafter referred to as 'led by ministries', and others led by private sector or industry groups. The majority of the countries that provided information on the sectors included in

national risk and vulnerability assessments (27) report that agriculture (24), water (24), forestry (22), human health (22) and biodiversity (20) are the sectors most frequently considered in assessments at this level. These sectors are reported to be most frequently covered also in sector-based assessments led by ministries (15; 15; 13; 12; 11 countries per each sector respectively). Only seven countries report information about sector-based assessments led by the private sector or industry (Germany, Lithuania, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom). In the latter case, although interest is shown in certain sectors such as industry and finance/insurance, agriculture is still the sector reported by the largest number of responding countries (five of seven: the Netherlands, Portugal, Spain, Sweden, and the United Kingdom).

With regard to future plans, 8 of 29 countries report that the update of the assessments has already started (Bulgaria, Estonia, Germany, Lithuania, the Netherlands, Spain, Sweden, and the United Kingdom). A total of 13 countries report that this update has been planned but that work on this task has not started yet, while 8 of 29 countries either indicate lack of knowledge (Liechtenstein) on this topic or report that this task is not planned (Denmark, France, Greece, Ireland, Italy, Latvia and Switzerland). In the case of Switzerland, although no official decision has yet been made about the update of the assessment, new knowledge will continuously be taken into account.

Diverse methods are reported for the conduct of risk or vulnerability assessments

The self-assessment asked countries to describe the methodology used when undertaking risk or vulnerability assessments. Responding countries (28) report the use of a variety of methods (Table 2.5). Across different countries, variation is also observed regarding the level of the methodological elaboration. In Austria, for example, an extensive literature review was conducted prior to the assessment, to collect readily available information on, amongst others, observed impacts, exposure, sensitivity, and impacts. Qualitative vulnerability assessments were then carried out on the basis of the collected information. In Germany, a multi-method approach

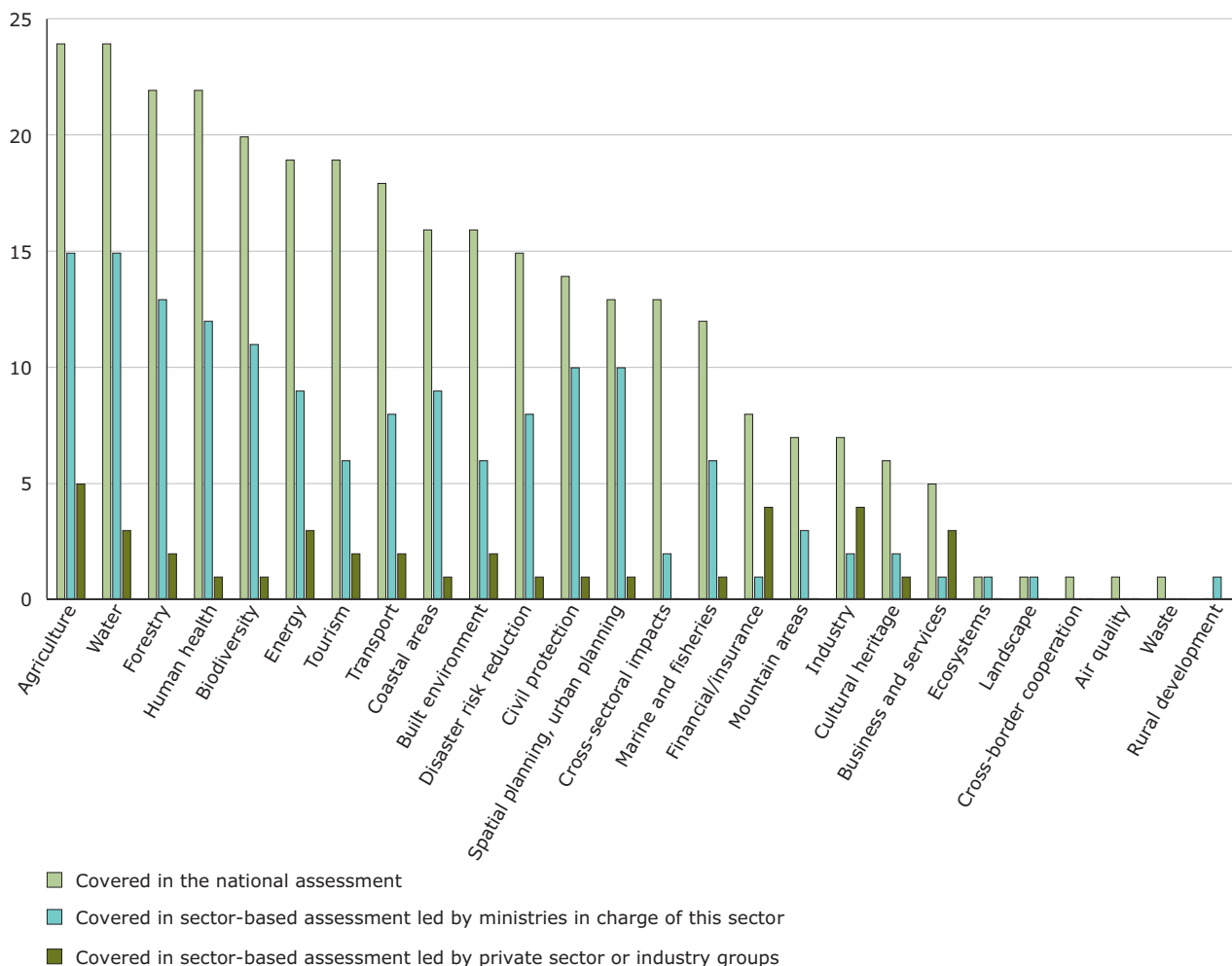
⁽²³⁾ Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Lithuania, Malta, the Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

⁽²⁴⁾ Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, the Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

⁽²⁵⁾ Austria, Belgium, Bulgaria, Cyprus, Denmark, France, Germany, Italy, Latvia, the Netherlands, Portugal, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

Figure 2.6 Sectors covered in national and sectoral assessments of risk and vulnerability (Question 17; national: 27 responding countries; sectoral led by ministries: 19 responding countries; sectoral led by private sector: 7 responding countries)

Number of country responses



was developed, including the use of literature review, climate-impact models from different sources, indicators derived from impact models and expert judgement, quantitative and qualitative socio-economic scenarios and normative decisions made by experts from federal agencies. In Denmark, a dialogue-based approach was developed, involving the private sector and industry. This ensured a forward-looking input and ownership of the climate change adaptation efforts, which, along with other initiatives undertaken, strengthened the vulnerability assessment. In Switzerland, the assessment of climate-related risks and opportunities in different sectors will form the basis for achieving the objectives of the Swiss NAS. In the context of a pilot project, a method was developed to assess and compare risks and opportunities

transparently, in the sectors of health, agriculture, forestry, energy, tourism, infrastructure and buildings, water management, biodiversity, and open spaces and green areas (Holthausen et al., 2013). The assessment is undertaken for six large areas: Mittelland, Alps, the foothills of the Alps, Jura, south of the Alps and the large urban zones, providing a good overview of the country. For each area, a representative canton was selected to be assessed in detail, followed by the results being scaled to the corresponding area. Other countries describe less elaborate approaches employing a single method (e.g. expert appraisal) for the conduct of risk or vulnerability assessments. These countries often tend to be at an earlier stage in the adaptation process. Mixed-method approaches, however, are reported by most of the countries.

Table 2.5 Overview of methods used in risk or vulnerability assessments (Question 18; 28 responding countries)

Methodological approach used in risk or vulnerability assessments	Example countries
Review of literature/existing databases	AT, BE, BG, CH, CY, CZ, DE, ES, FI, FR, HU, IT, LT, NL, PT, RO, SI, UK
Interviews/surveys	BE, CH, CY, NL, UK
Expert judgement/appraisal	BG, CH, CY, CZ, DE, FI, FR, HU, IE, IT, LI, LT, LV, NL, PT, RO, SE, SI, SK, TR, UK
Stakeholder engagement/consultation/advisory committee	BG, ES, IE, NL, PT, SE, UK
Workshops/seminars	BG, CH, ES, NL, SE, UK
Qualitative assessment	AT, CH, NL, NO, SK
Quantitative assessment	CH
Modelling	BE, BG, CH, CY, CZ, DE, FR, IE (incl. sensitivity analysis), LV, PT, RO, SE, SK, UK (sensitivity analysis)
Scenario analysis	BG, CH, DE, ES, FR, NL, PT, SE, SK, UK
Indicators/indexes	CH, DE, SE, SK
Monetisation exercise (market prices, non-market values, informed judgement)	CH, UK
Mapping exercise	UK
Multi-criteria scoring system	UK
Application/further development of existing frameworks	UK

Note: Country codes (based on Eurostat country codes at 1 June 2012: see http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Country_codes): AT (Austria), BE (Belgium), BG (Bulgaria), CH (Switzerland), CY (Cyprus), CZ (the Czech Republic), DE (Germany), DK (Denmark), EE (Estonia), ES (Spain), FI (Finland), FR (France), GR (Greece), HU (Hungary), IE (Ireland), IS (Iceland), IT (Italy), LI (Liechtenstein), LT (Lithuania), LU (Luxembourg), LV (Latvia), MT (Malta), NL (the Netherlands), NO (Norway), PL (Poland), PT (Portugal), RO (Romania), SE (Sweden), SI (Slovenia), SK (Slovakia), TR (Turkey), UK (the United Kingdom).

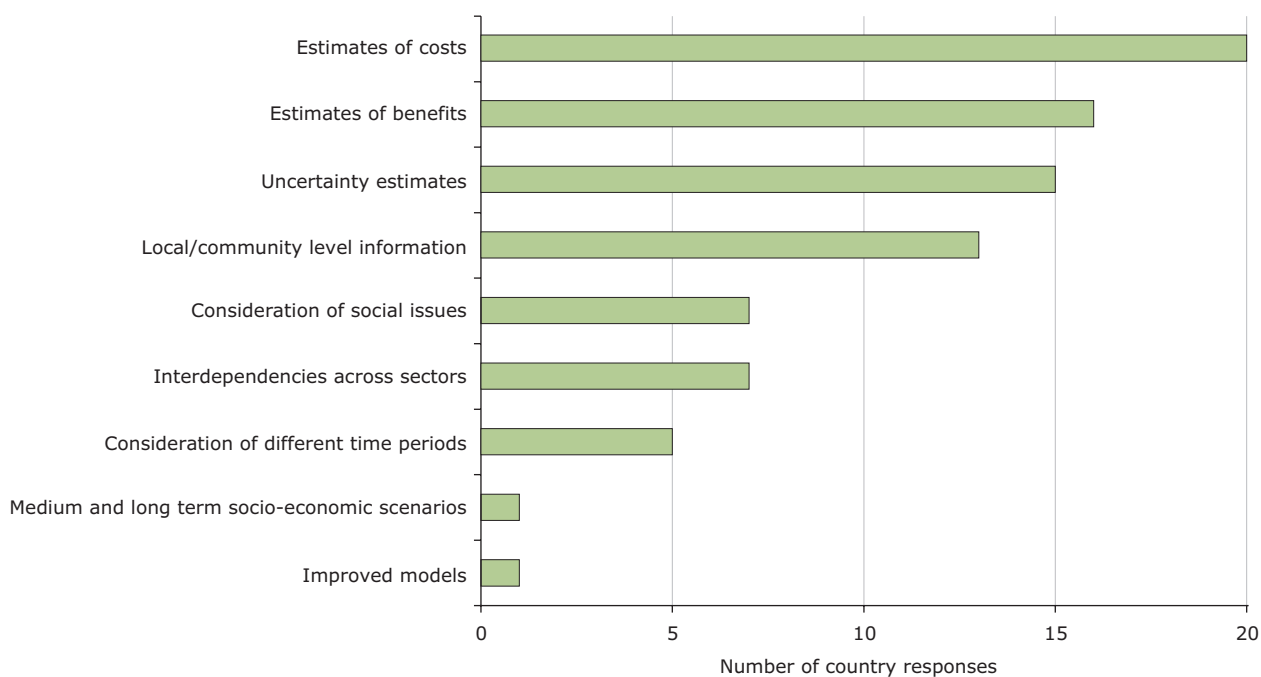
18 countries report that uncertainties in future climate change projections have been explicitly addressed in the adaptation policy process

Uncertainties in future projections related to climate change have been explicitly addressed in the adaptation policy process of 18 of the 30 responding countries (16 agree and 2 strongly agree; Austria and Norway). About a third of the responding countries, however, (10 of 29 (Estonia, Finland, Greece, Hungary, Latvia, Lithuania, Romania, Slovakia, Slovenia and Turkey)) indicates that there had been no change in this field; one indicates a lack of knowledge (Liechtenstein) and one disagrees with the relevant statement (Czech Republic).

In relation to national risk or vulnerability assessments, European countries report that more information is needed about the estimation of costs, benefits and uncertainties

In relation to national risk or vulnerability assessments, 20 of the responding countries (26) indicate that estimation of costs is one of the most

important issues about which more information is still needed. This is followed by the estimation of benefits (16 out of 26 countries) and the estimation of uncertainties (15 out of 26 countries) (Figure 2.7). The ranking of these topics is in alignment with the answers reported by participating countries when asked to indicate if the costs of climate change impacts and the costs and benefits of adaptation have been identified in their countries. Only 4 of 29 countries (France, referring to the cost of impacts, Greece, Slovakia and the United Kingdom) respond positively to indicate that these estimates have been undertaken for their countries. Eleven countries indicate absence of these estimates (Cyprus, the Czech Republic, Estonia, Hungary, Ireland, Liechtenstein, Lithuania, Romania, Switzerland, Slovenia and Turkey). The remaining countries make reference to studies that have conducted partial estimations, or report that estimations are currently in progress. Finally, one country indicates that there is need for medium- and long-term, socio-economic scenarios (France) and one country for improved models that identify possible climate change impacts with the necessary granularity (Malta).

**Figure 2.7 Information that is still needed for risk or vulnerability assessments
(Question 20; 26 responding countries)**

2.2.3 Country examples

This section presents five examples illustrating how different countries have been generating scientific-technical evidence relevant to adaptation policies or adaptation actions through research programmes and risk or vulnerability assessments. The first example describes the use of results from a risk assessment in the United Kingdom to develop the National Adaptation Programme. The second example showcases the development of the

Italian NAS using information produced through a strong established stakeholder dialogue and institutional support, and the third example focuses on strengthening the knowledge base in support of multilevel climate change adaptation decisions in the Netherlands. The fourth example describes the methodological approach used in the cross-sectoral vulnerability assessment in support of the German NAS progress report. The fifth example presents the vulnerability assessments of different scales that have been undertaken in Spain.

Risk assessments in support of adaptation action

United Kingdom

The Climate Change Act 2008 presents a framework for a long-term response to climate change in the United Kingdom and formulates climate change mitigation and adaptation laws in the country. Among other things, it requires the production of a United Kingdom-wide Climate Change Risk Assessment (CCRA) every five years and the development of national adaptation programmes based on the results of the former (Defra, 2012a).

The first British CCRA Evidence Report became available in 2012. It provides a detailed analysis of potential impacts, risks and opportunities that might emerge in the United Kingdom as a result of climate change both in and across a set of 11 sectors (agriculture; biodiversity and ecosystem services; built environment; business, industry and services; energy; floods and coastal erosion; forestry; health; marine and fisheries; transport; and water) (Defra, 2012b). Also, it provides an estimation of monetary values for certain risks when available data allowed (Defra, 2012a).

The overall approach is based on the UK Climate Impacts Programme Risk and Uncertainty Framework, namely its first three stages: identification of problem and objectives, establishment of decision-making criteria and assessment of risk (Defra, 2012a). A wide range of quantitative, semi-quantitative and qualitative methods (e.g. literature reviews, workshops, interviews, expert opinion, analysis of historical data, modelling, mapping exercises, application and further development of frameworks, multi-criteria scoring and metrics) were used at different stages of the assessment. This approach allowed for optimum use of the existing knowledge and human resources. At the same time, it supported identification of the areas that require more attention (Defra, 2012b), and the type of new knowledge that needs to be generated.

Evidence from the first CCRA was used as the base for the development of the British National Adaptation Programme (2013–2018). This includes the objectives and necessary policies to support decisions for the United Kingdom's adaptation to climate change (e.g. prioritisation for action and appropriate adaptation measures) (Defra, 2012a)). Relevant decisions are further supported by economic analysis of adaptation options and the results of a study looking at how climate change impacts beyond the British borders might affect the country (Defra, 2012a).

More information

<http://www.gov.uk/government/policies/adapting-to-climate-change>

<http://www.gov.uk/government/policies/adapting-to-climate-change/supporting-pages/national-adaptation-programme>

Research programmes in support of the development of national adaptation policies

Italy

The Italian Ministry for the Environment, Land and Sea (IMELS) has initiated the process of the preparation of the Italian National Adaptation Strategy to climate change. This aims to provide guidelines for short- and long-term adaptation, to support the mainstreaming of adaptation in current sectoral policies and to inform future adaptation action plans. A national project, 'Elementi per una Strategia Nazionale di Adattamento ai Cambiamenti Climatici' (SNAC) or 'Elements to develop a National Adaptation Strategy to Climate Change' has been funded by IMELS, from 2012 to 2014. The scientific/technical coordination of this national project has been assigned to the Euro-Mediterranean Center on Climate Change (CMCC). A comprehensive scientific literature review provided an extensive knowledge base on past, present and future climate change and on impacts and vulnerabilities of micro/macro sectors to climate change (water resources; desertification, soil degradation and droughts; hydrogeological risk; biodiversity and ecosystems; health; forestry; agriculture, aquaculture and fishery; energy; coastal zones; tourism; urban settlements; and critical infrastructure). Vulnerability assessments also generated information for two case studies (the mountain areas of the Alps and Apennines, and the Po river basin).

The knowledge base produced through this process was further enhanced by an ongoing dialogue on climate change adaptation among national, regional and local institutions. Two panels were established for this purpose. An 'institutional panel' coordinated by IMELS, involving representatives of relevant institutions (e.g. Ministry of Economic Development, Ministry of Agricultural and Forestry Policies, Ministry of Health) and other institutional stakeholders (e.g. Department of Civil Protection, State-Regions Conference, National Association of Italian Municipalities), and a 'technical panel of experts' coordinated by CMCC, involving about 100 members of the national scientific community (Medri et al., 2013). The involvement of stakeholders at multiple levels was one of the advantages of the adopted approach, contributing not only to the provision of information for the development of the Italian NAS but also to raising the awareness for the need for efficient adaptation planning.

More information

<http://www.minambiente.it/pagina/adattamento-ai-cambiamenti-climatici-0>

<http://www.cmcc.it/projects/snac-elements-to-develop-a-national-adaptation-strategy-to-climate-change>

Strengthening of knowledge base in support of multilevel climate change adaptation decisions

The Netherlands

Adaptation to current and projected climate change and variability requires a major investment in the production of scientific evidence and its use in policy decisions at multiple levels. In an attempt to strengthen the knowledge base about climate change and be better prepared to respond to its impacts, the Dutch government established a national research programme. 'Knowledge for Climate' (KfC) (*Kennis voor Klimaat*) (2008–2013) is one of the main research projects of this programme. Funded by the Economic Structure Enhancing Fund, with co-financing from other sources, the 'Knowledge for Climate' programme aims to develop knowledge and services that will support decisions for local, regional, national and international climate adaptation strategies, as well as to improve climate predictions and climate-effect models.

KfC supports three types of studies: (a) studies that aim at meeting urgent needs for adaptation knowledge; (b) long-term studies that generate more in-depth knowledge; and (c) studies that combine the produced research findings to develop adaptation strategies (MHSPE, 2013). Research focuses primarily on certain geographical areas in the Netherlands that are vulnerable to climate change and themes that are prioritised in the Dutch adaptation agenda. Major national academic and research institutes (e.g. Wageningen University, the University of Utrecht, the VU University) cooperate with government organisations (e.g. central government, provinces, municipalities and water boards) and private companies. The involvement of different stakeholders who not only co-invest but also collaborate in developing research is an important feature of this project, something that increases the relevance of the produced information and the chances that this will lead to action (in this connection see Key topic 4 and Key topic 5).

More information

<http://knowledgeforclimate.climate-research-netherlands.nl>

Cross-sectoral vulnerability assessment in support of the development of adaptation strategies

Germany

Following the first German vulnerability assessment (Zebisch et al., 2005), which informed the German Adaptation Strategy (2008), a new vulnerability assessment was commissioned by the Inter-ministerial Working Group on adaptation in 2011. It served to support the progress report of the adaptation strategy (due in 2015). The assessment focuses mainly on current and short-term vulnerability (2021–2050) which align with the timeframe for most adaptation decisions, while long-term vulnerability (2071–2100) is investigated only with reference to specific climate change impacts. The assessment is expected to cover all of Germany and each of the 15 sectors that were addressed in the German NAS.

A new element of this assessment is that it will also investigate cross-sectoral relationships, enabling the comparison of vulnerabilities and the identification of spatial and thematic hot-spots for the prioritisation of adaptation needs. A systemic approach using cause-effect chains between climate signals and climate impacts was designed for undertaking this task. This allowed for the identification of the most important chains and the selection of appropriate climate impact models or indicators. Scientific officers from public authorities selected the climate change impacts that were to be investigated in detail in the assessment. When no quantitative data was available, expert judgment was used to estimate future trends for specific climate impacts. Adaptive capacity was separated into a 'generic capacity', expressed by generic indicators, and 'sector specific capacity', estimated based on expert judgment. To compare and aggregate the quantitative and qualitative data, climate change impacts were normalised and semi-quantitative classes were created. This structured approach facilitated the identification of the most important climate impacts and highlighted the knowledge gaps that currently exist. The uncertainty of climate change projections was accounted for through an ensemble of climate models, while a range of trends in future socio-economic development was taken into account with the use of two different scenarios covering economic, demographic and spatial change.

In addition to the variety of the methods used, a strong element of the methodological approach employed for the German cross-sectoral vulnerability assessment was the 'Netzwerk Vulnerabilität'. This 'vulnerability network' consists of 16 different public authorities supported by a scientific consortium. Scientific officers from public authorities, who have a wide expert knowledge and experience in taking normative decisions, collaborated with members of the scientific community, who can provide detailed and robust evidence and contribute to the development of an objective and transparent process. Such collaborations can facilitate communication between the two fields and ensure that the results of such efforts are used in the following stages of the adaptation policy process.

More information

<http://www.anpassung.net> (in German)

<http://www.netzwerk-vulnerabilitaet.de> (in German)

National, sectoral and transnational assessment of impact and vulnerability to climate change

Spain

Spain was one of the first European countries that prepared a formal policy response to the observed and projected climate change impacts. In 2006, after a consultation process that involved representatives of the public administrations, NGOs and other stakeholders, Spain adopted its National Climate Change Adaptation Plan (PNACC). PNACC aims to mainstream adaptation in relevant systems and sectors, to promote the production of relevant knowledge and to support the implementation of Spain's adaptation policy commitments. It also acknowledged the importance of evaluating vulnerability and adaptation to climate change. However, the first impact and vulnerability assessments (IVAs) on the national level had initiated before that with the support of more than 400 experts in a project that focused on the review of existing information.

Since its adoption, PNACC has been implemented through three work programmes (2006; 2009 and 2014), each one focusing on different but also linked activities. Within the context of these programmes, IVAs have been already undertaken for several sectors such as water resources, biodiversity, coastal areas, health, forestry and tourism. As an example, the assessment of impacts on coastal areas allowed the development of a GIS tool that can be viewed online. Assessments for the sectors agriculture, transport, private sector and also local level assessments are under development, while a multi-sectoral indicator system on impacts, vulnerability and adaptation, and additional sectoral assessments will be carried out during the implementation of the 3rd Work Programme for the period 2014–2020. Sectoral IVAs are developed in close collaboration with the responsible unit within each sector and under the coordination of the Spanish Climate Change Office. Participatory workshops allow key stakeholders to work together on identifying adaptation options based on the vulnerability assessment results.

Finally, Spain has also been involved in transnational assessments, for example, on the assessment of the impacts and vulnerability of climate change on biodiversity in the Iberian Peninsula in collaboration with Portugal, or through its participation in the Adaptation Partnership. Since July 2013, information produced from the aforementioned activities has been communicated among stakeholders through the National Adaptation Platform 'AdapteCCa'.

More information

<http://www.magrama.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/plan-nacional-adaptacion-cambio-climatico>

<http://www.c3e.ihcantabria.com>

<http://www.adaptationpartnership.org>

<http://www.adaptecca.es>

2.2.4 Discussion of findings

An enhanced adaptation knowledge base

In Europe, mitigation has been the main institutional and societal response to climate change in recent decades. However, the need for adaptation is now considered necessary, both for human societies and natural systems. European countries have responded to this recognition by allocating research funds to programmes focusing on climate change adaptation (e.g. Knowledge for Climate, KLIMZUG, SNAC) and conducting risk or vulnerability assessments to climate change impacts (e.g. UK CCRA). As a result, climate change adaptation knowledge has advanced considerably in recent years and this will continue further in future.

In many cases, knowledge relevant to adaptation has been reflected in policies. The self-assessment survey shows that 21 countries in Europe have already developed a NAS and 12 countries have moved beyond that point by developing a NAP. Furthermore, 26 of the 30 countries that participated in the self-assessment survey reported an increase in the integration of adaptation into sectoral policies. Such observations frame an encouraging picture of progress on adaptation. Nevertheless, there are still certain areas that require further attention in order to minimise the barriers that might jeopardise adaptation action (see Key topic 1).

Risk and vulnerability assessments are available for the majority of European countries

Risk and vulnerability assessments can provide important information for climate change adaptation policies, although the results from such assessments are not a prerequisite for the development of a NAS. Their importance, however, is much higher for implementing adaptation through action plans (see the case of the UK National Adaptation Programme).

Currently risk/vulnerability assessments are available for the majority of the countries that participated in the self-assessment survey. Differences exist, however, in the number and type of sectors covered in the assessments of each country. Agriculture, forestry, water, biodiversity and human health are the sectors most frequently covered in national assessments. For the first four sectors, this is probably due to the fact that the relevant ecosystems provide important services, and because a potential negative effect due to climate change may have serious implications for both

natural systems and humans. At the same time, attention on the human health sector has increased after the high death rate that has been observed during recent extreme weather events (e.g. the heat wave in summer of 2003 in Europe).

Countries reported diversity in the methodologies that were used for conducting such assessments. Diversity refers to the methods used and the level of elaboration of the approach, as well as to whether a methodology was actually developed for this purpose or not. Differences across countries seem to relate to the policy process stage that they were in at the time when the assessment was undertaken. However, the influence of other context-specific factors cannot be excluded.

The plurality of approaches has the potential to improve knowledge, as different methods may deal with certain issues more effectively. Nevertheless, certain methodological challenges such as the quantification of adaptive capacities and uncertainties remain (BMU, 2014). The frequent use of literature review and expert appraisals as a substitute of the more challenging quantitative approaches perhaps suggests that more effort should be placed on the latter. Additionally, although the establishment of a rigid and unchangeable framework would not provide much help, developing comprehensive and flexible guidelines for undertaking risk or vulnerability assessments can support countries, particularly the ones that are in an early stage in the adaptation policy (e.g. WHO, 2013).

Estimation of costs, benefits and uncertainties are the main knowledge gaps for risk and vulnerabilities assessments

In relation to national risk or vulnerability assessments, estimation of costs, benefits and uncertainties were indicated by responding countries as the three most important topics for which more information is needed. Cost and benefit estimates are helpful for assessing climate change impacts and policy outcomes. They may complement information produced by risk and vulnerability assessments, and contribute to having better informed decisions. The need for, but mainly the difficulty of economic assessments related to climate change and climate change policies have been already highlighted and discussed elsewhere in the literature (McKibbin and Wilcoxon, 2003; EEA, 2013; EC, 2013). This is linked to the uncertainties of future changes both in the climate system and societies, which determine, in turn, not only the climate change impacts, but also

the need for — and the options for — adaptation (Füssel and Hildén, 2014).

Uncertainty is indeed a major challenge in climate change science. Also, it is identified as a barrier for all policy cycle stages (Clar et al., 2013), which may sometimes hinder adaptation decisions (Hanger et al., 2013). This appears to be relevant not only to countries at an early stage in the adaptation policy process, but also to countries that have already made progress. In the self-assessment survey, for example, six countries which stated that uncertainties related to climate change projections have been already included in adaptation policies, reported that additional information is still needed on this topic (Austria, Cyprus, Denmark, Italy, Poland and Portugal).

The aforementioned topics reflect some of the current knowledge gaps and should be considered when formulating the research agenda for the coming years. In addition to identifying the types of scientific information that may improve policies, it is important to develop effective ways for the dissemination of adaptation knowledge. In the case of uncertainty, for example, it is often difficult to communicate the relevant information to non-scientific audiences. Development of guidelines on how such information can be used in policymaking that do not consider context-specific characteristics are unlikely to improve knowledge use. Instead, investment on the development of climate information services that bring together researchers and other actors involved in the adaptation process is expected to have a positive influence (Moss et al., 2013).

At the local level, risk and vulnerability assessments are still needed

An important characteristic related to risk and vulnerability assessments is the level at which these are conducted. Among the responding countries, the majority of them refer to the national (27) and subnational assessments (17) that are either already available, currently under development or planned to be conducted. As adaptation requirements vary from locality to locality due to the specific contexts, the information provided by the national risk or vulnerability assessments is sometimes not appropriate for adaptation planning (Füssel and Hildén, 2014). Hence, adaptation measures will have to be identified through local level assessments, supplementing — or in some cases even replacing

— the more general measures recommended at the regional and national level.

The availability of local level assessments is reported only by one country (Sweden). In other countries, however, there is already action taking place locally. In the United Kingdom, for example, some cities have undertaken city-level risk or vulnerability assessments (e.g. Birmingham). Other cities have used the LCLIP tool to assess vulnerabilities to current weather conditions. Belgium reported that the use of vulnerability diagnostic tools is beginning to appear at the local level. In Ireland, research-based, local-scale vulnerability assessments have been conducted on an ad-hoc basis for some sectors (i.e. the Office of Public Works, Tourism and Heritage, Forfas; Ireland's policy advisory board for enterprise, trade, science, technology and innovation) bringing together groups of local authorities, civil society expert stakeholders and scientists (Falaleeva et al., 2013; Gray et al., 2014). Such activities aim to communicate local knowledge of the global change impacts on local communities to the higher-level adaptation decision makers. Additionally, they aim to develop adaptation capacity by providing adaptation actors at the local level with access to climate knowledge and networks operational at regional and national scale. Nevertheless, the fact that such examples are scarce confirm the finding that more effort should be placed on the generation of adaptation information at the local/community level (this is identified as the fourth most important topic about which more information is needed, see Figure 2.7) and agrees with the knowledge gaps identified in the EU Adaptation Strategy (EC, 2013).

Such information is expected to be enhanced in the future. Some countries mentioned, for example, that local level risk and vulnerability assessments are already included in their current activities or that there are plans to do so (e.g. Denmark, Spain and Sweden). Also, the production of such information will be further encouraged through initiatives and projects of the European Commission designed specifically to support cities, such as the Mayors Adapt — the Covenant of Mayors Initiative on Climate Change Adaptation (see <http://mayors-adapt.eu>) (Action 3; EC, 2013). Finally, relevant information for actions and initiatives in cities and towns across Europe is provided through the dedicated page of the European Climate Adaptation Platform (Climate-ADAPT <http://climate-adapt.eea.europa.eu/web/guest/cities>) and the ICLEI (Local Governments for Sustainability) network.

2.3 Key topic 3: Planning adaptation

Key messages

- More than half the European countries (19) report that they have made progress in identifying and assessing adaptation options. Seven further countries have said they will begin identifying and assessing adaptation options in the near future.
- Expert judgement has been reported as the method most often used to identify and assess adaptation options, often combined with other methodological approaches, such as participatory processes.
- The adaptation options most commonly considered by countries are 'soft' adaptation options, usually in combination with others such as 'green', 'grey' or 'combined' options.
- Prioritisation of adaptation options has been carried out or is currently under development by nearly half of the countries (14), and 10 more European countries report that they are planning to carry out this prioritisation.
- Biodiversity is reported to be the area that is the most advanced in terms of planning adaptation activities. In contrast, the water and agriculture sectors are the areas in which implementation of adaptation is reported to have been furthest advanced (see Key topic 6).

2.3.1 Planning adaptation: what does this entail?

In the context of this report, planning adaptation activities includes identifying, assessing and prioritising possible adaptation options (EC, 2013). Based on these three steps, different types of adaptation actions such as 'soft', 'green', 'grey' and 'combined' measures should be selected for implementation. As there will hardly ever be a clear optimum or one definitive solution, it is suggested that multiple types of adaptation actions be selected for implementation (Swart et al., in Prutsch et al., 2014).

Thus, a wide portfolio of adaptation options needs to be considered at the appropriate (temporal and spatial) scale in order to address possible climate change impacts. To identify a portfolio of suitable

climate change adaptation measures, goals, ideas and visions need to be discussed, analysed and agreed. In addition, adaptation cannot be addressed in isolation; it takes place within a wider social, economic and environmental context, which needs to be properly taken into account.

Adaptation options range from small changes to very substantial changes that have broad implications, but very often comprise a mix of different options. The challenging task in planning adaptation activities is to find ways to combine different measures in a meaningful way, in order to avoid mal-adaptation and achieve win-win solutions with a maximum level of consensus among stakeholders. The most attractive adaptation measures are those that offer benefits in the relatively near term as well as reductions of vulnerabilities in the long term (IPCC, 2014).

Definition of key terms

Planning in the context of this report comprises the following three steps:

- identifying possible adaptation options: collecting and describing a wide spectrum of possible adaptation options, including 'soft', 'green', 'grey' and 'combined' measures;
- assessing adaptation options: appraising options regarding their effectiveness in addressing potential impacts from climate change, their implementation timeframe, direct and indirect effects in environmental, social and economic terms, as well as costs and benefits and other criteria;
- prioritising adaptation options: on the basis of (i) and (ii), select preferred adaptation options to be further developed and implemented; most often, criteria such as importance, urgency and flexibility (Vetter and Schauser, 2013) are used for prioritising.

Source: Based on EC, 2013.

For further definitions and sources, see the glossary at the end of this report.

2.3.2 Self-assessment survey findings

This key topic is based on findings from eight questions with a focus on planning adaptation actions. Most questions in the self-assessment survey were closed and included multiple choice options. The table below presents the list of questions and indicates the number of countries having answered them. In total, 30 countries returned the self-assessment survey to the EEA.

Question from self-assessment survey (including question numbers)	Number of countries having answered this question (including % of total number)
Have you identified and assessed adaptation options on the basis of risk or vulnerability assessments? (Q22)	30/30 (100 %)
If you have identified and assessed adaptation options, please indicate at what level? (Q22a)	15/30 (50 %)
How have you identified and assessed adaptation options? (Q23)	25/30 (83 %)
Please indicate the types of adaptation options identified (Q24)	26/30 (87 %)
Have you prioritised adaptation options? (Q25)	29/30 (97 %)
If you have prioritised adaptation options, which methodological approach (e.g. expert judgment, multi-criteria analysis) has been used? (Q26)	11/30 (37 %)
Have the adaptation options been included in an action plan? (Q27)	23/30 (77 %)
Please highlight the relevant sector/areas in your country and assess the current state of adaptation at various levels (Q31)	26/30 (87 %)

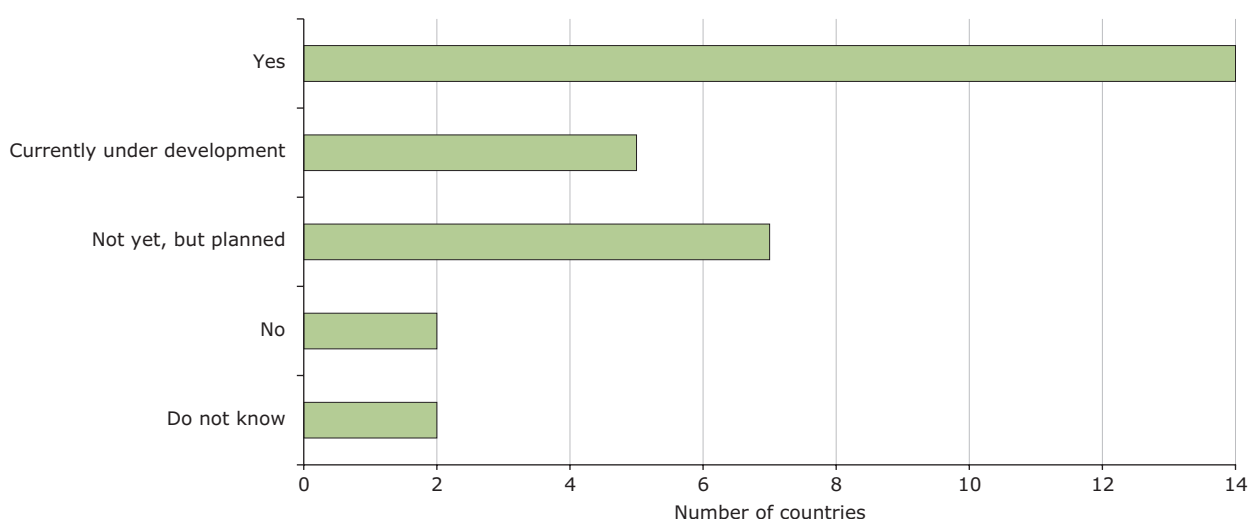
Efforts to identify and assess adaptation options have been or are being made by about half of the countries, and seven more will start with this effort in the near future

Of 30 countries, 14 report they have undertaken an analysis of suitable options (Figure 2.8). Most of these countries have presented their adaptation activities either in the framework of a NAP (i.e. Austria, Denmark, France — presenting only

some adaptation options, Germany, Malta, the Netherlands, Norway, Spain, Switzerland and the United Kingdom), in overall climate change policies (i.e. in Belgium (subnational Climate Plans) and Lithuania), or in the format of adaptation plans for selected sectors at various administrative levels (i.e. Portugal and Sweden).

In addition, five other countries report to be in the process of identifying and assessing adaptation

Figure 2.8 Status of identification and assessment of adaptation options (Question 22; 30 responding countries)



options to be presented in a NAP or related climate change policies (i.e. Cyprus, Czech Republic, Hungary, Italy and Slovakia). Of 30 countries, 7 have not started to identify adaptation options but will do so in the near future (e.g. Bulgaria, Estonia, Latvia, Romania and Slovenia).

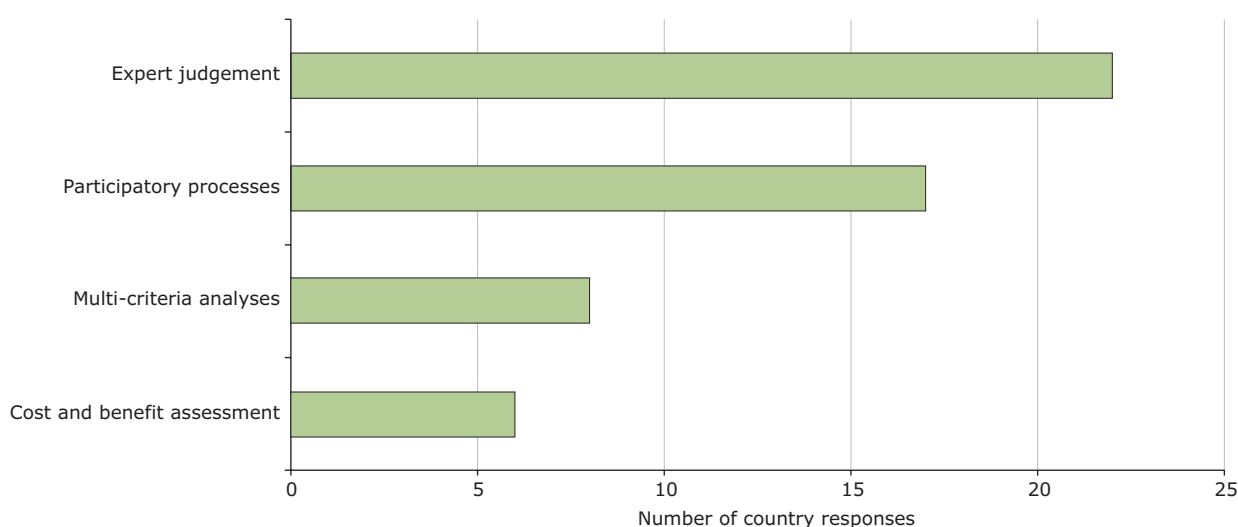
With regard to administrative levels, 6 of 15 countries state that they have identified or will assess adaptation options for the national level only (i.e. Czech Republic, Denmark, Hungary, Malta, Norway and Slovakia). Two countries mention that options have been or will be identified for the national and subnational level (i.e. Belgium and Sweden) and two countries mention that they work on measures for the national, subnational and sectoral level (i.e. Poland and Spain). Portugal reported having identified and assessed adaptation options at the national and sectoral level. Austria

and the United Kingdom have developed measures for the national, subnational, sectoral and cross-sectoral levels. Lithuania mentioned it had identified and assessed options to be implemented at national, transnational and sectoral levels. Cyprus reported it had options available for the national level as well as the sectoral and cross-sectoral levels.

Expert judgement has been reported as the most common method to identify and assess adaptation options

Expert judgement is used to identify and assess adaptation options for 21 out of 25 European countries (Figure 2.9). The Czech Republic, Estonia and Turkey report using a single method which is expert judgement to identify and assess options.

Figure 2.9 Methodological approaches for designing adaptation options (Question 23; 25 responding countries)



Four types of adaptation options (EEA, 2013)

- 'Soft' adaptation options are managerial, legal and policy approaches that aim at altering human behaviour or styles of governance. Examples include early warning systems or financial infrastructure that can insure against damage from natural disasters.
- 'Grey' adaptation options are 'hard' options used to reduce vulnerability to climate change and enhance resilience. Examples include dyke building and beach restoration to prevent coastal erosion.
- 'Green' adaptation options make use of nature. Examples include introducing new crop and tree varieties, allowing room for rivers to naturally flood onto floodplains, and restoring wetlands.
- 'Combined' options make use of all of these three types. In fact, the best results are often achieved by combining actions. For example, flood risk in a particular area can be addressed by a combination of 'green' and 'grey' actions, or 'grey' and 'soft' actions.

Most countries state that they combine expert judgement with other methodological approaches, most often with participatory processes (i.e. Austria, Belgium, Denmark, Finland, Italy, Liechtenstein, Lithuania, Malta, Portugal, Romania and Switzerland). Cost and benefit assessments are applied by six countries (i.e. France, Norway, Slovakia, Spain, Sweden and the United Kingdom) and multi-criteria analyses by eight (i.e. Cyprus, Hungary, the Netherlands, Norway, Poland, Slovakia, Spain and the United Kingdom); again both in combination with other approaches such as expert judgement. Three countries indicate having used all four methods for identifying and assessing adaptation options, namely Norway, Spain and the United Kingdom. Slovenia reports that it has not started yet, but it is planned to use all these approaches for designing adaptation options.

Countries report most often that they consider 'soft' adaptation options, commonly in combination with others such as 'green', 'grey' or 'combined' options

Results from the self-assessment survey show that soft measures are the type of adaptation option most often identified: 20 of 26 countries report that they have identified soft options such as awareness-raising initiatives, information policy approaches and early warning systems. Two countries report only soft options for adaptation (i.e. Bulgaria and Estonia). Some 17 countries indicate they consider soft options in combination with 'green' and 'grey' options for adaptation. 'Combined' adaptation options together with other types of options are recognised by 12 countries. Six countries reported only 'combined' options (i.e. Cyprus, Hungary, Liechtenstein, Malta, Slovenia and Turkey).

Prioritisation of adaptation options is carried out by a few countries, and more European countries are working or planning to prioritise in the near future

Of the 29 countries, 8 report having prioritised adaptation options: Cyprus, Denmark, the Netherlands, Norway, Malta, Poland, Switzerland and the United Kingdom. These countries have mostly applied a mix of methods by involving different groups of stakeholders and policymakers. Furthermore, six countries are currently working on prioritisation: Belgium, Germany, Italy, Portugal, Spain and Sweden. In addition, 10 countries plan to prioritise adaptation responses in the coming years (i.e. Bulgaria, the Czech Republic, Estonia, Finland, Hungary, Latvia, Liechtenstein, Slovakia, Slovenia and Turkey) and five countries have no plans yet (i.e. Austria, France, Lithuania, Ireland and Romania).

Countries were also asked the policy areas for which they were currently planning for adaptation (e.g. identifying options) and the biodiversity area was reported as the one most frequently addressed

Looking at the adaptation progress in various sectors at national level, most activities on planning adaptation options (in terms of identifying options) have been reported for biodiversity. For financial insurance, industry, tourism and marine fisheries, the self-assessment survey shows that these sectors are in an early stage in planning for adaptation. For the forestry sector and for the human health sector, in addition to numerous activities focused on planning adaptation activities, a number of countries have at least some adaptation measures implemented. The water sector and agriculture display the highest number of European countries having already implemented concrete adaptation actions and thus have passed the stage of identifying, assessing and prioritising options (see Key topic 6).

2.3.3 Country examples

A number of countries have reported in the self-assessment survey examples and experiences

in relation to identifying, assessing and prioritising options for adapting to climate change. The following selected cases present a diversity of approaches from various European countries.

Costs of inaction assessed for prioritisation of measures

Austria

The Austrian Action Plan for adaptation, adopted in October 2012, suggests more than 130 adaptation measures to be implemented in 14 various fields. In order to identify sectors and areas where adaptation is most needed, a project called 'Cost of Inaction: Assessing Costs of Climate Change for Austria' (COIN) was launched in 2013.

The aim of COIN is to assess costs of climate change for public and private budgets in Austria (i.e. damage costs with presently agreed mitigation but without adaptation measures), and scope the information where full assessment is not yet possible. Therefore a consistent framework will be developed and applied to all fields of activity/sectors presented in the Austrian national adaptation strategy. Climate scenarios will be interpreted according to each sector's special needs for certain climate parameters and indices. Instead of delivering a grand total cost sum for all sectors with a top-down assessment from some average climate triggers, this project applies a broad bottom-up approach, acknowledging sector-specific risks and trends.

The developed framework for assessing costs of climate change will provide valuable insights and lessons learned for other European countries too, and will help in prioritisation of adaptation measures, by focusing on areas which are affected most by climate change impacts.

More information

<http://www.coin.ccca.at>



Guidelines and framework for municipalities on climate change adaptation

Norway

The local character of the impacts of climate change puts municipalities in the front line in dealing with climate change. To enable municipalities to ensure resilient and sustainable communities in future, adaptation to climate change must be made an integral part of municipal responsibilities.

The Norwegian government has created a website that provides practical tools, case studies and information on climate change adaptation tailored to meet the needs of those responsible for spatial planning in the municipalities, including a guide on how to address climate change adaptation. Part one of this online 'Guide on Climate Change Adaptation' is about the basic knowledge everyone should have about climate change. It addresses questions about the administrative levels at which different adaptation questions should be addressed, why and ideas on how they could be approached. Part two provides guidance for municipalities on how to consider adaptation in various planning processes connected to the Planning and Building Act and the Civil Protection Act. Part three provides some tools, for instance for risk assessments.

The Norwegian government has appointed a committee to evaluate the current legislation relating to urban run-off water, and as appropriate make proposals for amendments to provide a better framework for the municipalities responsible for managing urban run-off water for dealing with the increasing challenges associated with urban flooding. The government also intends to prepare guidelines describing how the municipalities and counties can incorporate climate change adaptation work into their planning activities.

More information

<http://www.klimatilpasning.no>

Software tool for multi-criteria analysis (MCA)

Cyprus

In the case of Cyprus, various adaptation options ('grey', 'green' and 'soft') have been identified and assessed for each one of the eleven priority sectors of the economy, within the CYPADAPT project. The methodology applied was the participatory process, by means of a National Adaptation Steering Committee with all the stakeholders and a MCA based on a range of social, environmental and technical criteria. The stakeholders (governmental departments, local authorities, academic and research institutions, NGOs, thematic associations and consumer groups), which were involved from the beginning of the project, were requested to evaluate, by means of a questionnaire, the different adaptation measures and options listed in terms of defined environmental, social, technical and economic criteria. However, the economic criteria could not be evaluated, and therefore will be the subject of another project.

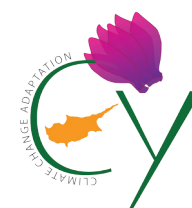
The MCA was carried out with the help of a software tool, which has been also developed within the CYPADAPT project (CYPADAPT Tool). The first version of this software has a similar structure as the questionnaire: (a) introduction (general information and instructions); (b) input of general data (stakeholder's details, weights, etc.); (c) selection and weighting of general evaluation criteria; (d) selection and scoring of adaptation measures per sector; (e) results, scenarios formulation and sensitivity analysis, with the provision of graphs, diagrams and other data-presentation schemes.

The first optimisation of the software tool and the prioritisation of the most appropriate adaptation measures for Cyprus (existing in certain sectors, or being used successfully in other countries or new ones suggested) was based on the answered questionnaires. The aim of the questionnaires was the selection of adaptation measures and options and their evaluation with the criteria and weights used in the MCA. The outcomes are being further discussed and analysed in meetings with stakeholders, and online public consultation is still in progress.

The work was carried out under the LIFE+ co-financed project CYPADAPT.

More information

http://uest.ntua.gr/cypadapt/?page_id=106



Five types of adaptation measures in the French National Adaptation Plan (NAP)

France

In order to address uncertainties related to climate change, the French NAP suggests the following types of measures for prioritising implementation in the first instance:

- 'no regrets' measures, which are of benefit even in the absence of climate change, such as measures to promote water-saving across all sectors, or the adaptation of the French shellfish sector to climate change through disease-monitoring and an evaluation of the genetic potential for adaptation of oysters and mussels;
- reversible measures, such as mainstreaming climate change in public service contracts;
- measures increasing 'safety margins', such as the measure to review the mapping of areas that are potentially vulnerable to forest fires in order to extend the vigilance area;
- measures requiring long-term implementation, such as integrating climate change into regional forestry guidelines;
- measures which can be adjusted and reviewed periodically for various stakeholders as knowledge advances, such as more stringent requirements for comfortable summer temperature in buildings.

Ultimately, the French NAP suggests a set of 84 actions expressed in 230 measures for the national scale. These actions span the entire duration of the plan from 2011 to 2015 and some go beyond that date. Although adaptation options have not been formally prioritised, 'grey' options (e.g. increase of water storage for agriculture that invests in more water efficient irrigation) and 'soft' (e.g. heat-wave management plans) were identified as the main types of adaptation options. These actions have been identified and assessed using participatory processes and cost-benefit assessment.

More information

http://www.developpement-durable.gouv.fr/IMG/pdf/ONERC_PNACC_Eng_part_1.pdf



2.3.4 Discussion of findings

Identifying, assessing and prioritising adaptation options is mostly based on qualitative approaches

Findings from the self-assessment survey indicate that when planning options, European countries most often use expert judgement in combination with other qualitative approaches such as participatory processes.

The role of stakeholders in designing adaptation activities is of high importance for several reasons: they improve quality by bringing in different perspectives as well as experiences, and they increase transparency in decision-making as well as the likely acceptability of the responses taken (PROVIA, 2013; Prutsch et al., 2014). Thus, it is positive to see that European countries have recognised the importance of involvement and cooperation with relevant actors (see Key topic 5).

Many guidelines for adaptation (e.g. EC, 2013; Brown et al., 2011; Lim et al., 2004) mention the use of different sets of criteria for assessing and prioritising adaptation options. For example, based on literature review, Vetter and Schauser (2013) have distinguished the following five key criteria for prioritisation: importance, urgency, absence of negative side-effects, no regret ⁽²⁶⁾ and flexibility (Germany has developed a concept for prioritisation based on this work). It remains unclear whether expert judgements are applying these criteria explicitly or are mainly based on subjective judgement with regard to the related fields of action. For the latter, often detailed information for a more in-depth analysis of adaptation options along these criteria is missing.

Prioritisation is considered an important step in most guidelines for adaptation, but is seldom applied by European countries

Based on information from the EEA report 'Adaptation in Europe' (EEA, 2013) and results from the self-assessment survey, the following 12 European countries have adopted NAPs for adaptation as of 2014: Austria, Denmark, Finland, France, Germany, Malta, the Netherlands, Norway, Spain, Switzerland, Turkey and the United Kingdom. The Netherlands is currently updating the national plan on adaptation. Some countries have NAPs in place for selected

sectors. In addition, a number of other countries are currently in the process of preparing NAPs (e.g. Belgium, Poland and Romania).

Interestingly, the results from the self-assessment survey show that so far, only the following 8 out of 29 countries have prioritised their adaptation options: Cyprus, Denmark, the Netherlands, Norway, Malta, Poland, Switzerland and the United Kingdom. These countries either have a NAP in place or are in the process of developing one.

It is expected that more countries will prioritise adaptation options and a variety of approaches and methods can be applied. An overview of possible approaches is presented in Table 2.6 (based on Watkiss and Hunt, 2013). Nevertheless, not all countries plan to carry out prioritisation at the national level (see results in the self-assessment survey). Some governments might not intend to do so because they aim to keep a broad portfolio of options, depending on specific contextual conditions, and make choices based on political priorities. One could argue that prioritisation of options will mostly be carried out subnationally, as this is the level where climate change impacts will materialise and context-specific response is needed.

Guidelines present cost-benefit analyses (Table 2.6) as one of the most important approaches for prioritising adaptation options. Nevertheless, it is very likely that only a few countries will use this method as this approach depends on the availability of information on costs and benefits which is still poor and involves many subjective choices. A general recommendation is to use various methods for cost-benefit based prioritisation (Table 2.6) to stimulate learning: different approaches represent different ways of framing problems, may be applicable in different situations, have different strengths and weaknesses and can lead to different solutions (Swart et al. in Prutsch et al., 2014). Further work is needed to better understand the added value of prioritisation for countries, taking into account various methodological approaches.

EU policy has fostered planning for adaptation in biodiversity

Planning adaptation has been reported to be most advanced in the biodiversity sector. This may be

⁽²⁶⁾ Since any decision taken implies opportunity costs, this terminology should be understood as 'low-regret' actions (EEA, 2013).

Table 2.6 Overview of available approaches for prioritisation in adaptation

Approach	Short description	Most useful to apply when...
Cost-benefit analysis (CBA)	CBA values all relevant costs and benefits to society of all options, and then estimates a net present value or a benefit. It is an absolute measure providing the justification for intervention, though it is often difficult to value all the costs and benefits of a particular project or policy.	Climate probabilities are known. Climate sensitivity is small compared to costs/benefits. Good data exist for major cost/benefit components.
Cost-effectiveness analysis (CEA)	CEA compares alternative options for achieving similar outputs (or objectives). In this regard it is a relative measure, providing comparative information between choices (unlike CBA, which provides an absolute measure).	There is an agreement on a sectoral social objective (e.g. acceptable risks of flooding) when non-monetary metrics are considered.
Multi-criteria analysis (MCA)	MCA is a systematic method for assessing and scoring options against a range of decision criteria, some of which are expressed in physical or monetary units, and some of which are qualitative. The various criteria can then be weighted to provide an overall ranking of options.	There is a mix of qualitative and quantitative data.
Real options analysis (ROA)	ROA quantifies the investment risk associated with uncertain future outcomes. It can therefore assess whether it is better to invest now or to wait — or whether it is better to invest in options that offer greater flexibility in the future.	Large irreversible capital decisions are to be made. Climate-risk probabilities are known, or adequate information is available. Good-quality data for major cost/benefit components are available.
Robust decision-making (RDM)	RDM is a decision-support tool that is used in situations of deep uncertainty. It uses quantitative models, or scenario generators, with data-mining algorithms, to evaluate how different strategies perform under large ensembles of scenarios reflecting different plausible future conditions.	High uncertainty of climate change has been signalled. A mix of quantitative and qualitative information is available. Non-market sectors are involved (e.g. ecosystems and health).
Portfolio analysis (PA)	PA helps in developing portfolios of options, rather than single options. It originated in the context of financial markets to explore the potential for portfolios of financial assets to maximise the financial return on investments, subject to a given level of risk.	Adaptation actions are likely to be complementary in reducing climate risks. Climate-risk probabilities are known or good information is available.
Adaptive management/adaptation turning points	Adaptive management is a long-established and less formalised approach that uses a monitoring, research, evaluation and learning process to improve future management strategies. A variation of the approach is to consider major biophysical, human, social or economic thresholds, and the MEDIATION project has developed such assessments using the term 'adaptation turning points', looking at sociopolitical thresholds (i.e. a formal policy objective or societal preference).	High uncertainty exists. Clear risk thresholds and indicators are identified.
Analytic hierarchy process (AHP)	AHP is a form of multi-criteria analysis that undertakes pairwise comparisons using expert judgements to derive priority scales. The method allows the analysis of tangible and intangible elements together, allowing these to be traded off against each other in a decision-making process.	There is a mix of quantitative and qualitative information; and of qualitative and quantitative data. There is a need for consensus-building.

Source: MEDIATION project; Watkiss and Hunt, 2013.

explained by the fact that biodiversity adaptation is still in the initial stage, while non-climate policies addressing biodiversity provide the basis for a systematic identification, assessment and prioritisation of options.

Identifying, assessing and prioritising adaptation options for biodiversity policy have been fostered by various factors, e.g. new policies at the EU level. The EU biodiversity strategy (EC, 2011) highlights biodiversity loss, alongside climate change, as the most critical global environmental threats. Both are

inextricably linked. While biodiversity protection can make a key contribution to climate change mitigation (e.g. towards achieving the target to limit the increase in global temperature to a maximum of 2 °C above pre-industrial levels) and adaptation (adequate measures to reduce the impacts of unavoidable effects of climate change), those actions are also essential to avert biodiversity loss.

In contrast, implementation of adaptation has been reported more often for the water and agriculture sectors.

2.4 Key topic 4: Coordination of adaptation

Key messages

- Countries implementing adaptation consider that their coordination mechanisms are at least 'medium-effective' or 'effective' and fulfil their purpose, although improvements are possible.
- Working groups and task forces are common ways to coordinate adaptation action across sectors and levels of governance.
- Countries find that knowledge exchange, coordination of stakeholders and assignment of responsibilities can support coordination of adaptation action. However countries also find that these activities can present challenges to coordination.
- Countries can improve their coordination of adaptation further by learning about the diversity in coordination mechanisms across countries, and by sharing experiences and lessons learned.

2.4.1 *Coordination of adaptation: what does this entail?*

Adaptation to climate change is a cross-cutting topic that concerns all sectors of society and requires action at multiple levels from national governments to local actors. Horizontal and vertical coordination will help to integrate adaptation into relevant policy areas. An important aim of coordination is to ensure that

the different factors are recognised and taken into account across policies and scales of governance. Coordination is also expected to reduce the risk of mal-adaptation, which only shifts the burden of adaptation from one sector or actor to another, worsens future problems of adaptation or increases the challenges of mitigation (EEA, 2013). The need for horizontal and vertical coordination is explicitly stressed by the EU Adaptation Strategy (EC, 2013).

Definition of key terms

Horizontal coordination mechanisms refer to institutions and processes in place to support integration of adaptation into sectoral policies. Actors responsible for different policy areas within an administrative level (e.g. national) exchange information, and adjust their activities so as to ensure that adaptation efforts result in coherent action, responding to the unavoidable impacts of climate change and, where possible, benefiting from climate change.

Vertical coordination mechanisms refer to institutions and processes in place to support integration of adaptation through multiple administrative levels within a country (i.e. national, provincial, regional and local/city level). This means that information on and approaches to adaptation are transferred and exchanged effectively within each policy area, from the national to the subnational levels and vice versa.

For further definitions and sources, see the glossary at the end of this report.

2.4.2 Self-assessment survey findings

Questions on the effectiveness of horizontal and vertical coordination mechanisms used a Likert-type scale requesting respondents to judge the effectiveness of the coordination mechanisms in their country. Responses have been grouped with the help of information on the stage of the adaptation policy process on a six-point scale as one can expect that coordination develops with the implementation of policies. Countries were also asked to describe their horizontal and vertical coordination mechanisms as well as to report success factors and challenges linked to coordination.

Question from self-assessment survey (including question numbers)	Number of countries having answered this question (including % of total number)
In what stage of the adaptation policy process is your country? (Q12)	30/30 (100 %)
How would you assess the mechanism put in place at national level to coordinate the horizontal integration (i.e. integration into sectors) of the adaptation policy process? (Q13)	29/30 (97 %)
How would you assess the mechanism put in place at national level to coordinate the vertical integration (from national to local level) of the adaptation policy process? (Q14)	29/30 (97 %)
Please give a short description of the horizontal and vertical coordination of adaptation policy in your country. Please also indicate who has been involved and what mechanism for coordination has been used (please also indicate if these mechanisms have changed in the different stages of the process, e.g. from formulation to implementation): A) Horizontal coordination B) Vertical coordination C) What was crucial for successful coordination? D) What was challenging or missing? (Q15)	A 27/30 (90 %) B 24/30 (80 %) C 22/30 (73 %) D 19/30 (63 %)

Working groups and task forces are common ways to achieve coordination across sectors and levels of governance

European countries report a variety of institutional mechanisms to support horizontal coordination of adaptation across sectors. Examples of horizontal coordination mechanisms have been reported by 22 out of 29 countries (Table 2.7). Ministries that are responsible for the environment or the use of natural resources are generally reported to carry the responsibility for horizontal coordination. The most common form of horizontal coordination at the national level is the establishment of working groups or task forces that bring together representatives from different ministries and other organisations. Some countries, for example Bulgaria, Cyprus, Italy, Liechtenstein and Lithuania, have reported that also non-governmental stakeholders

have been invited to take part in the horizontal coordination mechanisms.

Examples of vertical coordination mechanisms for adaptation were reported by 18 out of 29 countries (Table 2.8). Vertical coordination of adaptation is either a task of each sector ministry, or a more general task coordinated by the ministry in charge of adaptation at the national level. Similar to horizontal coordination mechanisms, vertical coordination takes place through joint task forces, panels and working groups as well as more informal channels of communication. Subnational plans and programmes also serve a coordinating function in, for example, France and Finland. Inclusion of stakeholders from regional and local levels in national level institutions was reported by Cyprus, Finland, Italy, Lithuania, the Netherlands and Portugal.

Table 2.7 Examples of horizontal coordination mechanisms reported by European countries, and country assessments of horizontal mechanism's effectiveness

Country	Description of horizontal coordination mechanism (reference to stage of policy process is made where countries have indicated differences in mechanisms)
Very effective coordination mechanisms	
Switzerland	A working group established under the Interdepartmental Committee on Climate (IDA Climate) with representation of 10 federal agencies.
Effective coordination mechanisms	
Austria	Policy formulation: NAS/NAP development was coordinated by Ministry of Agriculture, Forestry, Environment and Water Management, with support from existing institutions including the Kyoto Forum (originally developed for mitigation issues) and Interministerial Committee on Climate (IMC Climate). Implementation: Existing committees step in on adaptation issues, and there is informal exchange between the environment ministry and other relevant ministries.
Belgium	Examples are the Flemish task force on adaptation and Walloon working group on adaptation.
Cyprus	Development of the Cyprus NAS has been coordinated by the Environment Department of the Ministry of Agriculture, Natural Resources and Environment (MANRE) by means of the Life+ CYPADAPT project. The CYPADAPT Steering Committee comprised representatives of all sectors (government departments, local authorities, universities, research institutions, consultants, NGOs, consumer organisations, etc.).
Denmark	Policy formulation: Cross-ministerial committee of government officials responsible for mapping climate impacts and preparing the action plan for climate-proof Denmark.
Finland	Policy formulation: Interministerial working group of sector ministries and key research institutes, coordinated by the Ministry of Agriculture and Forestry. Additional consultation of experts and actors from sectors and the research community. Implementation, monitoring and evaluation: Coordination Group for Climate Change Adaptation with representatives from sector ministries, regional and local authorities and research institutes.
Germany	Interministerial Working Group at federal level with representatives of all federal ministries (meets two to four times a year)
Lithuania	The horizontal and vertical coordination is ensured by the Strategy for National Climate Change Management Policy (2013–2050) and its Interinstitutional Action Plan for the implementation of the goals and objectives for the period from 2013 to 2020. Implementation of the strategy and the action plan are coordinated by the Ministry of Environment. Also, horizontal and vertical coordination is ensured through the work of the National Climate Change Committee. The committee consists of experts from government, municipalities, science and NGOs, and has an advisory role.
Portugal	The National Strategy (ENAA) is supported by a coordination group involving nine sectors. Coordination responsibility lies with the Portuguese Environment Agency.
Romania	Policy formulation: Large consultation process including ministries and other stakeholders as part of strategy-drafting process.
Spain	Sectoral action programme for impacts and vulnerability assessments, including participatory workshops for key stakeholders.
United Kingdom	Cross-UK Government Climate Adaptation Board includes all key government departments and devolved administrations, as well as sectoral coordination groups e.g. Defra network adaptation delivery group and health coordination groups.
Medium effective coordination mechanisms	
Bulgaria	Policy formulation: Working group of concerned government organisations and NGOs.
Czech Republic	Policy formulation: Interdepartmental expert groups for each area of interest.
Italy	Policy formulation: Institutional Panel coordinated by the Ministry for Environment, Land and Sea includes representatives from relevant ministries and other institutional stakeholders such as regional and local administrations.
Latvia	Policy formulation: Two working groups (interministerial and expert) to support Ministry of Environmental Protection and Regional Development in policy preparation.
Malta	Climate Change Consultative Council and Climate Change Division deal with both adaptation and mitigation.
Netherlands	National-level coordination is carried out by the legally-based Delta programme, with joint responsibility of all involved ministries, and a coordinating role for the minister of Infrastructure and Environment.
Slovakia	The Ministry of the Environment coordinates national activities on climate change adaptation in collaboration with the Working Group for Adaptation comprising representatives of ministries, professional institutions, research and NGOs that supports the High-Level Coordination Committee on climate policy.
Sweden	Each sector is responsible for adaptation in their area and there is no national level coordinating actor. At regional level, country administrative boards hold overall responsibility.
Effectiveness of coordination mechanisms unknown	
Ireland	The integration of the adaptation policy across key sectors is at an early stage. The present mechanisms work on an ad-hoc basis. However, a more definitive position on the effectiveness of the coordination mechanisms will become more apparent over time; it is intended that there will be a primary legislative basis for sectoral adaptation plans in the very near future. The Impacts and Adaptation Steering Group with responsibility for coordinating research under the EPA's Climate Change Research Programme, also provides a forum for knowledge exchange amongst a wide range of sectors. This group in particular allows for the practical exchange of views and opinions as well as acting to identify where further work is needed.
Liechtenstein	Policy formulation: Meetings and interviews with all stakeholders.

Table 2.8 Examples of vertical coordination mechanisms reported by European countries, and country assessments of vertical mechanism's effectiveness

Country	Description of vertical coordination mechanism (reference to stage of policy process is made where countries have indicated differences in mechanisms)
Very effective coordination mechanisms	
Denmark	The National Task Force on Climate Change Adaptation supports municipalities in their adaptation work.
Effective coordination mechanisms	
Austria	Policy formulation: NAS development was coordinated by Ministry of Agriculture, Forestry, Environment and Water Management, with support from existing institutions including the Kyoto Forum (originally developed for mitigation issues) and Interministerial Committee on Climate (IMC Climate). Implementation: Existing committees (IMC Climate and National Climate Protection Committee) step in on adaptation issues and informal exchanges between the Environment Ministry and other relevant ministries.
Germany	A working group under the Conference of Environment Ministers integrates federal states in the process (meets twice a year).
Lithuania	Horizontal and vertical coordination is ensured by the Strategy for National Climate Change Management Policy (2013–2050) and its Interinstitutional Action Plan for the implementation of the goals and objectives for the period from 2013 to 2020. Implementation of the strategy and the action plan are coordinated by the Ministry of Environment. Also, horizontal and vertical coordination is ensured through the work of the National Climate Change Committee. The committee consists of experts from government, municipalities, science and NGOs and has an advisory role.
Romania	The responsible authority in each priority sector is responsible for coordination, implementation and for supporting local bodies.
Spain	Technical Working Group on Impacts and Adaptation established under the Coordination Commission of Climate Change Policies (CCPCC) coordinates among national and regional administrations. Local administrations are also represented in the CCPCC.
Switzerland	Vertical integration is part of sectoral policies. Vertical integration in cross-sectoral topics will be implemented, based on Article 8 of the CO ₂ Act.
United Kingdom	A local Adaptation Advisory Panel for England has been established by Defra. The panel comprises a wide range of local government bodies and their partners from across England to promote strong national/local dialogue on how best to support local adaptation action. Each government department works with its own network of local delivery partners to embed and operationalise adaptation action at the local level.
Medium effective coordination mechanisms	
Belgium	Coordination group between federal and regional governments is in place and effective. The Walloon and Flemish parts of Belgium provide some support to local administrations in their regions, and Brussels collaborates at the national level as a region of the national working group.
Cyprus	Development of the Cyprus NAS has been coordinated by the Environment Department of the Ministry of Agriculture, Natural Resources and Environment (MANRE) by means of the Life+ CYPADAPT project. The CYPADAPT Steering Committee comprised all sector representatives (government departments, local authorities, universities, research institutions, consultants, NGOs, consumer organisations, etc.).
France	National planning and regional planning are not formally coordinated, but local level adaptation planning must be compatible with regional level planning.
Malta	There is an Interministerial Committee to ensure coordinated policy design and implementation.
Netherlands	The Delta programme has a strong vertical commitment with other government levels and involved institutions.
Portugal	ENAA includes representation of the National Municipalities Association and autonomous regions (islands of Madeira and the Azores). Integration of adaptation into local policies is ongoing with support from the EEA Grants programme AdapT.
Slovakia	The High-Level Committee for the Coordination of Climate Change Policy defines the overall lines for adaptation policymaking. It is supported by the Working Group for Adaptation that includes representation of local governments through the Association of Towns and Communities of Slovakia and the Union of Towns and Cities of Slovakia.
Less effective coordination mechanisms	
Finland	Representatives of the municipal sector are included in the Coordination Group for Climate Change Adaptation. Most regions have climate strategies that also address adaptation to some extent.
Italy	Representatives of local and regional administrations are included in the Institutional Panel.
Sweden	Regional authorities have been tasked by the national government to develop action plans at regional level and map progress at local level.
Effectiveness of coordination mechanisms unknown	
Ireland	The integration of the adaptation policy process from national to local level is at an early stage. Local adaptation plans will be integrated into the long-established planning system. Local development planning will, in effect, become the mechanism for the delivery of local climate adaptation action. The effectiveness of coordination will become more apparent in time and will be kept under review in the context of national adaptation planning.

Countries that are implementing adaptation report that they have effective coordination mechanisms

Established horizontal coordination mechanisms are reported at least medium effective by 21 out of 29 countries (Figure 2.10). The remaining third of countries state that mechanisms are either not in place or are unknown to the respondent. No country has reported less effective or not effective coordination mechanisms.

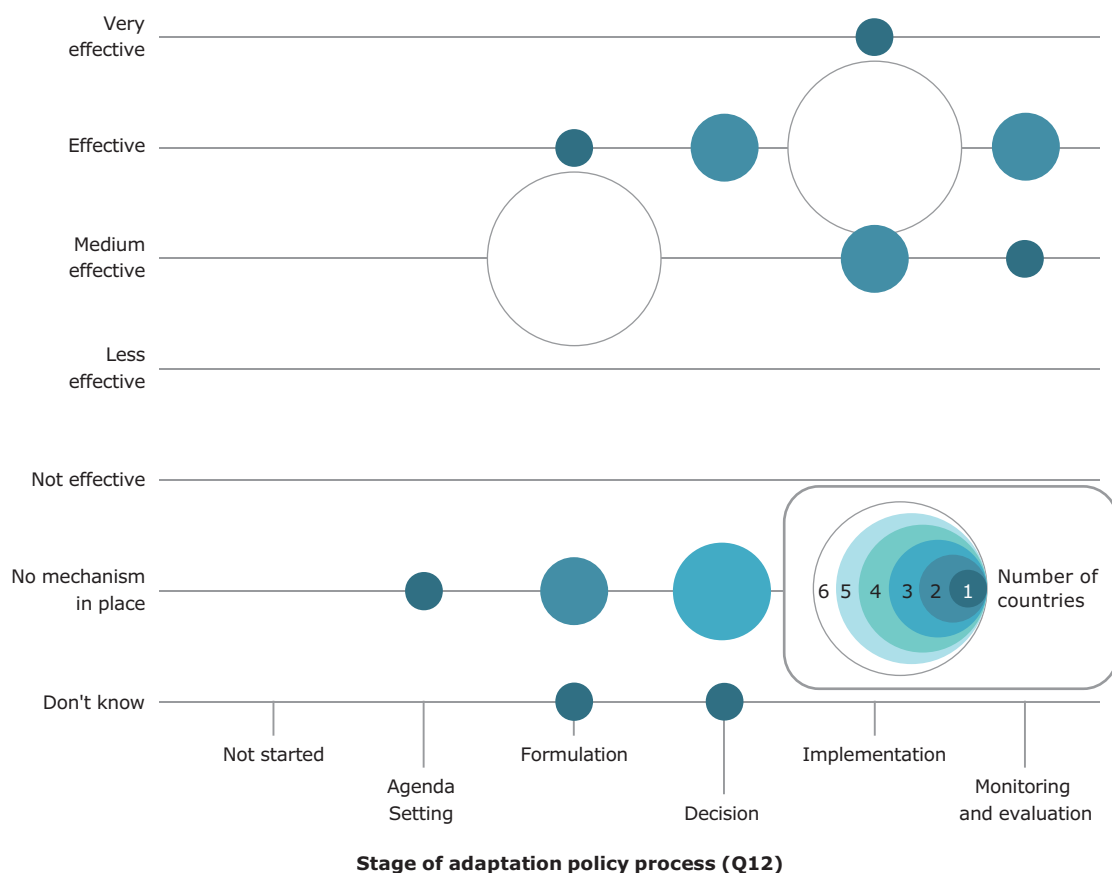
All countries that are implementing adaptation policies have horizontal coordination mechanisms in place and report them to be at least medium effective, as indicated by the empty space in the lower right corner of Figure 2.10 (Table 2.7 for details of the mechanisms). Countries in early stages of the adaptation policy process have generally not yet established horizontal coordination mechanisms, as

indicated by the empty space in the top-left corner of Figure 2.10. Of countries in the policy formulation and decision phases, 9 of 16 report that they have at least medium effective horizontal coordination processes.

The general pattern for vertical coordination mechanisms is similar to pattern for the horizontal coordination mechanisms. All countries that implement or monitor and evaluate their adaptation policies report having vertical coordination mechanisms in place (Figure 2.11 and see Table 2.8 for details of the mechanisms). The perceived effectiveness of vertical coordination is moderately lower than for horizontal coordination, with four countries reporting 'less effective' vertical coordination mechanisms. Of the 12 countries in the implementation stage and monitoring and evaluation stage of the policy process, 11 report

Figure 2.10 Reported effectiveness of horizontal coordination mechanisms in national adaptation policy processes, relative to stages of adaptation policy process (Questions 12 and 13; 29 responding countries)

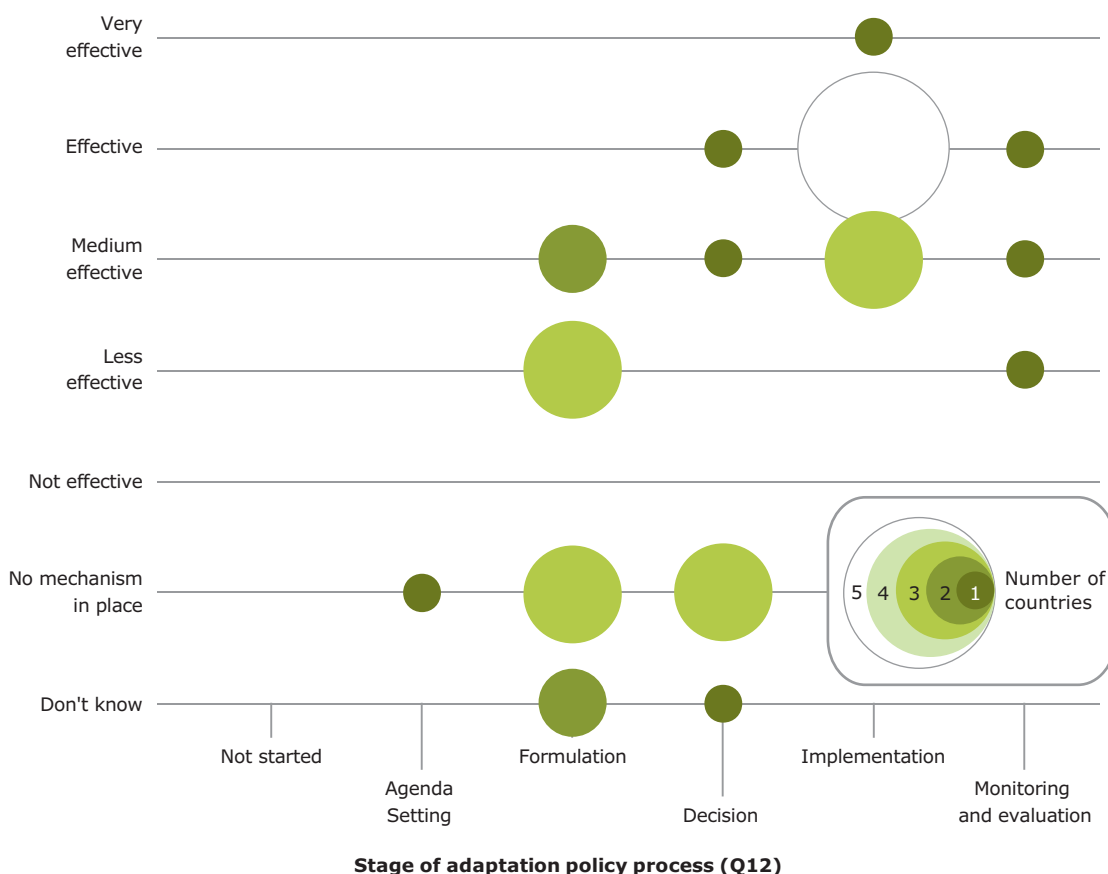
Effectiveness of horizontal coordination mechanism at national level (Q13)



Note: Bubbles indicate the number of countries in a given stage of adaptation policy process with a similar perception of the effectiveness of their horizontal coordination mechanism.

Figure 2.11 Reported effectiveness of vertical coordination mechanisms in national adaptation policy processes, relative to stages of adaptation policy process (Questions 12 and 14; 29 responding countries)

Effectiveness of vertical coordination mechanism at national level (Q14)



Note: Bubbles indicate the number of countries in a given stage of adaptation policy process with a similar perception of the effectiveness of their vertical coordination mechanism.

their vertical coordination mechanisms to be at least medium effective. In the formulation stage, none of the 10 countries reports having an effective vertical coordination mechanism in place. Overall 14 out of 29 countries report less effective (or unknown effectiveness of) vertical coordination mechanisms or not to have vertical coordination mechanism in place.

Knowledge exchange, coordination of stakeholders and assignment of responsibilities can both support and present challenges to coordination

Countries provided multiple examples of factors related to institutions and processes, which, when in place, contribute to successful coordination, but when missing, make coordination more challenging.

These factors range from general transparency and information exchange to stakeholder coordination, commitment of actors and institutional factors such as legal frameworks and the assignment of responsibilities (Table 2.9).

Reported challenges relate to similar issues as the reported success factors. Insufficient mechanisms for knowledge exchange can present a challenge along with limited resources when trying to coordinate large and diverse groups of stakeholders. Lack of formal structures and agreements may present a challenge for coordination, e.g. in the case of public sector reorganisations. Countries also report challenges arising from competing interests between different stakeholders and unclear responsibilities linked to coordination of adaptation activities.

Table 2.9 Examples of success factors and challenges of coordination reported by countries

Issue in coordination	Reported success factors	Reported challenges
Transparency	Transparent process Open dialogue	
Knowledge exchange	Interactive and constructive communication Shared knowledge base with regional and local actors Knowledge exchange with responsible entities Extensive awareness events	Lack of communication campaigns and education Insufficient information exchange and diffusion of studies Lack of platforms for knowledge exchange
Coordination of stakeholder involvement	Involvement of all sectors Inclusion of all stakeholders National public consultation	Limited involvement of relevant stakeholders Large number of stakeholders requires time, creates a coordination burden, makes effective involvement difficult
Commitment by key actors	Shared objectives among stakeholders Commitment and ownership of all relevant ministries Willingness and awareness among members of the coordination group Active and voluntary involvement of all stakeholders Political commitment	Different interests and priorities among key stakeholders Long-term action hinders prioritisation and makes commitment difficult Stakeholders who fear losing will try to counteract Lack of prioritisation of climate change adaptation at high political level
(Legal) Framework for action	Legal basis for adaptation planning Legally based framework for action	Insufficient recognition of subnational levels in NAS Competition with other legally binding agreements (e.g. Natura 2000, WFD)
Assignment of responsibilities	Designated body in charge of coordination Clearly assigned responsibilities for each priority sector and coordinating body Political mandate for coordination process	Lack of a responsible body with convening powers Scattered responsibilities and resources

2.4.3 Country examples

A number of countries have reported in the self-assessment survey examples and experiences of

institutional arrangements supporting coordination of adaptation across sectors and administrative levels. The following selected cases present a diversity of approaches from European countries.

Interministerial body supports coordination across sectors

Switzerland

The Swiss strategy on climate change adaptation is coordinated by the Interdepartmental Committee on Climate, which was founded for the revision of the CO₂ Act (effective from 1 January 2013) that mandates the coordination of adaptation measures. A working group is responsible for climate change adaptation with representation from 10 federal agencies. The Federal Office for the Environment (FOEN) has overall responsibility for developing the Swiss adaptation strategy. It chairs the procedures, ensures that a uniform approach is adopted and coordinates work between sectors. The individual federal offices are responsible for adaptation in their sectors.

More information

<http://www.bafu.admin.ch/index.html?lang=en>

Regional coordination of climate action in Jämtland, Sweden

Sweden

In 2009, the County Administrative Boards (CAB) in Sweden were assigned responsibility for climate adaptation action at the regional level. For example, in Jämtland county in the north-west of Sweden, work on climate action integrates aspects of both mitigation and adaptation and the county has recently developed a climate strategy that includes action plans for both mitigation and adaptation.

The CAB collaborates with a broad selection of both public and private stakeholders within the county, including regional and municipal authorities, industries and the education sector. An important role for the CAB is to increase knowledge of climate change and its impacts and encourage adaptation actions in dialogue with stakeholders. To promote wide engagement of stakeholders, organisations have been invited by the county governor to sign letters of intent and join the regional Climate Focus platform (Klimatfokus) for collaboration on climate action.

More information

National adaptation portal page (Roles for government actors at different levels) <http://www.klimatanpassning.se/in-English/roles-and-responsibilities-1.25109>

Adaptation in the Jämtland county (in Swedish) <http://www.lansstyrelsen.se/JAMTLAND/SV/MILJO-OCH-KLIMAT/KLIMAT-OCH-ENERGI/KLIMATANPASSNING/Pages/index.aspx>

Delta Programme embodies all administrative levels

The Netherlands

The legally-based national Delta Programme in the Netherlands incorporates all administrative levels in safeguarding the country from flooding and ensuring continued availability of freshwater resources. The programme is a joint responsibility of all involved ministries with a coordinating role for the Minister of Infrastructure and Environment.

The programme has a strong vertical commitment, through inclusion of provincial and municipal authorities and involved institutions such as water boards, business and civil society organisations. At regional level, advisory groups play an important role in the deliberations of the regional steering groups. At the local level, 'municipal ambassadors' have been appointed for the Delta Programme for each of the six area-oriented subprogrammes. They are responsible for involving municipalities in the Delta Programme by providing information, encouragement and, wherever necessary, support. They also act as liaison officers between the programme organisation and the municipal authorities.

More information

<http://www.deltacommissaris.nl/english/delta-programme>

<http://www.government.nl/issues/water-management/delta-programme/working-method-of-the-delta-programme>

Integrated mechanisms for horizontal and vertical coordination

Italy, Finland and Portugal

While most countries have opted for separate institutional set-ups for horizontal and vertical coordination mechanisms, some countries use the same mechanisms for both coordination tasks. In Italy, the Institutional Panel coordinated by the Ministry for Environment, Land and Sea includes representatives from relevant ministries and other institutional stakeholders such as regional and local administrations.

In Finland, the Coordination Group for Climate Change Adaptation led by the Ministry of Agriculture and Forestry has representatives from sector ministries, regional and local authorities and research institutes. Regional and local-level stakeholders were not members of the original Coordination Group appointed in 2008, but were invited to join the group when it was re-established in 2012 based on challenges experienced in coordination of adaptation activities across administrative levels. Likewise in Portugal, the coordination group that supports the National Strategy (ENAAC) includes representation of sectoral and subnational-level stakeholders.

2.4.4 Discussion of findings

Effective coordination mechanisms are ensured when adaptation policies have reached implementation stage

Adaptation to climate change is a typical multilevel governance problem (EEA, 2013). The general strategies that are developed at a central level need to be interpreted and applied at subnational levels, and activities have to be coordinated across multiple sectors. Horizontal and vertical coordination are known to be generally important in systems with multilevel governance (Schout and Jordan, 2005). Therefore the need for — and experiences of — both horizontal and vertical coordination increase when countries advance to implementation and evaluation stages of the adaptation policy process (Figures 2.10 and 2.11). In the self-assessment survey, countries provided several examples of how the integration of adaptation policy into other policy areas and levels of governance occurs in practice (Tables 2.7 and 2.8). The findings reflect many different forms of integrating or mainstreaming adaptation policies into other policy areas, with some countries relying on more formal integration and others on open forms of coordination (Russel et al., 2014).

Responses from the countries suggest that coordination has evolved naturally to fill its purpose. Although there can be some elements of reporting bias in the responses based on a self-assessment and different interpretations of what 'effective coordination' means in practice, it is noteworthy that all but one of the countries that have reached the implementation stage consider their coordination mechanisms to be at least medium effective (Figures 2.10 and 2.11). The general mechanisms that countries use are similar, but their implementation and details differ between countries and between horizontal and vertical coordination tasks.

When coordination mechanisms are viewed across all stages of the adaptation policy process, one can see that horizontal coordination mechanisms were generally assessed by countries as more effective than vertical coordination mechanisms. This corresponds to a general observation for many areas of administration that vertical coordination to the regional or municipal level is more challenging than horizontal coordination due to both structural and cultural factors such as the relative autonomy that regional and local government have when it comes to the implementation of policies (Christensen and Lægrend, 2008). The responses to the self-assessment also suggest that countries generally have less

experience so far in implementing vertical coordination mechanisms for adaptation, as indicated by the relatively larger number of answers reporting that vertical coordination mechanisms are either not in place or are unknown. This may reflect the fact that relatively few countries have progressed to implementing adaptation policies and thus have less experience of vertical coordination (as the local nature of practical adaptation actions may suggest). The responses may, however, also reflect a difficulty in getting sufficiently detailed information on the vertical coordination as it is generally a task of each sector of administration. Many of the responses showed that vertical coordination is the responsibility of each sector that may use existing processes for coordination, rather than establish new mechanisms for adaptation alone. Switzerland is a case in point where vertical integration is reported to primarily fall under sectoral policies, and only cross-sectoral topics will be addressed through a framework dedicated to adaptation.

Processes for knowledge exchange, communication and division of tasks contribute to successful coordination, but coordination problems can arise nevertheless

One way to examine the success of coordination is to examine it at the level of process or outcome. A successful coordination process means among other things that information flows between those who are expected to coordinate their activities. A successful outcome could mean that the objectives of the activity are met, which in the case of adaptation to climate change could mean a noticeable increase in adaptive capacity. The two perspectives are obviously closely related. In the responses, successful coordination was linked to effective communication and knowledge exchange, which also affect and reflect issues of stakeholder involvement, the setting up of frameworks for action and assignment of responsibilities. All of these refer to processes, but outcomes in the form of coordinated actions for adaptation are likely to depend on them too. Stakeholder involvement can further be viewed as a form of a coordination process. Additionally, the results of successful coordination are likely to improve conditions for the involvement of stakeholders by ensuring that policies are coherent, which in turn will affect adaptive capacity. For a discussion of stakeholder involvement in adaptation policy processes, see Key topic 5.

Successful coordination should in principle reduce problems that typically arise under conditions of

poor coordination, i.e. unclear responsibilities, limited cooperation among stakeholders, lack of knowledge exchange, legal issues (e.g. conflicting legislations) and conflicting values and interests. The self-assessment survey provided some indications that countries with no (or unknown) coordination mechanisms experience relatively more of these barriers than those that reported effective coordination mechanisms. This observation is, however, not fully clear-cut as some problems related to coordination have also been reported by countries that describe their coordination mechanisms as effective. There are also conceptual issues involved. As McConnell (2010) notes, success and failure in policies are inherently multidimensional. Success in one dimension such as a process accepted for dealing with a problem does not automatically imply success in actually solving it or in achieving political recognition for it. Therefore respondents may simultaneously consider a coordination mechanism to be effective and yet experience typical problems of coordination.

Diversity in the coordination mechanisms and sharing of lessons learned are likely to benefit the development of effective coordination for adaptation

The self-assessment survey shows that there is diversity in how countries approach coordination. There are, for instance, differences in how formal coordination mechanisms are and also in the details of their set-up. There are examples of countries that have created a clear legal base for coordination (i.e. France and the Netherlands) but also examples of more informal structures. Countries also reported challenges linked to a lack of formal structures and agreements for coordination e.g. in the case of public sector reorganisations. Studies have highlighted that governance of adaptation takes place through both formal and informal institutions and networks of actors at different levels. Such networks provide opportunities for actors at subnational levels to engage in planned adaptation, but any lack of coordination at the national level may be an impediment for involvement (Juhola and Westerhoff, 2011).

The self-assessment survey results provide several examples of horizontal coordination in the form of working groups or task forces for policy development. These tend to be temporary set-ups, whereas councils or advisory panels can provide more permanent mechanisms that can support both horizontal and vertical coordination. Vertical

coordination of climate change adaptation can also be mainstreamed into general administrative coordination mechanisms without the need for new permanent mechanisms.

Similarities in the reported success factors and challenges to coordination suggest that further analysis and sharing of lessons learned could support countries in their efforts to coordinate adaptation across sectors and levels of governance. A detailed comparative evaluation of the merits and drawbacks of various approaches to coordination cannot be made based on the self-assessment survey results. A full comparative evaluation would demand information on the societal context as the effectiveness of a particular approach is likely to depend on general societal structures and not only on the approach chosen for coordinating climate change adaptation. Adaptation governance mechanisms have been found to depend not only on political systems (centralised, administrative-federal or federal) but also on other variables such as financial and economic circumstances, cultural values and societal expectations (Venturini et al., forthcoming). For the same reason, it is difficult to make any definitive claims concerning the differences in approaches to horizontal and vertical coordination. Whatever the approach, unclear responsibilities, limited cooperation among stakeholders, lack of knowledge exchange, legal issues (e.g. conflicting legislations) and conflicting values and interests can become obstacles to effective coordination. Ultimately, these obstacles are likely to be reflected in incoherent policies for adaptation. Addressing the challenges of coordination should be a top priority, although solutions to them are likely to depend on the particular societal context, including general governance structures.

Findings from analyses of river basin management provide evidence that governance regimes that are characterised by a distribution of power and at the same time effective coordination structures, perform relatively better in achieving climate change adaptation than other arrangements. The ability to respond to challenges from climate change thus appears to be strongly related to effective coordination and innovative and flexible ways for dealing with uncertainty (Pahl-Wostl et al., 2012). The extent to which this applies to all fields of climate change adaptation policies is still an open question, but the findings of the self-assessment survey indicate the importance of factors such as knowledge exchange and clear, shared responsibilities (Table 2.9). The issues of coordination also highlight, for example, the

importance of effective stakeholder involvement and dissemination of information (discussed further under Key topic 5).

The results of the self-assessment survey support the general observation of the EEA report 'Adaptation in Europe' (EEA, 2013) that there is considerable

diversity in the ways coordination has been developed and implemented by European countries, and that issues of coordination are important for the success of adaptation activities. This suggests that there is potential for learning and exchanging experiences that have strengthened coordination as called for by the EU Adaptation Strategy.

2.5 Key topic 5: Stakeholder involvement

Key messages

- Countries across Europe report that they have involved various stakeholder groups in adaptation policy processes.
- Stakeholder involvement is more widespread in the development of adaptation policy than in the implementation or monitoring and evaluation of policies.
- Countries emphasise the importance of transparent, inclusive and well-informed stakeholder involvement processes.
- Countries have yet to explore and expand in-depth involvement processes that would increase the commitment to adaptation of private sector and civil society stakeholders.

2.5.1 Stakeholder involvement: what does this entail?

Stakeholder involvement is the process of involving those who are affected by and thus have an interest in adaptation throughout the policy cycle. This includes formulation and implementation as well as monitoring and evaluation of adaptation policies. In its basic forms, stakeholder involvement relies on the exchange of information among governmental and other interested stakeholders. In-depth involvement is a communication and collaboration process that explicitly seeks to

identify and to clarify the various interests at stake, with the ultimate aim of producing well-informed policies that can be implemented in practice. Stakeholder involvement has been seen to be an integral part of policy development, implementation and monitoring and evaluation (IPCC, 2014).

Different levels of stakeholder involvement are identified: they vary in type and level of ambition. The self-assessment survey focused on six forms of involvement used by countries in different phases of the adaptation policy process.

Means of strengthening stakeholder involvement in the context of climate change adaptation:

- ensure that a broad range of interests is considered;
- help gather data or information, identify gaps in data or information, and identify future data sources;
- provide transparency and accountability, regarding both decisions taken and the process by which those decisions were taken;
- accustom stakeholders to the fact that choices may have to be made in the means of strengthening adaptive capacity;
- strengthen commitment to improve adaptive capacity.

Source: Modified and adapted from André et al., 2006, and Innes and Booher, 2005.

Definition of key terms

'Stakeholders' in the context of this report include the following actors:

- government officials at national level (e.g. policymakers, public administration, government agencies);
- government officials at subnational level (including provincial, regional and local levels);
- the private sector;
- interest groups (e.g. farmers' associations and NGOs);
- scientists/researchers;
- the general public.

The following forms of stakeholder involvement were considered in the self-assessment survey:

Information given: information has been provided to stakeholders (e.g. websites, newsletters, reports and informative meetings).

Information gathered: information has been collected from stakeholders (e.g. online survey).

Consultation: feedback on policy draft proposals has been obtained from stakeholders (e.g. written feedback on policy drafts).

Active involvement: stakeholders have actively been involved in, and have had the possibility to shape decision-making in the adaptation policy (e.g. advisory committees).

Partnerships: decision-making power is redistributed through negotiation between responsible authority and stakeholders.

Empowerment: final decision is in the hands of the stakeholders.

Active involvement, partnerships and empowerment are considered 'deeper' forms of stakeholder involvement in the context of this report. Country responses brought up an additional form of involvement, co-creation, where multiple public and private sector stakeholders work together and share responsibility for developing knowledge, options and solutions. Elements of co-creation can be found in both partnerships and empowerment.

For further definitions and sources, see the glossary at the end of this report.

2.5.2 Self-assessment survey findings

The self-assessment survey requested information on four questions on stakeholder involvement: the general contribution of stakeholders' involvement in the adaptation policy process, the stakeholders involved and the format of their involvement in the development, implementation, monitoring and evaluation phases of the adaptation process, and elements of successful stakeholder processes. Information on formats of stakeholder involvement has been cross-checked with the responses to an additional question on the stage of the adaptation policy process.

Question from self-assessment survey (including question numbers)	Number of countries having answered this question (including % of total number)
Have you involved stakeholders in the adaptation policy process? (Q38)	28/30 (93 %)
If yes, how would you assess the general contribution of stakeholders/actors engagement in the adaptation policy process? (Q39)	28/30 (93 %)
The three tables below allow you to identify the stakeholders involved and the format of their involvement for the development (first table), implementation (second table) and monitoring and evaluation (third table) phases of the adaptation process (Q40)	first table: 27/30 (90 %) second table: 18/30 (60 %) third table: 13/30 (43 %)
From your experience, what are the three most important elements in running a successful stakeholder process? (Q41)	23/30 (77 %)
Please give a short description of the horizontal and vertical coordination of adaptation policy in your country. Please also indicate who has been involved and what mechanism for coordination has been used (please also indicate if these mechanisms have changed in the different stages of the process, e.g. from formulation to implementation). Sub-question: What was challenging or missing? (Q15)	19/30 (63 %)

Stakeholder involvement in adaptation policy processes has been used throughout Europe and its importance is recognised by all responding countries

All of the 28 responding countries reported involving stakeholders in their adaptation policy processes at some level. Nearly half of the countries (13/28) assessed the contribution of stakeholders as very important and another 13 countries described it as important. Two countries expressed a neutral view on the general contribution of stakeholders in the adaptation policy process.

The form of stakeholder involvement varies with stakeholder groups and stage of the adaptation policy process. Responses from the countries show that who have been involved and how has changed with the stages of the policy process from policy development to policy implementation and finally monitoring and evaluation of adaptation policies.

Provision of information is used throughout the policy processes for practically all stakeholder groups. In the development and implementation phases, information has also been gathered extensively from different stakeholder groups and consultations have been used for most stakeholder groups except for the general public. In the implementation and monitoring and evaluation stages, anything beyond consultation is relatively rare. Few countries report active involvement, partnerships or empowerment in any stage for stakeholders outside national and subnational levels of government (Figures 2.12, 2.13 and 2.14). Those that do, report slightly more empowerment of private sector and scientific community stakeholders in the implementation than in the development of policies.

More and deeper involvement is reported in development of adaptation policy than in implementation or monitoring and evaluation of policies

Countries have reported more and deeper stakeholder involvement in adaptation policy development compared to other stages of the adaptation policy process. The greatest number of responses was also provided on involvement in policy development (27 countries) followed by implementation (18), and monitoring and evaluation (13). This reflects the number of countries that have progressed to the respective stages in the adaptation policy process. Overall the

responses indicate a relative decline in the level of stakeholder involvement from policy development to policy implementation.

For policy development, the two most commonly reported forms of involvement (21 of 27 responses) were active involvement of national level government stakeholders and consultation of scientists and researchers (Figure 2.12). Information has been provided to and collected from all stakeholder groups by approximately half of the countries.

For the implementation stage, the highest overall levels of involvement were reported for government stakeholders at national and subnational levels. For these groups, active involvement and other deeper forms of involvement were reported by approximately half of the responding countries. Non-government stakeholders were involved by on average half of the countries, primarily in information-sharing and consultation. Involvement of the general public in implementation was mostly reported as being limited to dissemination of information (Figure 2.13).

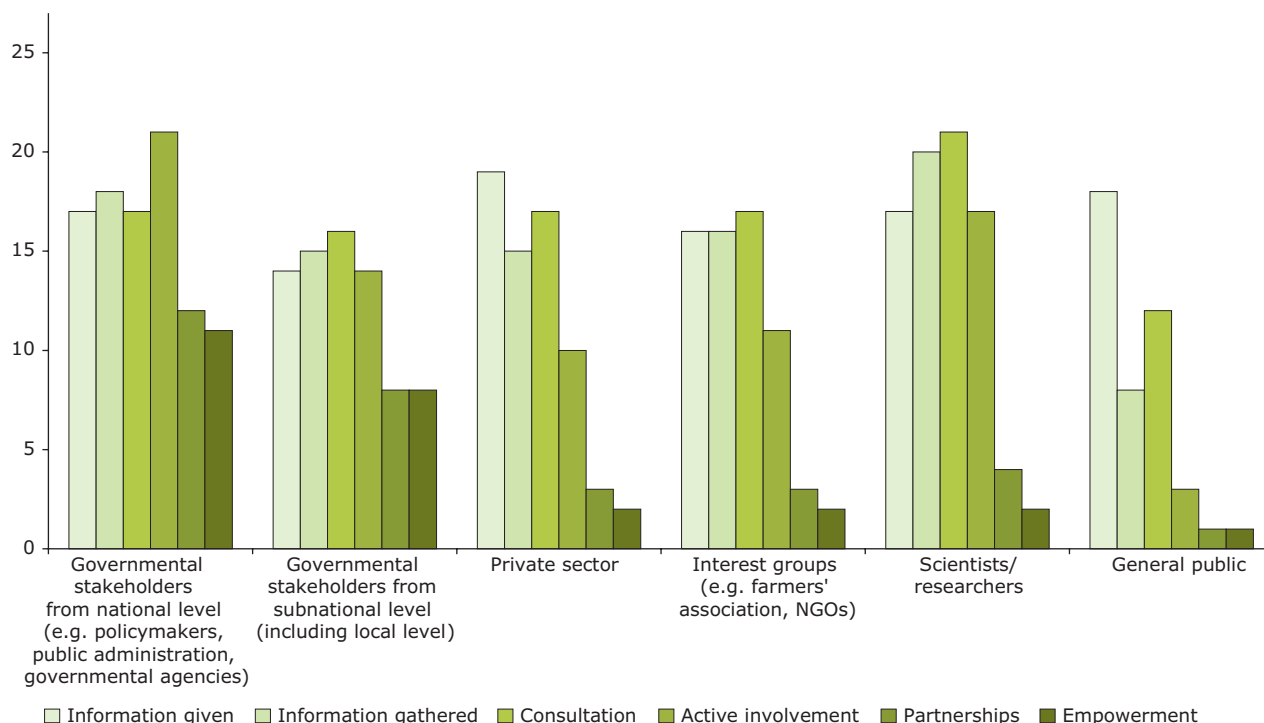
The monitoring and evaluation stage has so far included relatively limited stakeholder involvement. Of the 13 responding countries, the highest levels and forms of involvement were reported for government stakeholders as in the other stages. Involvement of other stakeholder groups was limited to mainly information-sharing and consultation, with slightly more involvement of scientists and researchers. Active involvement and other deeper forms of involvement outside national government stakeholders were reported by less than a quarter of the responding countries (Figure 2.14).

Government stakeholders at national and subnational levels feature most visibly in involvement processes

Government stakeholders at the national level feature visibly in all forms of involvement across all stages of the adaptation policy process. The responses suggest further that approximately a third of all countries have developed and implemented their adaptation policies with rather limited stakeholder involvement even at the national level (Figures 2.12, 2.13 and 2.14). In monitoring and evaluation, approximately half of the 13 responses reported national government stakeholder involvement (Figure 2.14).

Figure 2.12 Forms of stakeholder involvement in the development of national adaptation policy (Question 40; 27 responding countries)

Number of countries (out of 27) reporting stakeholder involvement in development of adaptation policy

**Figure 2.13 Forms of stakeholder involvement in the implementation of national adaptation policy (Question 40; 18 responding countries)**

Number of countries (out of 18) reporting stakeholder involvement in implementation of adaptation policy

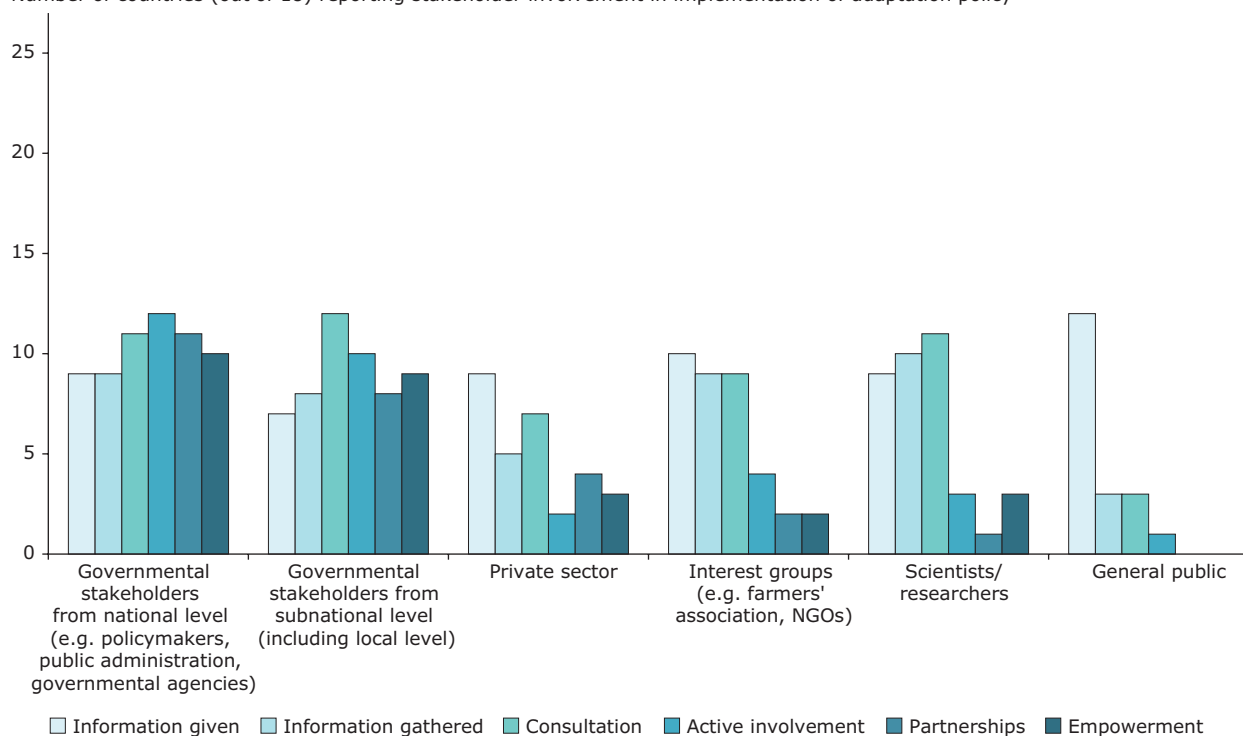
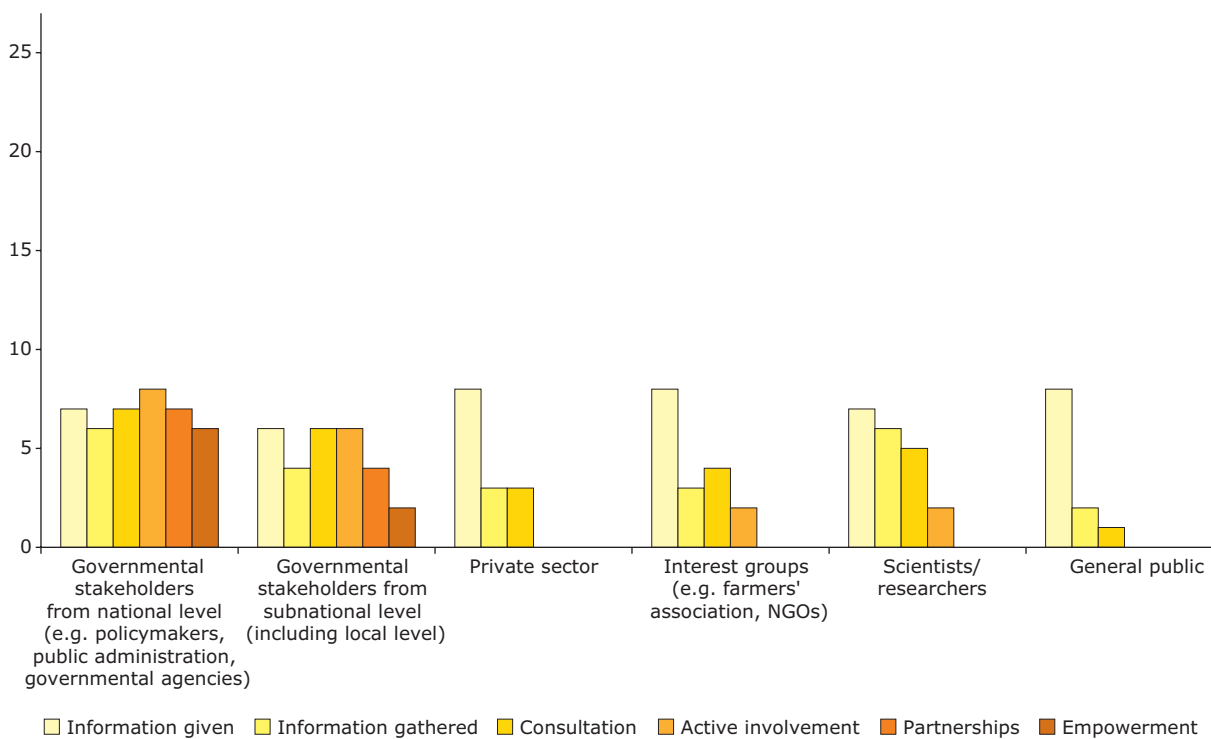


Figure 2.14 Forms of stakeholder involvement in monitoring and evaluation of national adaptation policy (Question 40; 13 responding countries)

Number of countries (out of 13) reporting stakeholder involvement in monitoring and evaluation



The involvement of subnational government stakeholders has been lower than that of national level stakeholders, especially in the policy development and evaluation stages (Figures 2.12, 2.13 and 2.14). In the implementation stage, approximately half of the 18 responding countries involved subnational government stakeholders in some way, including deep forms of involvement such as partnerships and empowerment (Figure 2.13). Overall, the relative share of deeper forms of involvement among government stakeholders was reported to increase from policy development to policy implementation.

Relative to government stakeholders, the responses indicated lower levels of involvement for non-government stakeholder groups. According to the self-assessment survey, the private sector and interest groups have been treated similarly across all stages of the policy process relative to other stakeholder groups. The main focus of their involvement has been on information exchange and consultation, but more active forms of involvement have also been reported. For example, in policy development, 10 and 11 countries (out of 27) have reported active involvement of the private sector and interest groups, respectively. Also in monitoring and evaluation of adaptation policies, countries

have reported the involvement of interest groups to be slightly more active relative to the private sector. The implementation stage has offered some opportunities for involvement of the private sector and interest groups, but deeper forms of involvement have been used in less than a fifth of the responding countries (Figure 2.13).

For scientists and researchers, the most commonly reported form of involvement in development and implementation of adaptation policies has been consultation. In the implementation stage, 12 out of 18 countries reported consultation as one of the forms of involvement used with scientific community stakeholders. The scientific community has also been an important provider of information and at least half of the counties have reported that information has been actively gathered from the research community in all stages of the policy process.

According to the responses, information on adaptation has been provided to the general public in all stages of adaptation policy. In the policy development stage some countries have reported that information has been gathered from the general public. In later stages virtually no countries use other levels of involvement for the general public.

Countries emphasise the importance of transparent, inclusive and well-informed stakeholder involvement processes

Countries have highlighted a number of ways by which the chances of successful stakeholder involvement can be increased. The factors that countries have identified as contributing to successful involvement can be grouped into those that contribute to a strong basis for involvement, those that ensure functioning involvement processes, and those ensuring that appropriate stakeholders get involved (Table 2.10).

The strengthening of the base for involvement that countries have reported can be seen to aim at ensuring informed discussions on adaptation to climate change. This can be facilitated e.g. by supporting stakeholders' capacities for involvement and ensuring knowledge provision to involvement processes.

With respect to the involvement process itself, countries have emphasised characteristics such

as early involvement, dialogue, transparency and continuity (Table 2.10). Motivating stakeholders to participate and ensuring continued commitment among stakeholders beyond one-off meetings were reported as success factors by countries. Importantly, difficulties related to motivating stakeholders and raising the will to act on adaptation were reported by countries as challenges in relation to coordination mechanisms and processes (see Table 2.9).

Countries have noted the importance of differentiating between stakeholders. Consequently, countries considered that clear definition of the roles, responsibilities and scopes of influence for different stakeholder groups are essential preconditions for running a successful stakeholder involvement process. Sensitivity to different stakeholders also implies the use of appropriate language and providing information in an accessible and easily understandable format, which links back to planning of involvement processes. Selection of methods appropriate for each stakeholder group and clarity in the objectives of the involvement process are key to ensuring successful stakeholder processes.

Table 2.10 Reported examples of success factors for stakeholder involvement

Success factor	Examples of country responses
Basis for involvement	
Awareness-raising	'raising importance of climate change and adaptation in the eyes of all stakeholders'
Providing knowledge	'communication of scientific results' 'dissemination of information' 'being transparent and honest about climate change uncertainties to gain credibility' 'bring in scientific results/studies'
Capacity-building	'capacity-building' 'build capacity at the beginning to enable a good comprehension of stakes'
Characteristics of involvement process	
Involvement early in the process	'early involvement in the policy process' 'active involvement from very beginning of process' 'involvement at an early stage of policy development' 'promoting engagement at an early and appropriate stage'
Two-way communication	'good communication' 'multidirectional knowledge/information transfer' 'constructive dialogue' 'provide forums for interactive discussions between policymakers/stakeholders and scientists'
Methods of involvement	'system approach' 'choose the right format' 'different designs should be used [for different stakeholders]'
Transparency of process	'transparent and effective protocols' 'transparency in order to follow process' 'clear and transparent process' 'transparency' 'be open and build trust'
Continuity of processes	'follow-up process' 'feedback'
Range and role of involved stakeholders	
Selection of stakeholders	'engage right stakeholders' 'identifying the right stakeholders to be involved' 'engage key audiences' 'choice of stakeholders — focused approach'
Involving a wide range of stakeholders	'active engagement from all stakeholders' 'identifying all relevant stakeholders and motivating them to participate' 'different types of stakeholders should be involved' 'involvement of various stakeholders' 'involvement of all the stakeholder groups'
Definition of roles and responsibilities	'defining responsibilities' 'communicate the roles/responsibilities/scopes of influence' 'identification of gaps, needs and roles'

2.5.3 Country examples

Extensive participatory process ensured consideration of a broad range of interests in the development of NAS

Austria

Involvement of all affected stakeholders and the general public was considered essential for the Austrian policy process on climate change adaptation and requested by the Austrian Government Programme (2008–2013). Thus, as part of the development of Austria's National Adaptation Strategy (with an integrated National Action Plan), a broad stakeholder involvement process was carried out from summer 2008 until summer 2011 by Environment Agency Austria. This process was crucial in order to raise awareness of the need for adaptation, gain acceptance from the various stakeholder groups involved as well as enhance the quality of the adaptation policy outcome. Within the process stakeholders had the opportunity to exchange their expertise and interests and had a platform to discuss potentially conflicting issues.

The main objective of the involvement process was to discuss with stakeholders (e.g. federal and provincial ministries or related institutions, interest groups and social/environmental NGOs) the adaptation options identified in a prior step by the scientific community. Discussions focused on topics such as responsibilities for implementation, financial resources, knowledge gaps and open research questions. The bigger part of the suggestions from the stakeholder participation process was included one-to-one in the NAS/NAP by the responsible Ministry.

More information

<http://www.klimawandelanpassung.at>

The mobile team on climate change adaptation supports municipalities in planning and implementing adaptation

Denmark

The Danish government has requested that all municipalities prepare action plans for climate change adaptation by the end of 2013. Guidelines prepared by the government describe how municipalities can manage the task. A mobile team on climate change adaptation was established in February 2012 within the National Task Force on Climate Change Adaptation at the Danish Ministry of the Environment. The mobile team can be called upon, free of charge, to support municipal authorities for guidance, and to facilitate collaboration between municipal authorities and other stakeholders in connection with preparing municipal climate change adaptation plans, for instance. By the end of 2013, the mobile team had had meetings with 75 of the 98 municipalities in Denmark, organised several regional meetings and facilitated workshops and meetings with politicians, policymakers and citizens.

Danish municipalities also participate in dialogue forums set up by the Ministry of Environment for climate change adaptation. These forums have engaged a wide range of players from the business community, research institutions and municipalities in an open and inclusive decision-making process that provides inputs for new legislation and supports the creation of synergies between sectors and actors.

More information

<http://en.klimatilpasning.dk>

Co-creation as part of the development of the UK/England National Adaptation Programme

United Kingdom

A series of sector-facing, co-creation workshops were held as part of the development of the UK/England National Adaptation Programme (NAP). The development of the NAP was divided into seven themes covering Built Environment, Infrastructure, Healthy and Resilient Communities, Agriculture and Forestry, Natural Environment, Business and Local Government (the latter was included as a cross-cutting theme to reflect the importance of local adaptation action). The workshops were designed around the key sectors likely to be most impacted by climate change (as identified in the UK Climate Change Risk Assessment) and sought to involve those who are already, or need to, take action. The workshops included more than 600 individuals from over 250 organisations.

The national workshops explored the stakeholders' awareness and capacity for adaptation, interdependencies between organisations and sectors, helped shape the associated Government's Climate Ready Support Service led by the Environment Agency and worked to secure joint buy-in and ownership of the delivery actions set out in the NAP. The stakeholders included private business and their umbrella organisations (e.g. Confederation of British Industry, Energy Networks Association), significant land owners (e.g. National Farmers Union (NFU), Crown Estates), academia (Marine Climate Change Impacts Programme), government agencies (e.g. Environment Agency, Forestry Commission, Health and Safety Executive), national and local government (e.g. lead government departments, Local Government Association) and civil society organisations (e.g. National Flood Forum, Chartered Institute of Water and Environmental Management (CIWEM), Royal Society for the Protection of Birds (RSPB)). Regional events were also held across England to inform the Local Government chapter and steer support available to local councils. The Local Adaptation Advisory Panel for England also steered the development of this chapter.

The emerging priorities for the NAP were placed on the UK Government website for wider public comment and review. They were further revised and shared at a major stakeholder event that aimed to ensure that cross-sector interdependencies were identified and that there was comparable action across the key sectors. Many of the stakeholders that attended the workshops such as the water companies, RSPB and NFU as well as public sector organisations contribute actions within the NAP.

More information

<https://www.gov.uk/government/policies/adapting-to-climate-change>

2.5.4 Discussion of findings

Limited use of deeper forms of involvement along with limited involvement of non-governmental stakeholders may reflect the novelty of adaptation as a policy area

The importance of stakeholder involvement in adaptation is evident from the self-assessment responses and has been underlined both from practical and theoretical points of view (Schröter et al., 2005). Collaboration of multiple stakeholders may help to address future goals and present deficiencies of different adaptation strategies. In the self-assessment survey stakeholder involvement was used as a general term covering several different but related concepts such as participation, engagement and consultation. The emphasis can vary depending on the country-specific context and the objectives for stakeholder involvement. These starting points are generally reflected in the responses to the self-assessment survey. In line with the objectives of mainstreaming, the main

focus in (national) policy development has been on the involvement of stakeholders at the central government level.

Stakeholder involvement in adaptation policies was primarily reported for policy development and dominantly involving government level stakeholders, especially with respect to in-depth involvement in implementation and evaluation. This can partly be explained by the relative novelty of adaptation as a policy area: networks, approaches and opportunities have not yet been developed for in-depth involvement of stakeholders outside government. It may also be that many adaptation strategies are still in a stage of intentions to act rather than specification of adaptation actions (Berrang-Ford et al., 2011), meaning that it is difficult to involve especially private sector stakeholders, except for distributing information on the intentions. The long time-frame of adaptation may, however, mean that the contribution of the public sector will continue to be important also in the implementation of action as suggested by the

observations of Castán Broto and Bulkeley (2013) on city-level implementation of adaptation.

Conditions for successful stakeholder involvement need to be considered carefully

The elements that countries have identified for successful stakeholder involvement in climate change adaptation are mostly general and do not differ significantly from factors identified for other environmental areas. The general advice that a systematic approach to participation should involve careful identification and characterisation of stakeholders before choosing the appropriate method of involvement is reflected in the reported conditions for successful stakeholder involvement. However, the long timeframes, the dominant role of (uncertain) hazards and risks and the public debates on the 'extent of climate change', raise specific challenges for involvement related to adaptation.

Some recognition of these specific challenges in developing involvement for adaptation to climate change can be seen in the identified success factors for involvement. For example, the suggestions to build capacity at the beginning to enable a good comprehension of stakes and to deal openly with uncertainties may help to overcome some stumbling blocks. The co-creation of programmes and the provisioning of scientific findings in an appropriate form for different stakeholders are also likely to help in dealing with the challenges of involvement in developing and implementing adaptation policies. The emphasis on selecting stakeholders may also be an important precondition for successful involvement. It is one way of avoiding the risk of overly managed forms of inclusion that attempt to involve large groups but which in the end fail to satisfy most (Few et al., 2007). For selected groups the limitations of involvement can be made explicit from the outset, which helps to manage expectations.

The above aspects of successful stakeholder involvement underline the need for identifying and selecting methods appropriate for each stakeholder group and task in the involvement process. A multitude of tools and methods are readily available to support both the planning and implementation of stakeholder involvement processes. The online MEDIATION Toolbox (MEDIATION Adaptation Platform, 2013) includes a section on such methods adapted to the context of climate change adaptation. A broad range of tools are available (e.g. for understanding complexity) which directly respond to the need to deal with long time-frames and uncertainties in climate change

adaptation. A recently published report collects experiences from and lessons learned during stakeholder involvement processes in the German Adaptation Process (Rotter et al., 2013).

The identified success factors for stakeholder involvement imply the importance of exchange of knowledge and information. As discussed in Key topics 1 and 6, sharing and collecting information alone does not necessarily result in the implementation of adaptation actions. More information does not necessarily translate into knowledge on what could and should be done. Deeper forms of stakeholder involvement are likely to provide stakeholders with more support on how to take action and thus encourage implementation of adaptation.

Opportunities and approaches for expanding in-depth processes for private sector and civil society stakeholders are worth exploring further

Although the self-assessment survey suggests a wide recognition of the importance of stakeholder involvement and also considerable practical experience in many countries, it is also fair to conclude that there is still much to be learned on the needs, relevance and opportunities of active involvement. As noted by Few et al. (2007), 'experience in other fields has shown that it is crucial to recognise the subtleties and complexities inherent in efforts to engage the public in decision-making and to avoid simplistic assumptions about the efficacy, transparency and public reach of community involvement processes.' This statement appears to be valid as the self-assessment survey results show limited reporting on the use of active, deep involvement beyond stakeholders from central government. This may partly be due to the fact that the responses to the survey were coordinated from central governments. It may be that the most important opportunities for co-creation and other in-depth forms of involvement are found in adaptation taking place at subnational levels, outside the direct remit of national level governments. Part of this adaptation may even take place spontaneously without the intervention of government actors (Cannon and Müller-Mahn, 2010) or as bottom-up processes where governments only provide support through funding, for example through regional development funds.

Only two to four countries report deeper stakeholder involvement of the private sector or interest groups in the implementation and evaluation stages. This may partly be because

relatively few countries had, at the time of the survey, proceeded to these stages, but it may also reflect a general uncertainty in how to involve these stakeholder groups in a meaningful way especially in the evaluation of adaptation policies. It will require ways to demonstrate to stakeholders the impact and benefits of being involved. This means not just demonstrating how inputs can influence, but also where it has influenced. Some of the examples (Portugal, Spain and the United Kingdom) include elements of co-creation of adaptation options. There are examples of how partnerships can investigate regional and local impacts of climate change, build the knowledge base as well as the capacities for adaptation (Bauer and Steurer, 2014). Accumulation and dissemination of these experiences are likely to be particularly valuable for the implementation

of concrete actions. The establishment of portals that also allow stakeholders to report on their own activities (e.g. Austria, Denmark, Finland, Germany and the United Kingdom and at the EU level) strengthens involvement and the diffusion of experiences.

Finding the appropriate ways of involving stakeholders and actively testing different approaches is likely to contribute to these ambitious goals. With successful co-creation, adaptation may live up to the expectations of the EU Adaptation Strategy (EC, 2013), which claims that 'adaptation action will bring new market opportunities and jobs, in such sectors as agricultural technologies, ecosystem management, construction, water management and insurance'.

2.6 Key topic 6: Implementation of adaptation

Key messages

- Of 30 European countries, 13 report that they are at the implementation or monitoring and evaluation stages of the adaptation policy process.
- Most adaptation actions were reported to be implemented at national level (i.e. nationally funded or targeting the whole country). In terms of sectoral coverage, most adaptation takes place in relation to water.
- The most common policy instrument for implementing adaptation is the provision of information, followed by the mainstreaming of adaptation into sector policies and action plans.
- Project-based support was reported as the most important financing mechanism currently in place for implementing adaptation. Budget allocations for implementing adaptation are most frequently made in the water and agriculture sectors.
- Due to the short history of adaptation, implementation is still at an early stage, and is often carried out by applying 'soft' measures (e.g. providing information or mainstreaming). As adaptation in European countries evolves, more progress on implementation is likely to be seen in the near future.

2.6.1 *Implementation of adaptation: what does this entail?*

In the context of this report, 'implementing adaptation' comprises both initiatives that aim to enhance the ability of a (human or natural) system to adapt to climate change (IPCC, 2007) and deliver concrete adaptation actions that reduce climate change-related vulnerabilities or exploit beneficial climate change-induced opportunities. Initiatives to build adaptive capacity are essential for implementing adaptation actions, thus both responses are closely interlinked.

Nevertheless, high adaptive capacity does not necessarily translate into adaptation actions that reduce vulnerability (IPCC, 2007). For example, governments may provide information material to residents on how to deal with heat stress, an activity to build adaptive capacity. This requires dedicated initiatives for residents to act upon this information they received (e.g. do not implement inexpensive adaptation responses such as airing living spaces and drinking water). Unless these initiatives are put in place, a country might still be faced with a high level of morbidity or even mortality in case of extensive heat waves and thus, high vulnerabilities to climate change.

Definition of key terms

Implementation in the context of the policy-cycle framework is defined as putting 'a public policy into effect'. Once policymakers decide on, formulate and adopt a policy, then it is implemented, i.e. activities identified in the policy document are translated into concrete actions.

Implementing adaptation is a dynamic iterative learning process, and monitoring and evaluation help to adjust policy responses and actions to accommodate, for example, the availability of new information such as changes in climate and socio-economic conditions (IPCC, 2014). Adaptation action that is taken independently of government policies is considered to be 'autonomous' and is not captured by the self-assessment survey.

For further definitions and sources, see the glossary at the end of this report.

2.6.2 Self-assessment survey findings

This key topic is based on findings from eight questions with focus on implementing adaptation. All questions in the self-assessment survey — except two (Q34 and Q42) — were closed and most included multiple choice options. The table below presents the list of questions and indicates the number of countries having answered them. In total, 30 countries returned the self-assessment survey to the EEA.

Question from self-assessment survey (including question numbers)	Number of countries having answered this question (including % of total number)
In my country, integration of adaptation into sectoral policies and programmes is increasing (Q8)	30/30 (100 %)
In what stage of the adaptation policy process is your country? (Q12)	30/30 (100 %)
Please highlight the relevant sectors/areas in your country and assess the current state of adaptation at various levels (Q31)	26/30 (86 %)
Are you using policy instruments (see question 33 below for examples) for implementing adaptation actions? (Q32)	26/30 (87 %)
If you are already using instruments for implementing adaptation, what are the main instruments in the different sectors in your country? (Q33)	19/30 (63 %)
If (additional) instruments for implementation are planned in your country, what are the main instruments you are considering? (Q34)	12/30 (40 %)
What are the most important financing mechanisms currently in place (or the mechanisms that will be considered in the future) for implementing adaptation in the sectors you have identified as relevant in your country? (Q35)	20/30 (67 %)
What are the next steps your country is planning? Please provide information on the following issues and the related timing (addressing both national and sub-national levels): focus on implementation (Q42)	22/30 (73 %)

Implementing adaptation is still at an early stage across Europe

Overall, the response from 30 European countries shows that implementing adaptation is still at an early stage across Europe. Nevertheless, the self-assessment survey demonstrates a varying picture when taking into account for example the different stages of policymaking or sectoral activities in the countries. Implementation is most advanced in the water sector, followed by agriculture and forestry. In industry and business, very little or no adaptation activity has been reported by the member countries. In addition, most activities have been reported for the national level.

Of 30 countries, 13 report that they are in the implementation or monitoring and evaluation stages of the adaptation policy process

A total of 13 countries described themselves as being in the implementation or monitoring and evaluation stages of their national adaptation policy process: Austria, Belgium, Denmark, Finland, France, Germany, Lithuania, Malta, the Netherlands, Norway, Spain, Switzerland and the

United Kingdom (Table 2.3). Most of these countries have adopted a NAS and NAP.

Some of these countries such as Finland, France, Lithuania, the Netherlands and Spain indicated that for some sectors (e.g. water and human health) they have already implemented a portfolio of adaptation measures. The United Kingdom stated that for all priority sectors, a portfolio of adaptation measures is in place, and is also being monitored/evaluated.

Most adaptation responses have been reported to be implemented at national level and in the water sector

The self-assessment survey shows that the national level is reported to be the most advanced in implementing adaptation measures (i.e. nationally funded or targeting the whole country). Furthermore, for most sectors, the subnational level is suggested to be more active in implementing adaptation than the local level (e.g. cities). However, for the built environment, spatial/urban planning and disaster risk reduction more activity on adaptation implementation is reported at the local/city level than at other subnational levels.

The front runner in implementing adaptation at national level is the water sector (Figure 2.15). Results from the self-assessment survey show that 16 out of 26 countries are advanced in implementing adaptation measures in the water sector with either single adaptation measures (i.e. Cyprus, Denmark, Italy, Liechtenstein, Lithuania, Malta, the Netherlands, Poland, Slovenia and Turkey) or a portfolio of adaptation measures (i.e. Finland, France, Portugal, Spain and the United Kingdom).

The scoring of the stage of adaptation in various sectors also corresponds well with the selection of priority sectors as indicated by 17 member countries (Figure 2.16): the water sector as front runner in implementing adaptation also received most scores for being a priority sector/area for implementation, followed by agriculture, forestry and human health. Those sectors are also relatively advanced in putting adaptation into practice, as approximately one third of the countries answering this question have started with implementing adaptation measures in these sectors. In the case of human health, France and the United Kingdom have indicated that a portfolio of adaptation measures is in place and monitored.

Sectors where private actors play a large role (e.g. business and services, industries, finance/insurance as well as tourism) are reported to be not very active in implementation. They are also reported as less prioritised for adaptation across Europe (Figure 2.16) (not taking into account sectors that are defined by a specific geographical situation such as mountain or coastal areas).

Furthermore, no adaptation responses have been reported for the sector 'cultural heritage', which is indeed lower down on the list of priorities in adaptation implementation (Figure 2.16). Nevertheless, in Finland, climate change adaptation is integrated in the revised Strategy of the Cultural Environment (2014).

Countries can have very advanced adaptation measures in place in selected priority sectors, while still being at an early stage of adaptation policymaking in general

In general, the self-assessment survey shows a lower level of adaptation put into practice for countries that are in earlier stages of policymaking than for countries that are in the implementation or monitoring and evaluation (M&E) stages. Nevertheless, some of these countries in earlier stages of policymaking have reported that selected sectors are already active with concrete adaptation

initiatives. For example, for most priority sectors (i.e. water, forestry) Italy reports that measures have been identified and some are already implemented. Liechtenstein indicates progress in putting some adaptation activities into practice in sectors such as water and energy.

Providing information is the most frequently reported policy instrument used for implementation

For all sectors/areas represented in the self-assessment survey, all 19 countries answering this question reported the provision of information as the most often used policy instrument for implementing adaptation (see Figure 2.17). The second most often used policy instrument reported is mainstreaming. Furthermore, action plans are often mentioned in the survey as policy instruments supporting implementation for all sectors/areas except for mountain areas. Less often reported as policy instruments are legislation and financial support (e.g. subsidies, taxes).

Countries at present seem to use partnering instruments and green technologies only rarely for fostering implementation.

Looking at the use of policy instruments from a sectoral perspective, most instruments for implementation were reported for the water sector, a priority sector and a front runner in adaptation. By contrast, in areas such as civil protection, finance and insurance, businesses and services as well as cultural heritage, so far only a few policy instruments have been used for implementing adaptation.

Countries in the implementation stage of the adaptation process reported a higher number of implementation instruments.

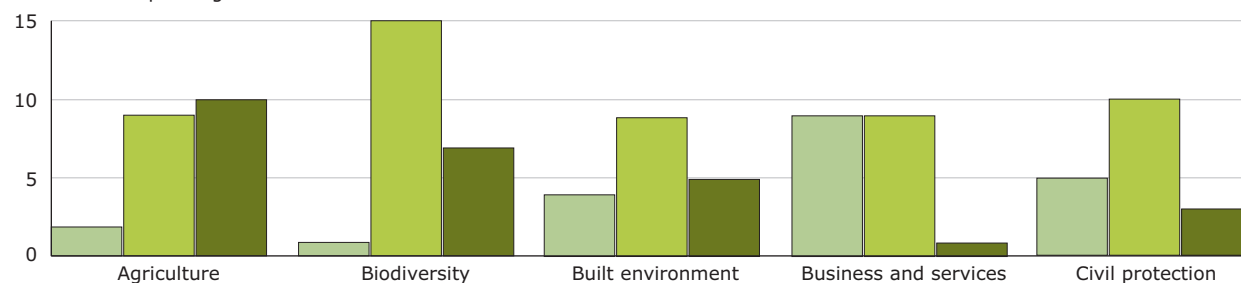
The majority of countries use mainstreaming to foster adaptation

Mainstreaming is the second most often reported policy instrument for implementation for various sectors. In addition, 26 of 30 countries report integration of adaptation into sectoral policies and programmes to be increasing. In Table 2.11, examples of integrating adaptation into sectoral policies and programmes are presented.

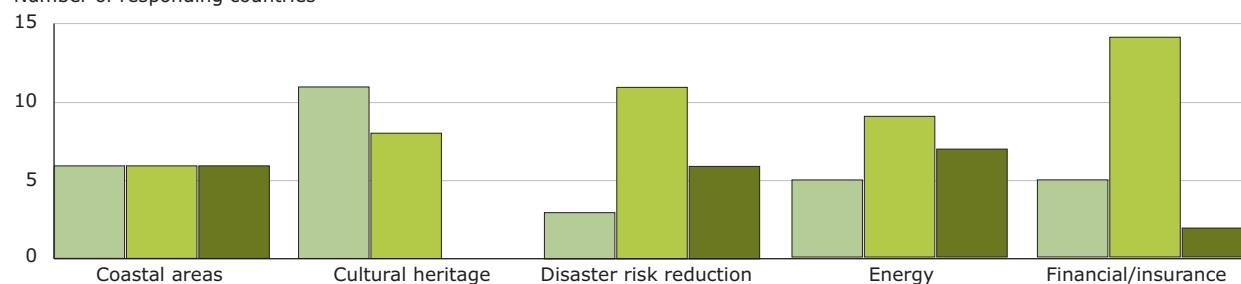
Examples have a focus on environmental sectors such as water and forestry. Besides environment-related

Figure 2.15 Progress in sectoral adaptation at national level (Question 31; 26 responding countries)

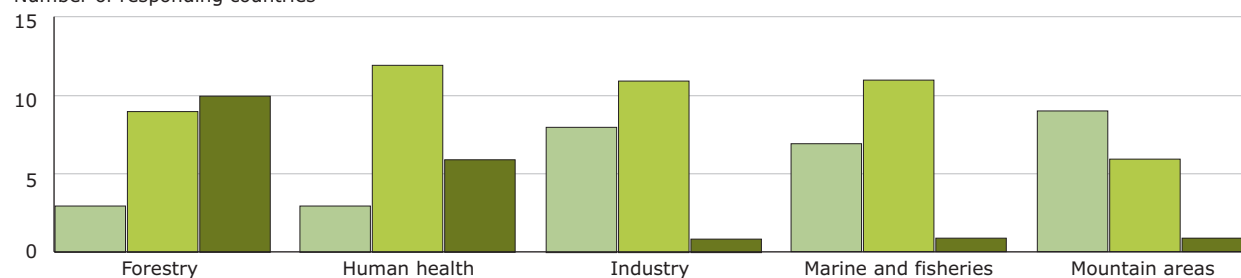
Number of responding countries



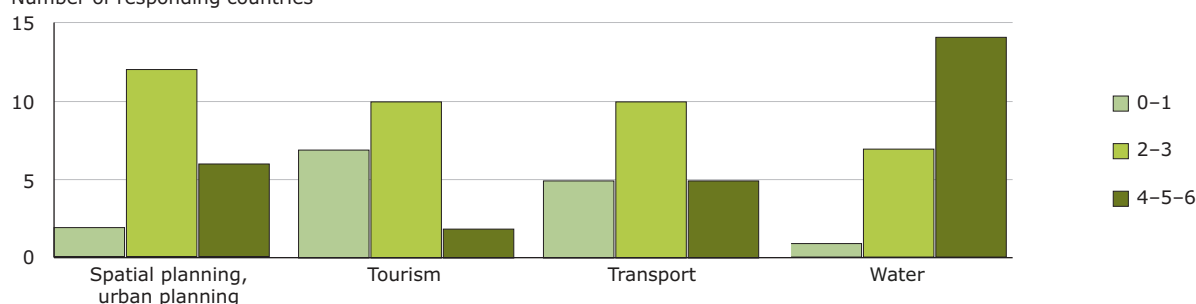
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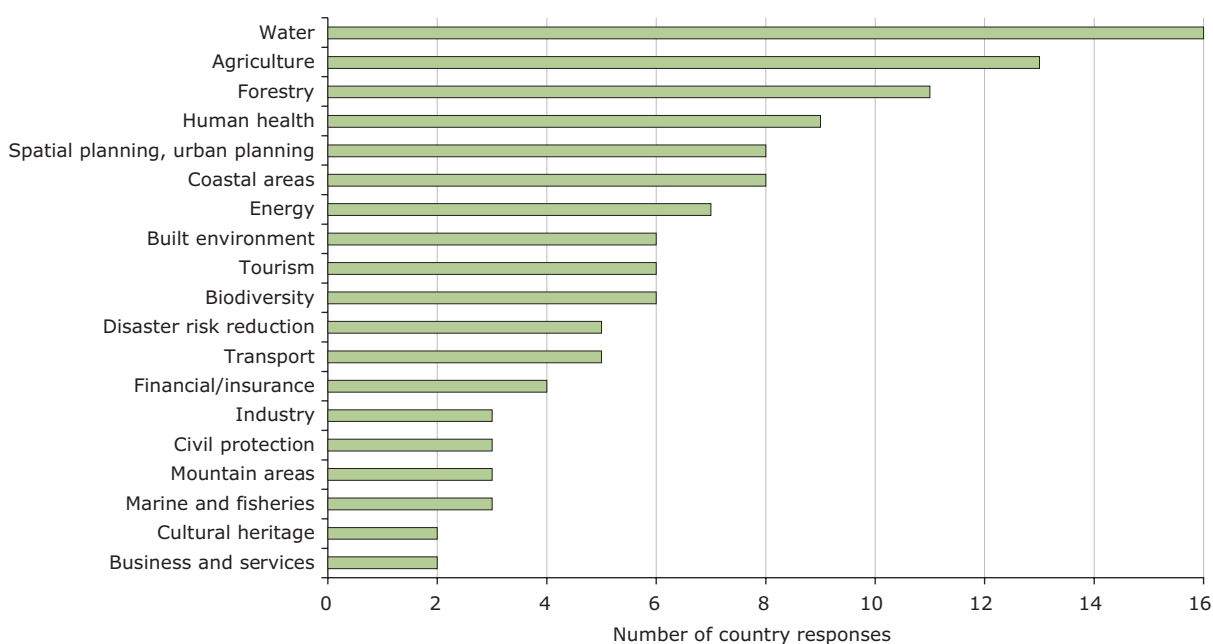
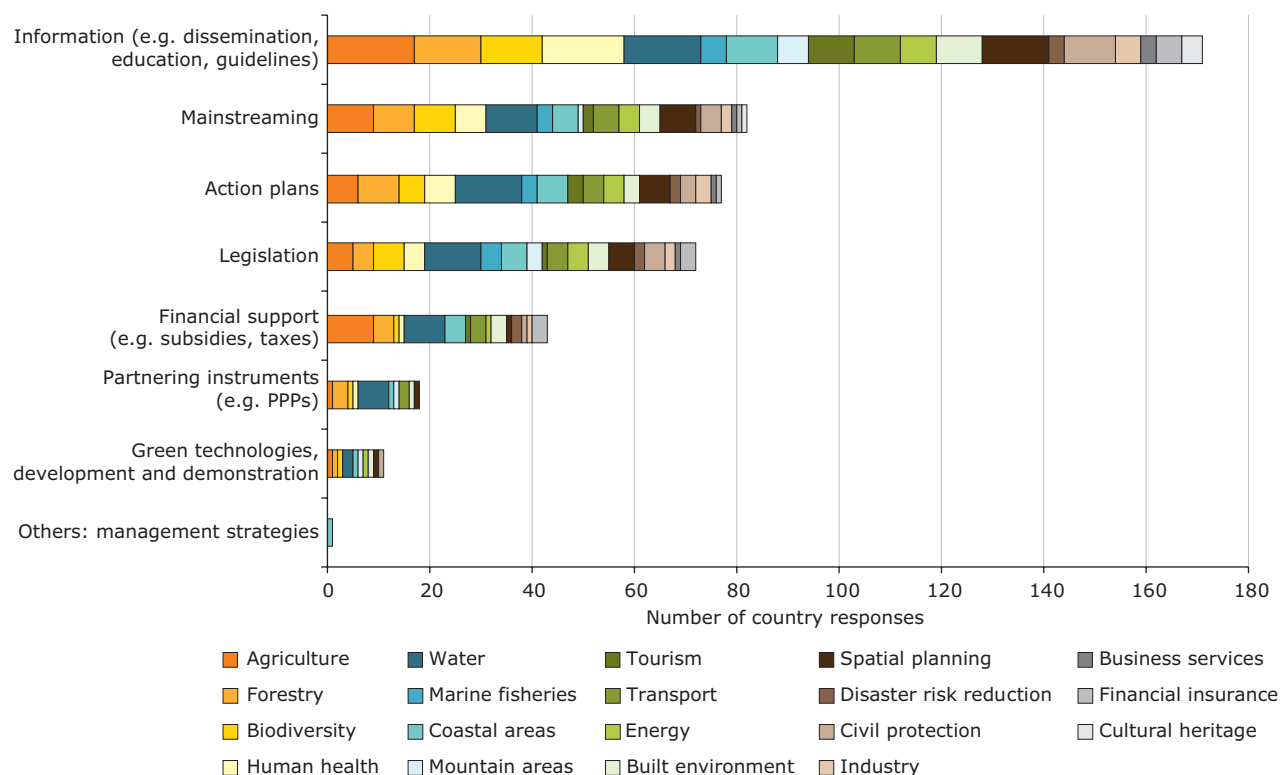


Number of responding countries



Note:

- 0: adaptation is not relevant for my country
- 1: need for adaptation not recognised and no measures implemented yet
- 2: coordination activities for adaptation started
- 3: some adaptation measures identified for the sector but not yet implemented
- 4: portfolio of adaptation measures identified and implementation (of some) launched
- 5: portfolio of adaptation measures implemented
- 6: portfolio of adaptation measures in place and monitored/evaluated.

Figure 2.16 Priority sectors for adaptation implementation (Question 31; 17 responding countries)**Figure 2.17 Policy instruments used for implementing adaptation (Question 33; 19 responding countries)**

policies, mainstreaming adaptation into other policies has been mentioned, especially health by southern European countries. In addition, a few countries report efforts in integrating adaptation into infrastructure and building codes (Belgium, France and Denmark) or electricity (Finland). Guidelines for mainstreaming adaptation into Strategic

Environmental Assessment (SEA) processes are noted by Ireland and Slovenia. In Ireland, the Environmental Protection Agency is currently finalising a guidance note, 'Integrating Climate Change into Strategic Environmental Assessment in Ireland', which will complement the proposed national guidelines on the integration of climate change into SEA.

Table 2.11 Examples of mainstreaming adaptation into sectoral policies and programmes

Country	Examples of mainstreaming adaptation into sectoral policies and programmes
Austria	Various sectoral policies such as forestry, agriculture, water management and natural hazard management
Belgium	Multi-departmental taskforces for adaptation established to ensure integration, various sectoral policies such as water, coastal areas, biodiversity, forestry
Bulgaria	Forest policies
Cyprus	Various sectoral policies such as the Water Framework Directive, agriculture policy
Czech Republic	n/a
Denmark	Various sectoral policies such as water, building and construction, infrastructure and spatial planning, rescue preparedness
Estonia	Integration as response to key EU policies such as the Common Agriculture Policy, Cohesion Policy and the Common Fisheries Policy
Finland	Various sectoral policies such as Flood Risk Management Act, land use guidelines, National Forest Programme, electricity market Legislation
France	Various sectoral policies such as transport infrastructure building codes, housing building codes, coastal risk planning
Germany	Various policies such as Water Framework Directive, infrastructure and spatial planning, forestry, natural hazard management
Greece	Various sectoral policies such as Rural Development Programme, National Biodiversity Strategy
Hungary	Various sectoral policies such as the National Water Strategy, Biodiversity Preservation Strategy
Iceland	n/a
Ireland	Guidelines are being developed on how to integrate climate change adaptation into the spatial planning process and through the SEA instrument
Italy	Various sectoral policies such as the operational plan to prevent effects on human health from heat waves, River Basin Management Plan, Risk Management Plans, Water Balance Plan
Latvia	Various sectoral policies such as forestry, environmental policies, Rural Development Programme
Liechtenstein	Various sectoral policies such as energy and water
Lithuania	Various sectoral policies such as agriculture, forestry
Luxembourg	n/a
Malta	Various sectoral policies such as Water Catchment Management Plan, water policy, Storm Water Master Plan, national environmental policy, sustainable tourism
Netherlands	Various sectoral policies such as water, spatial and urban planning and reconstruction, transport, energy, health, nature, agriculture, horticulture and fisheries
Norway	n/a
Poland	n/a
Portugal	Various sectoral policies such as health, agriculture (Rural Development Programme), Strategic Plan for Tourism, spatial planning instruments, Shoreline Management Plans, Coastal Action Plan, Plans for Water Use Efficiency, River Basin Management Plans, Drought Prevention and Response, Estuarine Management Plans
Romania	Various sectoral policies such as agriculture and National Strategy to Combat Floods
Slovakia	Mainstreaming of proposed adaptation measures into the relevant operational programmes for the period 2014–2020
Slovenia	Guidelines on how to include adaptation in spatial planning and the SEA, various sectoral policies include adaptation such as agriculture and forestry
Spain	Various sectoral policies such as water, river basin management plans, coastal areas, health, biodiversity
Sweden	Various sectoral policies such as agriculture, forestry, built environment and spatial planning
Switzerland	Various sectoral policies such as water, biodiversity, forestry, natural hazards, tourism, agriculture
Turkey	n/a
United Kingdom	British government policy has been to embed all adaptation consideration into relevant policies

Source: EEA self-assessment survey Question 8.

Financing instruments for adaptation

- **Project-based public support:** Implementing adaptation is facilitated with the help of public funding on the basis of projects (e.g. research projects including test cases where implementation is carried out, financing adaptation measures to be implemented regionally/locally).
- **Explicit budgetary allocations:** A dedicated part of public finance is earmarked to finance adaptation implementation. This may lead to project-based adaptation, and hence in some cases may overlap with project-based public support.
- **Insurance mechanisms:** To equitably transfer the risk of a loss, insurance helps to avoid or minimise human and economic losses following climate change related events.
- **Public-private-partnerships (PPPs):** A venture between a government service and the private sector, which is funded and operated through a partnership. PPPs can be a useful tool to combine financial and knowledge resources from both the public and private sectors on specific projects, in order to foster adaptation implementation.

Project-based public support constitutes the most important financing mechanism for implementing adaptation followed by explicit budgetary allocation

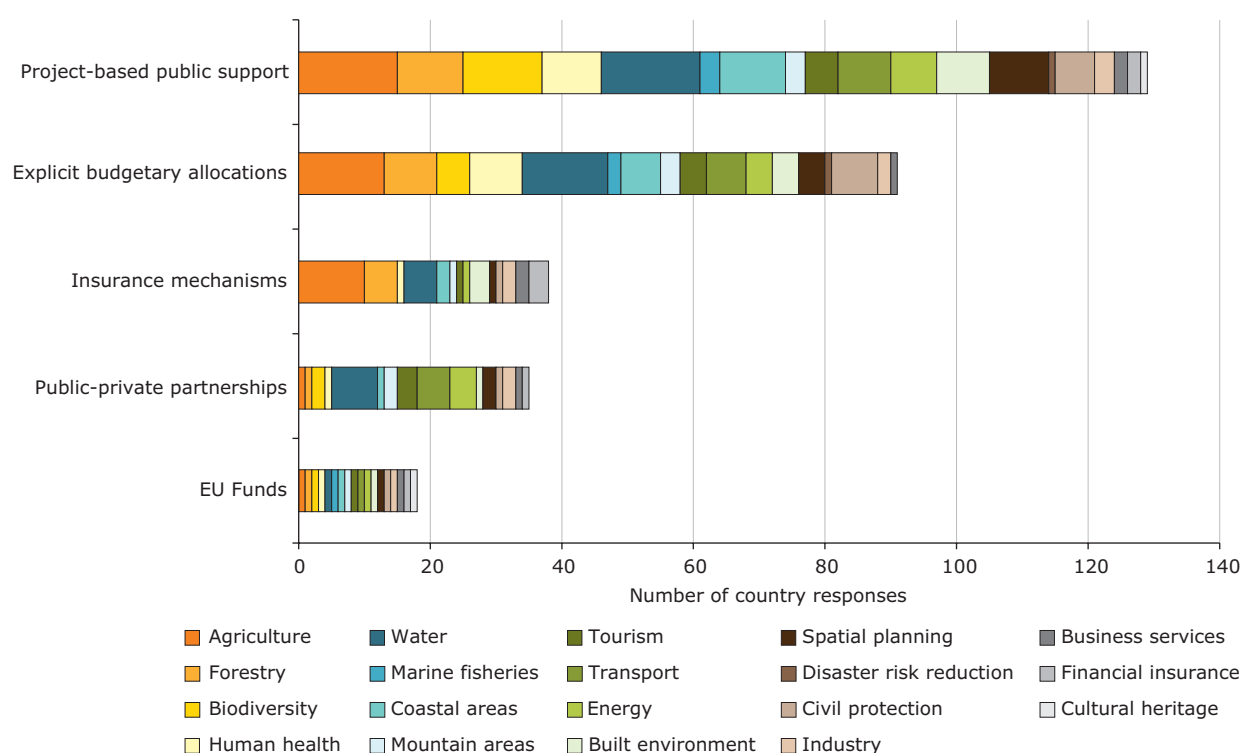
Countries indicate a wide range of financing instruments for implementing adaptation. In general, project-based public support is mentioned to be the most important financing mechanism currently in place for adaptation (Figure 2.18). The second most frequently used financing mechanism is an explicit budgetary allocation for adaptation. In the cases of water and agriculture, explicit budgetary allocations are reported to be used by 11 European countries. In addition, insurance mechanisms are indicated to be often used in agriculture and water as well as in the forestry sector. Generally, public-private partnerships (PPPs) are less often used, but seem to play an important role in the water sector, followed by transport and energy.

Adaptation implementation is an ongoing process and more progress is likely to be seen in future

Countries report to continue working on implementing adaptation in the future by using different approaches: some countries plan to finalise their adaptation strategies or action plans in a next step (e.g. the Czech Republic, Ireland, Italy,

Liechtenstein, Romania and Slovakia) and others put effort in follow-up initiatives (e.g. Austria, Denmark, Hungary, Lithuania, Malta and the United Kingdom). Germany for example will present, within the legislative period from 2013 to 2017, a progress report that sets out future measures and instruments to be taken by the German Federal Government. Other countries are currently working on establishing legislation to facilitate mainstreaming of climate change adaptation across various sectors (e.g. Malta). The Bulgarian government adopted a Climate Change Act in March 2014, which also touches upon the issue of adaptation. The government of Ireland is also in the process of preparing a legislative basis for actions on climate change including adaptation actions. Finland is currently investigating various policy instruments in terms of their suitability to promote adaptation in different sectors most effectively. Countries such as Norway are working on establishing climate services with the aim to bring adaptation to the attention of the broader public. In Denmark, the Ministry of Environment financially supports the development of green technologies, including new climate adaptation solutions.

Apart from these examples, many more adaptation-relevant activities can be observed, although some are carried out for other purposes and not necessarily under the heading of climate change adaptation.

Figure 2.18 Financing mechanisms in place for implementing adaptation in sectors identified as relevant (Question 35; 20 responding countries)

2.6.3 Country examples

23 European countries reported examples on implemented adaptation actions. The following

selected cases present a diversity of approaches from various European countries. More examples on adaptation actions can be found at the European Climate Adaptation Platform CLIMATE-ADAPT.

Cooperation for flood management

Finland

Adaptation goal

Decrease the impacts caused by floods and heavy rain and further increase preparedness for such extreme events.

Adaptation actions

Key elements of successful flood management include preparatory work, early warning systems, communication and cooperation between different authorities. A significant number of flood protection structures have been established in recent decades to flood-prone areas. More funding has been allocated for the preparation of flood banks/terraces, pumping stations and roads, and automation of observation stations. The LUOVA warning system produces an early warning about possibly dangerous flooding several days in advance. The Regional Centres for Economic Development, Transport and Environment along with municipalities and municipal rescue services are responsible for the anticipatory action (e.g. regulation of lake water levels, preparation for rescue activities). Up-to-date information of the flooding situation is provided on the Finnish Environment Institute web pages, including maps as well as further instruction and warnings for the general public. The Finnish Transport Agency also provides information and controls roads and traffic in flooding areas.

More information

http://www.mmm.fi/attachments/mmm/julkaisut/julkaisusarja/5g45OUXOp/MMMjulkaisu2005_1a.pdf

http://www.ymparisto.fi/en-US/Waters_and_sea/Floods

Information to deal with heat stress

France

Adaptation goal

Inform the general public on how to prevent negative health consequences in the case of heat waves.

Adaptation actions

As a response to the heat wave in 2003, France adopted a national heat wave plan in 2011. This plan is updated on a yearly basis. The Ministry of Health has published recommendations to be implemented in case of heatwaves as well as developed various communication formats to inform the general public on possible measures to be taken. Besides printed formats such as brochures, TV information spots were broadcast and a heatwave hotline installed.

More information

<http://www.ars.centre.sante.fr>

<http://www.sante.gouv.fr/canicule-et-chaleurs-extremes.html>

Multi-usable park

Denmark

Adaptation goal

Combine climate change adaptation with other uses.

Adaptation actions

In September 2012, the Danish Minister for the Environment, Ida Auken, opened the Rabalder Park on the Musicon site (a new creative and educational hotspot) in Roskilde on Zealand. The park sets new standards for combining climate change adaptation measures and specialised recreational installations. The unique thing about Rabalder Park is that although the area is primarily for storm water drainage, it also serves as a skate-park for children and young people.

The idea behind the installation is that during cloudbursts the area will constitute a number of flood-retention basins, which together can hold up to 23 000 cubic metres of water. This will retain the water in the basins, and prevent flooding of roads and basements in adjoining properties. However, when heavy rain does not fall, as mentioned above, the area will act as a skate-park for everything from skateboards and BMX bikes to barbecues.

More information

<http://en.klimatilpasning.dk/recent/news/newsletter7.aspx>

Urban climatic map for the city of Stuttgart

Germany

Adaptation goal

Decrease cities' vulnerability to heat.

Adaptation actions

Stuttgart has a long tradition of incorporating urban climate concerns into its planning. Situated in a valley, the city of Stuttgart was forced early on to think about how fresh air can be ensured even in unfavourable weather conditions. Increasingly hot summers at the beginning of the new century have also led the city to counteract heat problems. For this reason, the city introduced a package of measures that are mostly covered by the city's own funds. The main approach consists in incorporating urban climatic factors into planning. It focuses on the preservation and expansion of green areas as well as the assurance of fresh air corridors and heat-moderating areas.

Good practice in this case means that the city integrated the local climate strategy in their land use planning. Stuttgart already implemented effective measures with a low budget. The local climate strategy is a long-term task for the city of Stuttgart that requires intensive cooperation between the city's authorities.

More information

City of Stuttgart: <http://www.sed.manchester.ac.uk/architecture/research/csud/outputsresources/isocarp-hebbertwebb.pdf>

The Flood Protection System

Slovakia

Adaptation goal

Decrease the impacts caused by floods and heavy rain and further increase preparedness for such extreme events.

Adaptation actions

The Hazard warning system in Slovakia includes also a Flood Warning and Forecasting System (FWFS). It covers all the Slovakian territory (49 035 km²). The system is based on information about meteorological and hydrological parameters. An innovation of the system, which includes the installation of four new meteorological radars, 65 automatic weather stations and a new information system is under way. It has proven its importance when giving updated forecasts and non-stop monitoring during flood events. FWFS presents close-to-real-time information about the local weather and hydrological situation, as well its development in the next 24 hours. In the case of a flood threat, all relevant authorities are informed in advance.

One of the practical examples of flood protection activities is the Flood Protection System (FPS) around Bratislava, which is supposed to protect citizens of the Slovak capital in the case of a momentous flood. It was officially completed in 2010. The EUR 31 million project was co-financed from the EU Cohesion Fund.

The results of the project were as follows:

- construction of new flood protection barrier in urban and suburban areas of Bratislava, including 2.2 km of portable barriers. These barriers are used to increase the whole barrier height in cases when the forecast of water stage reaches the top of solid barriers. Portable barriers further increase the total height of the barrier by about 1.4 m;
- complete restoration (replacement and increase) of the initial flood protection line around Bratislava Old Town;
- increase of the flood protection barrier in the municipality Petržalka (part of Bratislava with 115 000 citizens);
- increase of the flood protection barrier on the left bank of Morava river close to its confluence with the Danube;
- increase of the safety of levees on the left side of the flue channel Gabčíkovo municipalities;
- prevention of economic damages in the project area including the capital city Bratislava and its neighbourhood municipalities;
- prevention of environmental damages in the project area including prevention of contamination of drinking water sources.

FPS around Bratislava showed its efficiency during flooding on the Danube in June 2013. The water stage as well as the water flow reached their highest ever-recorded height but the portable barriers fully protected the capital and the surrounding municipalities. The damages were 98 % lower than those caused by similar flooding in 2002, which practically triggered the renovation of FPS on the Slovakian part of the Danube. Further to that, the hydroengineering structure Gabčíkovo protected the Žitný ostrov area, where the biggest reservoir of fresh water in central Europe is situated.

More information

<http://www.mowe-it.eu/wordpress/floods-control-barrier-in-bratislava>

2.6.4 Discussion of findings

Countries that started to develop adaptation policy early have generally advanced towards implementing adaptation

To date, 21 European countries (i.e. Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Ireland, Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden, Switzerland, Turkey and the United Kingdom) have already developed a NAS and more are in the process of developing

their policy. This compares with 2008, when eight European countries (i.e. Finland in 2005, France and Spain in 2006, Denmark, Germany, Hungary, the Netherlands and the United Kingdom in 2008) had their strategy in place, considerable progress can be noted in developing policies for adaptation (Swart et al., 2009).

Although the number of adaptation policies in place across Europe has significantly increased in the last five years, implementing adaptation can be considered to still be in an early phase (EEA, 2013). However, the results from the self-assessment

survey illustrate that those 13 countries (i.e. Austria, Belgium, Denmark, Finland, France, Germany, Lithuania, Malta, the Netherlands, Norway, Spain, Switzerland and the United Kingdom) considering themselves in an advanced stage in the policy cycle (i.e. implementation or monitoring and evaluation) also have an adaptation policy (NAS and/or NAP) adopted and show a higher activity level for implementing adaptation. Nine of these countries adopted their adaptation policies (NAS or NAP) before or in 2008, and thus have experience of more than 6 years. On the basis of this information, one could conclude that countries having adaptation policies in place for several years are also more advanced in implementing adaptation activities.

Interestingly, some countries that also have a NAS and/or NAP adopted (EEA, 2013) reported in the self-assessment survey that they do not consider themselves in the implementation phase, but rather in the formulation and decision stage. One explanation for this could be that some countries are currently revising and specifying their adaptation policies, e.g. by integrating new information for adaptation implementation or redesigning their strategy. Others (e.g. Ireland and Portugal) might have assessed their stage as formulation/decision as they are presently in the process of developing their action plans of more focused strategies or updating their existing NAS (e.g. in the case of Portugal to focus on implementation and monitoring).

When looking at countries with no adaptation strategy in place, some adaptation implementation can be observed. This information suggests that in some countries forces other than policies (e.g. past extreme weather events) are fostering adaptation.

The relationship between a national adaptation policy and implementing adaptation cannot be answered unambiguously from the results of the self-assessment survey. However, it is clear that countries with a longer history in adaptation policymaking are also more active in implementing adaptation activities. Nevertheless, more research is needed on how (and under which conditions) public policies can most effectively foster adaptation implementation, including the institutional mechanisms that govern this process (e.g. Biesbroek, 2014).

Provision of information does not necessarily lead to adaptation measures

The countries responding to the self-assessment survey have reported the provision of information

as the most often used policy instrument for implementing adaptation. Any decision to take adaptation actions should ideally be based on evidence and robust information. Therefore a sufficient knowledge base is needed. Given that more proactive information transfer thus contributes to building adaptive capacity, it is expected also to build the ground for concrete adaptation actions and can be considered as an important contribution to adaptation implementation. Nevertheless, research findings suggest that more information on climate change impacts and adaptation possibilities does not necessarily lead to more adaptation actions. Merely disseminating information does not ensure that those affected by a changing climate will adequately address related risks or opportunities.

To successfully foster adaptation implementation, targeted information should be provided in ways that serve those who need it, such as local communities and government and private sector decision makers (see also for discussion under Key topic 1). In addition, enabling societies to adapt to climate change will require establishing systems that transfer relevant information both from the national to the subnational level and vice versa (McCallum et al., 2013). It also appears that how information on climate change impacts and adaptation options is presented is crucial for sparking adaptation action. More research is needed on effective ways to communicate information on climate change adaptation in order to motivate stakeholders to take action (Wirth et al., 2014).

One can expect in future that the relatively slow pace of adaptation implementation (IPCC, 2014) in terms of reducing vulnerabilities to climate change may change when uncertainties (e.g. with regard to the frequency of extreme weather events) decrease and/or are better understood, or when projected climate change impacts materialise more visibly. One of the key challenges at that stage will be to shift from a primarily reactive and soft policy response pattern to an anticipatory one, in particular in sectors that as yet demonstrate little interest in climate change adaptation (Steuer and Bauer, in Prutsch et al., 2014).

Adaptation implementation is most advanced in environment-related sectors

Adaptation to climate change is defined as an 'adjustment in natural or human systems in response to actual or expected climatic changes or their effects' (IPCC, 2001; 2007; 2014). Nevertheless, as the profile of climate change has mainly risen from

an environmental perspective, also research and policy relevant questions connected to adaptation have tended to give more weight to environment-related sectors. Horizontal coordination, which goes beyond the environmental with other ministries is required in order to address adaptation effectively as a multisectoral issue (see Key topic 4).

The results from the self-assessment survey seem to confirm this, as the water, agriculture and forestry sectors were reported to be the top three priority sectors for adaptation, and the most advanced in terms of implementing adaptation actions. In contrast, other areas highly vulnerable to climate change, such as transport infrastructure (Doll, 2012), are reported to have very limited activities to date.

The extent to which these findings have been influenced by the fact that responsibilities for coordinating adaptation policies at national level across Europe are mostly assigned to environment-related ministries — which were also the institutions providing information to the self-assessment survey — is unknown.

Adaptation implementation appears to be more strongly driven by the public domain

The results from the self-assessment survey suggest that sectors that mainly fall into the responsibility of private actors (e.g. business and services, industries, finance/insurance as well as tourism) are suggested not to be very active in implementation and as yet they are also seen as less relevant for adaptation across Europe. Furthermore, a high level of stakeholder involvement (i.e. active involvement, partnerships and empowerment) of the private sector in the implementation stage was reported to be still relatively rare (see Key topic 5). The reported high level of implementation in some sectors may refer more to the development of sectoral government policies than actual adaptation by private actors, such as farmers or water companies.

These findings suggest that the role of the private sector in adaptation has been under-explored up to now. This is further supported by Surminski (2013)

who notes that the importance of the private sector for adaptation is very large (e.g. they are responsible for over 70 % of global investments in buildings and infrastructure), but the evidence base for adaptation in the private sector is still very limited.

Adaptation in vulnerable sectors may already take place, but information about this could be unavailable in the public domain. Thus, an inventory of actual and planned adaptation in the private sector would facilitate a better collaboration and coordination between the public and private sectors. Governments may support private sector adaptation on various levels, e.g. providing more actionable information on climate change and enhancing cooperation in order to help the private sector to adapt to a changing climate (Benzie and Wallgren in Prutsch et al., 2014).

Adaptation implementation is reported to be more advanced at national level

Due to the diversity of biophysical and socio-economic situations in different regions, the impacts of climate change will differ from region to region. Thus, besides government support for the private sector, national public authorities play also a key role for fostering adaptation across all levels of decision-making from national to local. The results from the self-assessment survey suggest fewer ongoing adaptation activities on the subnational and local/city level than on the national level across Europe ⁽²⁷⁾.

Nevertheless, adaptation responses can clearly be observed at various administrative levels, which may not have been captured in the responses to the self-assessment survey (as provided mostly from experts working for the national authorities). Latest information on current adaptation responses on subnational and local/city scale can be accessed on the Climate-ADAPT website ⁽²⁸⁾, from the EEA report Urban Adaptation to Climate Change (EEA, 2012) ⁽²⁹⁾ or the Directorate-General (DG) for Climate Action project on regions (report to be published in 2014) as well as the Mayors Adapt initiative ⁽³⁰⁾.

⁽²⁷⁾ It should be borne in mind that the self-assessment survey was sent to authorities in countries responsible for coordinating adaptation at national level, and the findings will therefore reflect the views of these authorities.

⁽²⁸⁾ See <http://climate-adapt.eea.europa.eu>.

⁽²⁹⁾ See <http://www.eea.europa.eu/publications/urban-adaptation-to-climate-change>.

⁽³⁰⁾ See <http://mayors-adapt.eu/about>.

2.7 Key topic 7: Transnational cooperation

Key messages

- Half of the European countries surveyed report that they were considering transnational cooperation in their national adaptation policy processes.
- Shared natural resources such as transboundary watercourses have motivated transnational cooperation in adaptation.
- Transnational cooperation in adaptation has often emerged with the support of European funding instruments and in the context of established cooperation forums, such as European regional conventions.
- There is no apparent relation between the degree to which transnational cooperation is considered in a country's national adaptation policy process and the stage of the adaptation policy process that a country is in.
- Instead of setting up new platforms for transnational cooperation in adaptation, further integration of adaptation into existing conventions and other institutions for cooperation can strengthen transnational adaptation efforts.

2.7.1 *Transnational cooperation: what does this entail?*

Transnational cooperation can be seen as a way to ensure cross-border coherence in adaptation, but also as a way to learn and exchange good practices, not necessarily restricted to neighbouring countries. The EU Adaptation Strategy (EC, 2013a) stresses the need to consider cross-border issues in NASs as well as in impact and vulnerability assessments.

Consequently, the EU Strategy encourages countries to address cross-border issues and also foresees EU funding (e.g. LIFE and regional cooperation funds such as Interreg) to support such activities. Transboundary cooperation has so far focused on the use of transboundary natural resources or ways to deal with transboundary environmental impacts and risks. Adaptation to climate change is increasingly also becoming an issue of transboundary cooperation.

Definition of key terms

Transnational cooperation covers both cross-border cooperation between (neighbouring) countries and transboundary cooperation among countries with shared transboundary resources (e.g. water and protected areas) or otherwise shared interests. In the context of this report, transnational cooperation refers to cooperation within Europe and thus excludes international cooperation with developing countries. Transboundary cooperation between regions within a country is not considered here.

For further definitions and sources, see the glossary at the end of this report.

2.7.2 Self-assessment survey findings

The self-assessment survey covered the general consideration of transnational cooperation in national adaptation policy processes as well as how transboundary issues are addressed in countries.

Question from self-assessment survey (including question numbers)	Number of countries having answered this question (including % of total number)
In my country, the following influences have triggered adaptation (Adaptation in neighbouring countries is one of the possible triggers) (Q3)	29/30 (97 %)
In my country, transnational cooperation is considered as an element in our adaptation policy process. Please provide examples (Q10)	30/30 (100 %); of which 24 with examples (80 %)
In what stage of the adaptation policy process is your country? (Q12)	30/30 (100 %)
Are risk assessments or vulnerability assessments available for your country? If yes, available at... (transnational one of the possible levels) (Q16)	30/30 (100 %); of which 22 'yes' answers (73 %)
Have you identified and assessed adaptation options on the basis of risk or vulnerability assessments? If yes, available at... (transnational one of the possible levels) (Q22)	30/30 (100 %); of which 12 'yes' answers (40 %)
In your country, how do you address transboundary issues? Which instruments facilitate your work (e.g. EU Regional Policy, EU Interreg projects, biogeographical regions and regional adaptation strategies)? (Q36)	24/30 (80 %)

Transnational cooperation in national adaptation policy processes is considered by half the European countries, but there is limited evidence of its inclusion in actual policies

Half of the responding countries (16/30) agree or strongly agree with the statement that transnational cooperation has been considered in national adaptation policy processes in their country. The remaining countries expressed a neutral opinion and no country reported disagreement with the statement. Of 29 countries, Liechtenstein and Switzerland reported adaptation in neighbouring countries as one of the three most important triggers for adaptation in their country.

Five countries (i.e. Belgium, France, Germany, Portugal and Switzerland) reported that transnational cooperation has been included in their NAS or plan. Other countries in the process of developing or updating their policies are also planning to pay attention to it (i.e. Bulgaria and Italy) or have recognised an interest in transnational cooperation in national adaptation policy (Romania). Countries also engage in transnational cooperation in the context of climate adaptation through different bilateral activities without explicit links to NAS (i.e. Latvia, Norway and Sweden) or have otherwise identified potential

for further cross-border collaboration on adaptation (Ireland).

There is no apparent relation between the consideration of transnational cooperation in the national adaptation policy process and the stage of the adaptation policy process. Some countries (i.e. Italy, Liechtenstein and Portugal) have emphasised transboundary topics in an early stage of their adaptation policy process, whilst other countries have reached active implementation of adaptation policies without particularly underlining transnational cooperation.

Shared natural resources such as transboundary watercourses have motivated transnational cooperation in adaptation

In spite of country responses suggesting a lack of explicit references to transnational cooperation in adaptation policies, a number of examples can be observed on the ground. Water management as a sector has the broadest experience of transnational cooperation. It is therefore natural that transnational cooperation in the water sector has taken on board adaptation to climate change. Multiple examples of transnational cooperation in adaptation have been reported by countries in areas of transboundary

river basins or catchment management (i.e. Belgium, Czech Republic, Finland, Italy, Lithuania, the Netherlands, Poland, Portugal, Slovakia, Spain and Switzerland). Coastal area management is also a common sector for transnational cooperation and adaptation to climate change has been recognised as a transboundary issue in this area by Denmark, Latvia and Lithuania. Other areas where transnational cooperation has expanded to cover adaptation to climate change include biodiversity conservation as reported by Italy and Spain, and strategies and risk management protocols for natural hazards as reported by Italy and Switzerland. Six countries report that risk or vulnerability assessments are available at transnational level. However, only one country (Lithuania) reported that transnational adaptation options have been identified and assessed on the basis of transnational risk or vulnerability assessments.

Transnational cooperation in adaptation has often emerged with the support of European funding instruments and in the context of established cooperation forums such as regional conventions

European funding instruments have been important for developing transnational cooperation in the field of adaptation. European funding instruments have been used by 17 out of 24 countries to support

transnational cooperation activities. Activities have been facilitated by Interreg programmes, for instance, especially in the Alpine and Baltic Sea regions and the Pyrenees. The use of Interreg funding was mentioned by Belgium, Ireland, Lithuania, the Netherlands, Romania and Spain. Support from the European Regional Development and Cohesion Funds (e.g. South East Europe Transnational Cooperation Programme) has been mentioned in relation to transnational cooperation in adaptation. Also support from the EEA Grants scheme (<http://eeagrants.org>) has been used to develop adaptation policies.

Examples of integration of adaptation into existing transnational cooperation forums have been reported from several areas in Europe. These include the Baltic Sea region, the Alpine region and the Pyrenees with the Baltic Sea Region Strategy, the Alpine Convention and the Working Community of Pyrenees, respectively. The implementation of the Wadden Sea Strategy (<http://www.waddensea-secretariat.org>) was also reported as a case of transnational collaboration in adaptation. Geographically broader cooperation forums such as the United Nations Economic Commission for Europe (UNECE), the Arctic Council and the Barents Euro-Arctic Council were also mentioned by European countries as facilitators of transnational cooperation in adaptation.

2.7.3 Country examples

Alpine area

In the Alpine area, transnational cooperation on adaptation has been fostered by several different actors and projects. The Alpine Convention sets the frame as an international treaty between the Alpine countries (Austria, France, Germany, Italy, Liechtenstein, Monaco, Slovenia and Switzerland) as well as the EU. It aims at promoting sustainable development in the Alpine area and at protecting the interests of the people living within it.

The European Regional Development Funds support the Alpine Space Programme of EU Territorial Cooperation. Specific projects include Adapt Alp (co-funded by European Regional Development Fund) that brought together partners from the Alpine Space Programme to collaborate on the topic of natural hazard management and climate change adaptation in the Alpine arc. Activities aimed at strengthening adaptive capacity of the region by harmonising data and sharing experiences, for example. This has been found to reduce the costs and implementation time of adaptation. Activities in other projects such as C3 Alps (co-funded by European Regional Development Fund) have also included synthesising, implementing and transferring best available adaptation knowledge related to policy and practice. Knowledge transfer driven by the information and communication needs of target groups can bridge the gap between the generation of adaptation knowledge and its application in practice.

More information

Alpine Convention: <http://www.alpconv.org/en/convention/default.html>

Alpine Space Programme: <http://www.alpine-space.eu/home>

C3 Alps project: <http://www.c3alps.eu/index.php/en>

AdaptAlp project: <http://www.adaptalp.org>



Baltic Sea Region

The Baltic Sea Region (BSR) comprises eight EU Member States, the neighbouring countries Norway and Belarus, and the north-west regions of Russia. The EU Member States — Denmark, Sweden, Finland, Estonia, Latvia, Lithuania, Poland and Germany — and Russia all directly border the Baltic Sea. Parts of Norway and Belarus are in the catchment area of the Baltic Sea. In 2009, the EU Strategy for the Baltic Sea Region (EUSBSR) was adopted, and adaptation to climate change was one of the 15 priority areas identified in the Strategy. Currently, there are 17 priority areas and 5 Horizontal Actions within the EUSBSR, and climate change adaptation is one of the actions under the Horizontal Action 'Sustainable Development'.

Transnational cooperation on adaptation in the region has been supported by a number of projects funded through for instance the EU Baltic Sea Region Programme that is part of the Interreg programme in the region. Transnational adaptation projects funded by the EU Baltic Sea Region Programme are BalticClimate, BaltCICA and Baltadapt, many of which have focused on capacity building and knowledge exchange. Targeted support for developing national adaptation strategies has been provided to the Baltic states of Estonia and Latvia in the BaltClim project.

Under the EUSBSR's framework, a strategy and action plan for adaptation for the macro-region were drafted in the BaltAdapt project. The proposals were based on a regional vulnerability assessment, impact assessment reports, macro-regional climate information and a gap-fit analysis of adaptation research and policy design. The strategy and action plan have been put forward for political endorsement under existing cooperation forums under the Council of the Baltic Sea States (CBSS). In the ongoing follow-up policy process, member states have been invited to a round table to discuss next steps in transnational cooperation on climate change adaptation based on the recommendations from the strategy and action plan.

More information

<http://climate-adapt.eea.europa.eu/baltic-sea-region>

<http://www.cbss.org/sustainable-prosperous-region/egsd-baltic-21>

<http://www.baltadapt.eu>

<http://www.baltcica.org>

<http://www.balticclimate.org>



Danube Region

The EU Strategy for the Danube Region (EUSDR) is a united response to challenges affecting an area that stretches from the Black Forest to the Black Sea, including over 100 million inhabitants. The Strategy provides a framework of cooperation for the region's 14 countries to address their common challenges from flooding to transport and energy links, environmental protection and challenges to security.

The accompanying Action Plan includes the preparation of a regional Adaptation Strategy for the Danube Region as soon as possible. This effort is supported by a number of specific actions, many of which focus on activities at various river basins in the region. For example, in the Sava River Basin, a pilot project is ongoing to develop an integrated water resources management and climate adaptation plan for the river basin. The Danube Region will be a new cooperation area in the next Interreg VB funding period (2014–2020), which may further encourage transnational adaptation-related collaboration, as seen in the Alpine and Baltic examples above.

More information

<http://www.danube-region.eu>



Observatory for climate change in the Pyrenees

Along with other mountain areas, the Pyrenees have been identified as particularly vulnerable to impacts of climate change. To this effect, the Pyrenees Climate Change Observatory was created as a framework for shared actions by the Working Community of the Pyrenees in 2010. The Working Community represents a total of eight political entities: seven regions from France and Spain in the Pyrenees area and the Principality of Andorra. Adaptation to climate change is one of the identified priorities of the Pyrenees Working Community.

The Observatory's primary objective is to monitor and thus have a better understanding of climate change in the Pyrenees area and initiate studies with the aim of identifying actions necessary to limit the impacts of climate change and adapt to its effects. One of the outputs of the Observatory's work is an online database that displays practical adaptation initiatives and actions in the Pyrenees territory. The Observatory is also part of further developing transnational cooperation between mountain areas across Europe through a technical partnership with the European Environment Agency.

More information

<http://www.opcc-ctp.org>



2.7.4 Discussion of findings

Transnational cooperation in adaptation to climate change has increased with the recognition of adaptation as a policy area

Countries responding to the self-assessment survey have recognised transnational cooperation as relevant for adaptation. There are several different origins of this awareness. Shared resources (e.g. water or nature protection areas, mountain areas) or impacts may provide natural platforms for transnational cooperation in adaptation. The EU funding instruments for transnational cooperation have clearly contributed to deepening transnational cooperation with an emphasis on adaptation in several focal regions by supporting specific projects

(EC, 2014). Transnational cooperation in adaptation also warrants consideration at the sector level, for example in energy infrastructure and transport.

The lack of explicit descriptions of transnational adaptation options in the self-assessment survey may reflect the relatively early stage of the work. Six countries reported to have carried out risk or vulnerability assessments at transnational level, but of the 12 countries that reported to have identified adaptation options on the basis of such assessments, only one had identified options specific for the transnational level. The deepening of active transnational cooperation as seen in several regions may change the situation. Ongoing projects in, for example, the Alpine region suggest that options for joint adaptation activities are being explored.

In some cases the responses to the self-assessment survey may also have failed to bring out the transnational dimension if a sector perspective such as water has dominated the practical work, for example under the Water Framework Directive. The responses may also have missed a part of the activities that have emerged under the auspices of regional conventions or treaties such as those for regional seas or transboundary resources. These conventions are not primarily climate or adaptation oriented, but climate change impacts and adaptation are being increasingly recognised as important topics as illustrated by the above examples.

Shared natural resources have motivated transnational cooperation in adaptation and there is further scope for integrating adaptation considerations into other areas of transnational cooperation

The management and protection of shared transboundary resources and environmental conditions have increasingly recognised that adaptation to climate change is an emerging issue that has to be taken into account. The Water Convention of the UNECE is a case in point and management activities on transboundary waters have started to pay attention to climate change adaptation (UNECE, 2009). Within Europe this has also been reflected in the activities guided by the Water Framework Directive (EC, 2000).

There are obvious instrumental reasons for recognising climate change in the long-term management of transboundary resources. For example, flood risk management has to consider possibilities of changes in hazards, and agreements on the use of shared water resources need to pay attention to potential changes in hydrology that can affect possibilities for sustainable abstraction. Concrete transnational measures related to, for example, flood management and warning systems for extreme events have been developed and provide a base for encouraging further transnational cooperation in reducing vulnerability and implementing adaptation in relevant sectors. Transnational cooperation in adaptation may also include generic building of adaptive capacity such as the harmonisation of data and indicators for monitoring change.

European regional conventions on the protection of the environment, including sea areas, have initiated activities that include assessment of climate change impacts and considerations of adaptation. For example the OSPAR Commission has published

an assessment of climate change mitigation and adaptation (2009) and a similar synthesis has been published for the Baltic Sea (HELCOM, 2013). In these the starting point is generally the impacts and vulnerabilities, but eventually they lead to considerations of adaptation measures. At the European level the proposed Framework Directive for maritime spatial planning and integrated coastal management (EC, 2013b) is intended to support also adaptation that recognises cross-border activities as appropriate.

The examples above suggest that there are several existing forums for developing and implementing transnational adaptation strategies to address climate change. While the focus to date has been on water and coastal areas, there are other transnational issues relevant to adaptation (e.g. biodiversity, spatial planning) that are yet to link to adaptation and there are instruments for transboundary cooperation where adaptation to climate change may become an increasingly relevant issue although it has not yet been extensively recognised. For example, the 1992 UNECE Convention on the Transboundary Effects of Industrial Accidents may be relevant in considering the possible consequences of extreme climatic events. At the EU level this would also apply to the Directive on the control of major-accident hazards involving dangerous substances (2012/18/EU), which currently recognises transboundary impacts without making reference to climatic factors affecting the risks or consequences. There are also other forms of transnational cooperation such as that between cities rather than states (Bontenbal and van Lindert, 2009), where the similarities of context motivate cooperation. Within the EU, activities in the Mayors Adapt initiative launched under the Covenant of Mayors in 2014 is an example of transnational cooperation on urban adaptation. The Covenant of Mayors was also instrumental in putting adaptation on the agenda at the Warsaw summit of the UNFCCC in November 2013 where representatives of cities, city organisations and local authorities discussed ways to enhance adaptation and resilience at the local level (Covenant of Mayors, 2013).

Further integration of adaptation into conventions and other institutions for transnational cooperation can strengthen transnational adaptation efforts

The findings of the self-assessment survey clearly show the importance of pan-European initiatives in strengthening transnational cooperation. Several different instruments have contributed, many of which are project based, relying on support from, for

example, Life+, Interreg and in some cases the EU framework programmes for research. The challenge for these project-based adaptation strategies is to institutionalise the practices so that activities continue past the lifetime of a project. A dense web of policy networks on the European level may not be sufficient if institutionalised links between the major actors and institutions are missing as observed by Grande and Peschke (1999) in the area of science and technology policy. Project-based funding was not able to create the necessary institutionalised links, which is one of the reasons behind, for example, the emphasis on joint programming initiatives in the European science policy. The self-assessment survey has shown that a comparable 'joint programming of transnational adaptation' is only emerging.

Institutionalisation requires agreements on responsibilities and funding, and practical management, which is generally more difficult than coming to a shared vision. Effective cooperation demands a functional institutional base as shown in many projects on shared natural resources or river basins (Dieltjens and Van Den Langenbergh,

2005). It may not, however, be necessary to establish specific institutions for transnational adaptation. Transnational cooperation on adaptation can be integrated into a wider cooperation framework. For example, in a Portuguese-Spanish coastal region the co-responsibility for adaptation was included in the institutions for coastal management that had been developed for the border region (Pinto and Martins, 2013).

The institutional base for national level transnational cooperation on adaptation can be further developed through regional Conventions and Treaties that have established areas of cooperation, which can be naturally expanded to issues of adaptation as seen in the Baltic Sea Region and the Pyrenees. Such mainstreaming of transnational adaptation is in many cases likely to be more effective than the establishment of new international organisational structures exclusively for adaptation. There are clear links and synergies between, for example, the transnational management of natural resources or the transnational protection of the environment and considerations of climate change.

2.8 Key topic 8: Monitoring, reporting and evaluation

Key messages

- Seven countries are currently implementing a monitoring scheme, a reporting scheme or an evaluation scheme (MRE): Finland, France, Germany, Lithuania, Spain, Switzerland and the United Kingdom. Six additional countries are working on MRE schemes and 12 are planning to do so in the future.
- Countries reported that they are considering monitoring, reporting and evaluation schemes for a range of different purposes. These vary from evaluating the preparedness of a country to evaluating a specific policy measure.
- Countries are using a variety of approaches for their MRE schemes, for example, a review by an independent body and self-assessment by actors in different sectors.
- Ten countries out of 22 reported that they are implementing, or developing indicators on climate impacts, risks and adaptation. There are many challenges when developing indicators such as the long time-frames and the availability of data.
- Countries are planning to use the information from their monitoring and evaluation schemes to revise either their national strategy or plan. This suggests that countries have recognised that adaptation is an iterative process whereby learning from planning, implementation, MRE schemes and new information from research are fed back into the process to improve the adaptation interventions.

2.8.1 Monitoring, reporting and evaluation (MRE): what does this entail?

This topic will focus on the MRE of national adaptation interventions. Within this topic the term national adaptation interventions includes preparing a country for climate change, developing and implementing national strategies, action plans and specific policies. The topic will describe the status of MRE in European countries from the results of the self-assessment survey, the purposes and approaches that countries are using and from a number of examples how the challenges for adaptation MRE are being addressed. The key terms for MRE are provided in the box below.

Why MRE matters

MRE is a critical part of the adaptation process. The combination of the long timescales associated with climate change, and inherent uncertainties (e.g. in terms of our understanding of future climate change and societal responses) makes it essential that we monitor, report and evaluate how well we are adapting. In addition, we are still at a relatively early stage in implementing adaptation policies and measures, therefore it is critical that we understand and learn which adaptation actions work (or not), in what contexts and why.

MRE of adaptation interventions is important because countries need to decide whether their

intervention is effective (reducing the risks without introducing bad effects), efficient (the long-term benefits of adaptation actions should outweigh the costs), and equitable (the effects and costs of the activity on different groups should be taken into account). It is essential to aim for continual improvement: by learning lessons about the process of planning, implementing and measuring adaptation, future adaptation interventions can be more effective, efficient and equitable.

MRE is also seen as a critical part of the EU Adaptation Strategy (EC, 2013a) and is covered in the guidelines for formulating adaptation strategies (EC, 2013b). In addition, the way that the European Commission will assess the status of adaptation in the EU will be via Member State's reporting (e.g. Monitoring Mechanism Regulation (MMR)) and an adaptation preparedness scoreboard including indicators for measuring Member States' level of readiness.

Five reasons why measuring progress for adaptation is difficult

Measurement of progress for an adaptation intervention is often carried out using indicators. An indicator provides evidence that a certain condition exists or certain results have or have not been achieved and can be either quantitative or qualitative. In the context of climate adaptation, indicators are typically designed around three

Definition of key terms

National adaptation interventions include preparing a country for climate change, developing and implementing national strategies, action plans and specific policies.

Monitoring: to keep track of progress made in implementing an adaptation intervention by using systematic collection of data on specified indicators and reviewing the measure in relation to its objectives and inputs, including financial resources.

Reporting: to provide information about what is happening in relation to adaptation. Reporting is mostly coordinated with either a monitoring or evaluation scheme and reported internally (within an organisation or country). Reporting can also be an external, explicit requirement related to international procedures, for example the National Communications of the UNFCCC or the revised Monitoring Mechanism Regulation (MMR) of the European Union.

Evaluation: A systematic and objective determination of the effectiveness of an adaptation intervention in the light of its objectives. It is also a judgement of the measures relevance, efficiency, equity and overall utility. There are many different types of evaluation. An ex ante or midterm evaluation focuses on ways of improving a project or programme while it is still happening. In contrast, an ex post evaluation seeks to judge the overall effectiveness of an intervention, usually after a project or programme has been completed.

Indicators to measure progress of an adaptation intervention: An indicator provides evidence that a certain condition exists or certain results have or have not been achieved and can be either quantitative or qualitative. Two distinct types of indicators can be used:

- a process-based approach seeks to define the key stages in a process that would lead to the best choice of result (process indicators), without specifying that result at the outset and
- an outcome-based approach seeks to define an explicit outcome, or result, of the adaptation action (outcome indicators).

These are composite definitions informed by the following sources: AdaptME (Pringle, 2011); EC, 2011; UNFCCC, 2010; OECD DAC Glossary.

For further definitions and sources, see the glossary at the end of this report.

broad categories a) indicators of impacts, b) indicators of risks and c) indicators of adaptation action.

There are a number of reasons why MRE for adaptation and thus the development of indicators is difficult.

- Adaptation is not an outcome in its own right; in order to assess adaptation progress, proxies for measuring 'reduced vulnerability' or 'increased resilience' will often be required (Bours et al., 2014).
- Adaptation is context specific, a characteristic which must be reflected in the indicators used. This can make it harder to develop meaningful indicators over a large geographical area or across many sectors.
- Long timeframes. Climate change will unfold over many years; adaptation is often not an outcome that will be achieved within a normal programme cycle, typically 3 to 5 years.
- Uncertainty — about the scale, timing and spatial nature of how the climate might change

(ASC, 2011) and how society might respond makes it challenging to define good adaptation. Thus indicators of flexibility can be valuable as well.

- Adaptation has no prescribed target — there is no single metric (ASC, 2011), unlike climate change mitigation which can be quantified in terms, for example, of tonnes of carbon. This means that gathering a set of indicators together that provide a comprehensive picture is challenging.

Given these challenges, it can often be difficult to develop outcome indicators for adaptation. Thus outcome indicators can be combined with process indicators which measure progress towards the achievement of an outcome (e.g. the number of municipalities with adaptation action plans).

Developing a coherent set of indicators should be an iterative process (ASC, 2011) which takes into account the availability and robustness of data. Indicators should not be considered as a short cut to a deeper understanding of climate adaptation as they cannot reflect all the dimensions of adaptation planning and implementation (Bours et al., 2014).

2.8.2 Self-assessment survey findings

The purpose of this table is to illustrate the response rates to the four questions related to MRE within the self-assessment survey.

Question from self-assessment survey (including question numbers)	Number of countries having answered this question (including % of total number)
What are your plans for integrating new information and insights into existing adaptation policies? Answers related to MRE only (Q29)	10/30 (33 %)
In my country, monitoring, reporting and evaluation work for adaptation policies are 'not planned', 'planned', under development' or 'currently being implemented' (Q30)	30/30 (100 %)
The three tables below allow you to identify the stakeholders involved and the format of their involvement for the development (1st table), implementation (2nd table) and monitoring and evaluation (3rd table) phases of the adaptation process. Answers related to 3rd table on MRE only (Q40)	3rd table: 13/30 (43 %)
What are the next steps your country is planning? Please provide information on the following issues and the related timing (addressing both national and sub-national levels): Monitoring, reporting and evaluation Q42)	23/30 (76 %)

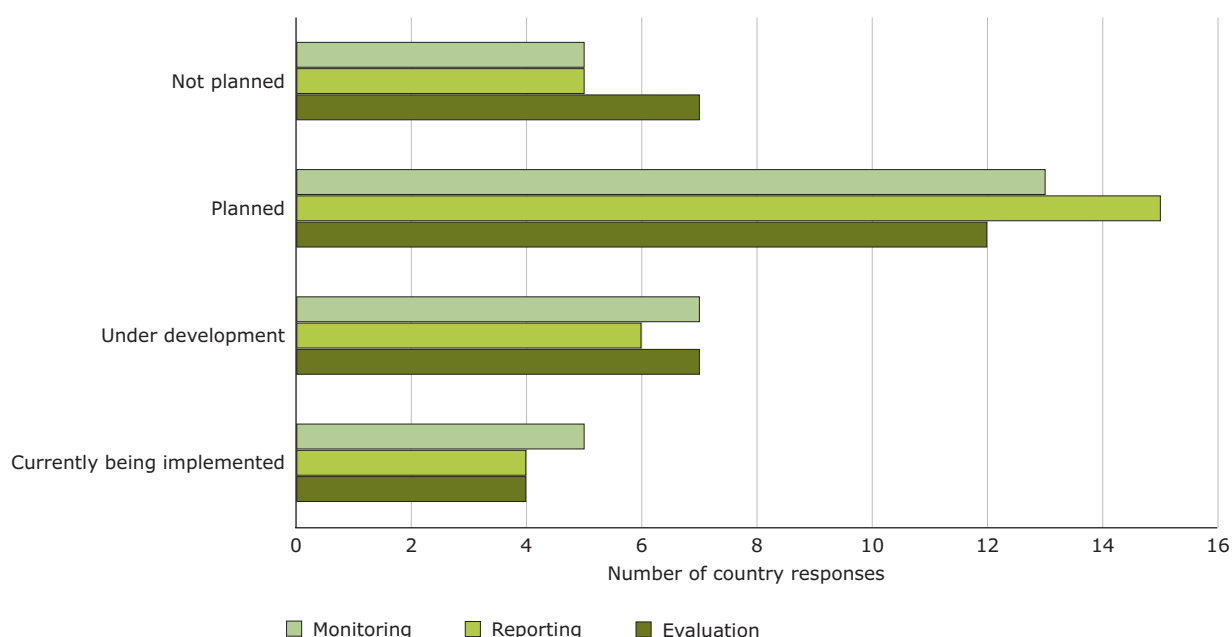
Seven countries are currently implementing a monitoring, a reporting or an evaluation scheme: Finland, France, Germany, Lithuania, Spain, Switzerland and the United Kingdom

The current status and progress of MRE schemes in European countries is shown in Figure 2.19 and Table 2.12.

The self-assessment survey reveals that the seven countries that are currently implementing either a

monitoring, a reporting or an evaluation scheme are Finland, France, Germany, Lithuania, Spain, Switzerland and the United Kingdom. Five countries are implementing monitoring schemes (France, Germany, Lithuania, Spain and the United Kingdom) while four countries are implementing reporting schemes (France, Lithuania, Spain and the United Kingdom). Finally, Figure 2.19 shows that four countries are implementing an evaluation scheme (Finland, Lithuania, Switzerland and the United Kingdom).

Figure 2.19 Status of monitoring, reporting and evaluation schemes (Question 30; 30 responding countries)



When comparing the responses to Question 12 about the stage of the policy process with the status of the MRE there is a good relationship. Countries that are in the early stages of the adaptation policy process (up to the 'Decision') are also in the early stages (either 'not planned' or 'planned') of their MRE schemes. Those countries that are implementing an MRE scheme (seven) are in the more advanced stages of the policy process.

Six additional countries are working on MRE schemes and 12 are planning to do so in the future

Figure 2.19 shows that the largest number of countries, (a half), have stated that they are 'planning' M or R or E schemes and Table 2.12 provides the list of countries that are planning a scheme.

It is evident from the self-assessment survey results that the status of MRE in Europe is not very advanced. This is not especially surprising as many countries are at an early stage of implementing their

strategies and plans. There is also the tendency for MRE to be considered later in the adaptation policy cycle, especially if MRE is related to the implementation of a specific strategy.

Stakeholder involvement in the monitoring and evaluation stage is limited

Stakeholders can range from the agencies that set the objectives to the parties that are the intended recipients of the intervention. Stakeholder involvement is therefore a critical part of a monitoring and evaluation scheme.

Figure 2.14 in Key topic 5 shows that stakeholder involvement in the monitoring and evaluation stage has so far been limited. Ten out of the 13 countries who answered this question are developing or implementing their MRE schemes. The general public have the lowest level of involvement with mainly information given. The private sector is slightly more involved as there

Table 2.12 Status of monitoring, reporting and evaluation schemes (Question 30; 30 responding countries)

Status of MRE	Monitoring	Reporting	Evaluation
Not planned	Bulgaria Czech Republic Greece Italy Liechtenstein	Bulgaria Czech Republic Greece Italy Liechtenstein	Bulgaria Czech Republic Greece Italy Liechtenstein Romania Slovenia
Planned	Cyprus Denmark Estonia Finland Hungary Ireland Latvia Poland Portugal Romania Slovenia Sweden Turkey	Austria Cyprus Denmark Estonia Finland Germany Hungary Ireland Latvia Poland Portugal Romania Slovenia Sweden Turkey	Belgium Cyprus Denmark Estonia Germany Hungary Ireland Latvia Poland Portugal Sweden Turkey
Under development	Austria Belgium Malta Netherlands Norway Slovakia Switzerland	Belgium Malta Netherlands Norway Slovakia Switzerland	Austria France Malta Netherlands Norway Slovakia Spain
Currently being implemented	France Germany Lithuania Spain United Kingdom	France Lithuania Spain United Kingdom	Finland Lithuania Switzerland United Kingdom

has been consultation in a few countries. Scientists and interest groups are actively involved. The self-assessment shows that deeper involvement (such as sharing the decision-making power) in monitoring and evaluation is restricted to government officials at national or subnational level, i.e. those more likely to be involved in developing adaptation interventions.

Countries have stated in the self-assessment survey that they are considering MRE schemes for a range of purposes. These vary from evaluating the preparedness of a country to evaluating a specific policy measure.

MRE has been planned or implemented for different purposes and for differing objectives. In some countries the purpose relates to the evaluation of a national strategy, while in another it may relate to a specific policy measure or a broader purpose that may have implications for the strategy/policy. These are demonstrated in Section 2.8.3 with the following examples:

- Finland, Lithuania and Austria are evaluating the implementation of their NAS;
- the United Kingdom has evaluated preparedness for a future climate, and with the Adaptation Reporting Power also evaluated a specific policy measure.

Countries are using a variety of approaches for their MRE schemes, for example a review by an independent body and self-assessment by actors in different sectors

The self-assessment survey results indicate that a number of different approaches have been considered (Table 2.13). These include, for example:

- the use of periodic monitoring reports, working groups with the main stakeholders, sectoral reviews and taking into account the requirements of the European Commission's adaptation preparedness scoreboard (e.g. Spain);
- the regional authorities are tasked with developing regional action plans to monitor adaptation work at the local level (e.g. Sweden);
- a review by an independent body (e.g. the United Kingdom);
- self-assessment by sectors (e.g. Austria and Finland).

The self-assessment survey asked countries to assess the status of their MRE processes separately (using the categories 'planned', 'not planned', 'under development' and 'currently being implemented'). The results show that in 22 out of 30 countries the M, R and E elements are at the same level of development, suggesting some degree of coordination in terms of planning and progress. However, in some countries these elements are at different levels and this is demonstrated in Table 2.13, which is colour-coded according to progress.

Table 2.13 illustrates that in cases where progress is 'uneven' across M, R and E elements; there is no clear pattern across Europe. For example, Finland and Switzerland are further advanced in terms of evaluation compared to monitoring while for Germany, Romania and Slovenia, it is the reverse.

Ten countries out of 22 have stated in the self-assessment survey that they are implementing or developing MRE indicators on climate impacts, risks and adaptation

The 10 countries either already implementing or developing MRE indicators include Austria, Belgium, Finland, Germany, Hungary, Ireland, Lithuania, Norway, Switzerland and the United Kingdom (Table 2.13).

There are a number of challenges with developing indicators for adaptation and these challenges are discussed further in Section 2.8.4.

Countries are planning to use the information from their monitoring and evaluation schemes to update either their national strategy or action plan.

A number of countries have commented on how they plan to use the results from their MRE scheme (Table 2.14).

Table 2.14 shows that these seven countries are planning to use the information from their monitoring and evaluation schemes to revise either their national strategy or action plan. In their response, Ireland referred to the integration of new insights and information in sectoral and local adaptation plans, highlighting how adaptation planning can include experience gained from both vertical (local) and horizontal (sectoral) coordination. It is valuable to consider the evaluation from both top-down and bottom-up perspectives.

Table 2.13 Country comments on their next steps for MRE and their status of MRE as described in the self-assessment survey

Country	Monitoring	Reporting	Evaluation
Austria	Developing a monitoring tool for the assessment/evaluation of the defined fields of activity.	The first Implementation Report will be published by the end of 2014. Future reporting is planned on a three-year cycle.	Developing an evaluation tool for the assessment/evaluation of the defined fields of activity.
Belgium	Indicators are being developed by the different federal and regional entities. A study commissioned by the Flemish Region will point out indicators for climate adaptation (e.g. heat island effect).		
Czech Republic	MRE should be taken into account in the action plan		
Finland			As a part of revision to improve methodology and system to monitor and evaluate the implementation of the strategy
France	Midterm review at the end of the year (report published January 2014)		
Germany	Currently indicators in order to establish a monitoring system on climate impacts and adaptation are being implemented		
Hungary	As part of the development of adaptation strategy, the elaboration of methods for monitoring/evaluation is under way		
Ireland	Future work under the EPA's Climate Change Research Programme will take account of the need for adaptation indicators to assist in monitoring and reviewing of plans as well as allowing for comparison across plans		
Lithuania	During the 2014-to-2016 period, to conduct studies for individual sectors (spatial planning, transport, energy, waste, industry, agriculture, fisheries, forestry, tourism and others) regarding the vulnerability to climate change and the opportunities to adapt, to propose the most effective adaptation measures and indicators. State and municipal institutions engaged in the implementation of the activities will provide the Ministry of Environment with information about the progress in implementing the Strategy and its Action Plan by submitting annual activity reports.		
Malta	It is recognised that the development of a monitoring, reporting and verification (MRV) framework for adaptation will be crucial to feed into the review of the NAS. In this regard, the Climate Change Division within the MRA has been tasked, inter alia, with the responsibility for monitoring and reporting of the relevant commitments, which is indeed ongoing.		
Netherlands	Developing a monitoring tool for the assessment/evaluation of the defined fields of activity.	The first Implementation Report will be published by the end of 2014. Future reporting is planned on a three-year cycle.	Developing an evaluation tool for the assessment/evaluation of the defined fields of activity.
Norway	Preliminary process established, through coordination of government action at national level and some other initiatives. Will be addressed more comprehensively in the coming years.		
Spain	The Third Monitoring Report of the Plan Nacional de Adaptación al Cambio Climático (PNACC) was published in December 2013, at the same time as the adoption of the Third Programme of Work. This Third Work Programme includes monitoring and evaluation aspects by means of periodic monitoring reports, progress evaluation in working groups with main stakeholders and sectoral reviews. It also follows, participates and considers the EC progress in the design of the scoreboard.		
Sweden	In 2013, the regional authorities were given the task to develop regional action plans and to monitor adaptation work at the local level. This work will include risk- or vulnerability assessments where needed.	As part of the work to review the risk and vulnerability assessment and to look at options for future adaptation work, we are also investigating the need for MRE activities.	
Switzerland	Setting up an M&E system: determination/ collection of indicators — first controlling/ evaluation of implementation and effectiveness of the strategy in order to get valuable input for the revision of the strategy and action plan.		
United Kingdom	Adaptation Subcommittees have statutory duty to report on implementation of NAP under Climate Change Act. They are developing indicators through which to do this. Also need to include related efforts by Scotland, Northern Ireland and Wales.		

Note: The category under which countries placed themselves for monitoring, reporting and evaluation separately is indicated by the shaded colour of the squares.

☐ No text provided ☐ Not planned ☐ Planned ☐ Under development ☐ Currently being implemented

Table 2.14 List of countries' comments on integrating new information and insights into existing adaptation policies

Country	Comment
Austria	M&E scheme currently being developed to review the implementation of the NAS/NAP, generate knowledge on trends of climate change effects and learn what is working and what is not.
France	An action plan expected (legal framework under progress) every 5 years and a midterm review.
Ireland	The National Adaptation Framework provides that that proposed sectoral and local adaptation plans should be reviewed every 5 years and build upon experience gained, new research and new policy on adaptation.
Netherlands	The plan is to integrate new information and insights into the national strategy.
Portugal	New information and methodological concepts will be evaluated and considered for integration into existing policies.
Poland	Progress in implementation of the adaptation policies will be monitored and periodically new measures will be added.
Switzerland	Switzerland has started to set up a M&E system for climate change adaptation in 2012. It focuses on five evaluation objects: concept, application, output, outcome, impact and it is closely related to the adaptation strategy (1st and 2nd part). Currently the process of evaluation is conducted in order to learn from past experiences and to gain insights into possibilities to optimise the process in the future. Regular controllings and evaluations of the progress and effectiveness of the implementation of the adaptation strategy are foreseen, which deliver valuable input for the revision of the adaptation strategy.

2.8.3 Country examples

This section provides five extended examples on:

- evaluating the implementation of a NAS, e.g. Finland;
- monitoring, reporting and evaluating the implementation of a NAS, e.g. Lithuania;
- evaluation of a specific policy — the Adaptation Reporting Power, e.g. the United Kingdom;

- evaluating preparedness for a future climate, e.g. the United Kingdom;
- development of indicators, e.g. Austria.

These examples are designed to show the different purposes, approaches, outcomes and indicators that have been developed so far in Europe.

Evaluating the implementation of a national adaptation strategy

Finland

Purpose

The inter-ministerial Coordination Group for Climate Change Adaptation, chaired by the Ministry of Agriculture and Forestry was responsible for the evaluation of the Finnish National Strategy for Adaptation to Climate Change (2005). The evaluation of the Strategy's implementation (2012/2013) assessed the level of adaptation in 15 sectors and produced recommendations for the Strategy's revision.

Approach

The evaluation looked at the progress of adaptation measures that had been proposed in the Strategy. The evaluation assessed the adaptation level of sectors using a 5-step indicator. The indicator measures: recognition of adaptation needs, level of adaptation research, launch of adaptation measures, and cooperation with other sectors. The evaluation used information from: a self-assessment by sectors, questionnaires and interviews of sector experts, a stakeholder workshop and results from research projects. The evaluation also provided an overview of some cross-sectoral measures (such as early warning systems and communication), adaptation at regional and local levels, EU adaptation policy and the results from recent adaptation research.

Challenges addressed

- Interministerial Coordination Group to address the communication and capacity issues between relevant national institutions.
- Multiple opportunities to use the 'learning' from the process.
- Midterm review (2009) and full review (2013) allowed for adjustments during the strategy period and recommendations at the end to feed into the new strategy.
- Horizontal coordination so that sector views were taken into consideration.
- Broad participation of stakeholders involved in the process.
- A 5-step process provided a range of process and outcome-based measures to assess the level of adaptation in the 15 sectors.
- Approach included an overview of cross-sectoral and local measures demonstrating vertical coordination and a recognition of interdependencies and cross-sectoral elements that are not covered by sectors.

More information

'Evaluation of the 2005 National Strategy for Adaptation to Climate Change', 2013, Report of the Coordination Group for Adaptation, Ministry of Agriculture and Forestry Working Group report 2013:5 (in Finnish)

http://www.mmm.fi/attachments/mmm/julkaisut/tyoryhmanmuistiot/2013/6MoQ7USVg/Ilmastomuutoksen_kansallisen_sopeutumisstrategian_2005_arviointi.PDF



Photo by Pentti Sormunen/Vastavalo.fi

Monitoring, reporting and evaluating the implementation of a national adaptation strategy

Lithuania

Purpose

The Strategy for National Climate Change Management Policy for 2013–2050 was adopted in November 2012. The strategy sets the strategic goals of both — Lithuania's climate change adaptation and mitigation policies. Every two years, the Government of the Republic of Lithuania prepares a report on the implementation of the Strategy to the Parliament of the Republic of Lithuania.

Approach

In order to ensure the implementation of the Strategy the Inter-institutional Action Plan for the goals and objectives (2013–2020) was approved in April 2013. Following the approval of the strategic planning methodology, the Plan is prepared for a three year period and is updated annually. The progress of the implementation of the Strategy is evaluated by a set of criteria established in the Plan.

In addition, ministries and other governmental institutions are obliged to integrate the goals and objectives set out in the Strategy, to establish implementation measures and to ensure close inter-institutional cooperation while developing the strategies, their implementation plans and programmes of individual sectors of the economy.

State and municipal institutions provide the Ministry of Environment with the information about the progress by submitting annual activity reports. These institutions also report on planned measures that could be included in the Plan.

Challenges addressed

- The criteria used to measure progress are quantitative.
- The outcomes of the MRE scheme will feed into further development of the Plan (2013–2016) and the update of the Strategy for the National Climate Change Management Policy.

The following short-term measures are included in the Inter-institutional Action Plan:

- Studies to assess vulnerability and opportunities and propose effective adaptation measures and indicators will be conducted for the individual sectors (spatial planning, transport, energy, waste, industry, agriculture, fisheries, forestry, tourism and others);
- Evaluation of the vulnerability and risks for different regions of Lithuania (2016).

More information

http://www.am.lt/VI/files/File/Klimato%20kaita/Lankstinukas_Klimato_kaita_ENG.pdf

Evaluation of a specific policy — the Adaptation Reporting Power

United Kingdom

Purpose

The Climate Change Act (2008) gives the British government the authority to request public and private sector organisations to report under the Adaptation Reporting Power (ARP). Organisations responsible for key services and infrastructure can be asked to assess the risk of climate change on their work and describe how they will address these risks. The first round of the ARP process (2010–2011) directed 91 organisations responsible for national infrastructure to report. In 2013, the Adaptation Sub-Committee (ASC) evaluated the first round of the ARP and advised government on the approach they should take in the second round.

Approach

The ASC assessed the first round of the ARP policy against three principles to ensure that it made a positive contribution to the national adaptation effort: usefulness, robustness; and cost-effectiveness.

Under 'usefulness' the ASC recommended that the ARP should encourage reporting organisations to identify and address their risks, particularly those who previously had a low awareness of adaptation. The outputs from the ARP report should also help to inform the government's adaptation policy. Under 'robustness' the ASC proposed that the reports should be based on quantitative assessments of risk and there should be a clear quality assurance process in place.

Under 'cost-effectiveness' the ASC recommended that the ARP should produce useful, low-cost reports, focussing on adaptation priorities, but avoiding duplication with existing regulatory requirements.

The key stakeholders (the reporting organisations) were given the opportunity for tailored support, they attended a stakeholder conference, and participated in discussions on sector-level assessments. They were also invited to comment on the ARP process and how it might be improved.

Challenges addressed

- Stakeholders were actively involved in the process through support, workshops and conferences to enable two-way discussion.
- Outcomes (recommendations) were considered when developing the second ARP.
- Qualitative and quantitative elements of the policy were assessed to ensure that both the finance and contextual aspects of implementing the policy were considered.
- An independent body (ASC) carried out the assessment to ensure transparency and publicise the lessons learned from a trusted source.

More information

<http://www.theccc.org.uk/publication/letter-advice-on-the-strategy-for-the-second-round-adaptation-reporting-power-5-november-2012>



Photo by Ed Nix, Oxford Mail

Evaluating preparedness for a future climate

United Kingdom

Purpose

The 2008 Climate Change Act introduced a framework for independent scrutiny of the government's adaptation programme. It included the establishment of the Adaptation Sub-Committee (ASC) of the Committee on Climate Change (CCC), an independent body created to fulfil a number of statutory responsibilities. One of these is to 'assess the preparedness of the United Kingdom to meet climate change risks and opportunities' and report by 2015.

Approach

The ASC developed an adaptation assessment toolkit. The toolkit has two main components:

1. Monitoring changes in climate risks using three categories of indicators
 - Indicators of risk, which measure changes in society's exposure and vulnerability to weather.
 - Indicators of adaptation action, which aim to measure risk reduction as well as the action itself.
 - Indicators of (realised) climate impact, which are the net result of the risk factors and adaptation actions on the economy, society and environment.

Adaptation indicators have been selected, including for flooding (see link below). Each headline indicator is underpinned by quantifiable data. Some of these indicators can be considered as proxy process indicators e.g. 'planning applications approved by local authorities despite Environment Agency objections'.

2. Evaluating preparedness for future climate — this involves analysing if the amount of adaptation occurring is sufficient to address climate risks, now and in the future.

The Climate Change Risk Assessment (2012) identified the major risks the United Kingdom faces from future climate change. The ASC will apply this toolkit to assess changes in exposure and vulnerability to each of the major climate risks and the uptake of actions to prepare. Doing this will help form the baseline against which progress in the implementation of the UK National Adaptation Programme can later be evaluated. These assessments are set out in a series of reports covering flooding and water scarcity (2012), ecosystem services/managing the land (2013) and health, infrastructure and business supply chains (2014).

Challenges addressed

- The assessment was carried out by an independent body.
- The framework covers the horizontal, vertical, cross-sectoral, other (e.g. interdependencies, emergency, and security) and unexpected aspects.
- The indicators used to measure progress are quantitative (where a baseline and data is available) qualitative and process (to ensure the context is understood).
- The assessments are continuous and encourage 'learning' with different aspects covered in the annual reports to allow regular adjustment to both the approach and the measures. The outcomes of the evaluations have (See co-creation example on page 92), and will continue to feed into the development of the National Adaptation Programme (NAP 2013).

More information

ASC 2012: <http://www.theccc.org.uk/publication/climate-change-is-the-uk-preparing-for-flooding-and-water-scarcity-3rd-progress-report-2012>

NAP 2013: <https://www.gov.uk/government/policies/adapting-to-climate-change/supporting-pages/national-adaptation-programme>

Adaptation indicators: <http://www.theccc.org.uk/charts-data/adaptation-indicators>

Development of indicators

Austria

Purpose

An M&E scheme is currently being developed by the Ministry of Environment to review the implementation of the national adaptation strategy (NAS) and the National Action Plan. The scheme will also generate further knowledge on trends of climate change effects and learn which adaptation inventions are working. The NAS and NAP will be further developed based on the progress report and new scientific knowledge.

Approach

The M&E scheme links to the 132 adaptation actions (across 14 sectors) identified in the NAP. The scheme aims to provide sufficient information to monitor implementation activities, while keeping it manageable in terms of effort. The scheme combines two different approaches.

- Self-assessment: a stakeholder survey on the adaptation actions will be carried out.
- Data related criteria-catalogue: an 'indicator-based approach' with collection of qualitative and quantitative data.

The criteria catalogue started with an in-depth literature review and the identification of interfaces with existing (adaptation) monitoring systems (Austrian and EU). Preliminary suggestions for a set of criteria (for each sector) were identified and discussed with experts and within a stakeholder workshop. The Austrian framework is designed as a 'learning system' to be flexible, iterative and open for new developments.

Challenges addressed

- Stakeholders are actively involved in the process (workshops to enable two-way discussion) and will be involved in the future through a self-assessment survey.
- Existing (adaptation) monitoring systems were used.
- The criteria selected to measure progress are both quantitative and qualitative
- The framework encourages 'learning' and is flexible.

More information

http://www.bmlfuw.gv.at/umwelt/klimaschutz/klimapolitik_national/anpassungsstrategie/fortschrittsbericht.html (in German)



2.8.4 Discussion of findings

We are still at an early stage in understanding how best to adapt to future climate change, how risks can be most effectively reduced and resilience enhanced, and what the characteristics of a well-adapting society might be. Therefore, learning what works well (or not), in which circumstances and for what reasons is critical (Pringle, 2011) and this is the reason for doing MRE.

There are two types of learning when considering an adaptation intervention, firstly the learning about the method or approach (linked to the purpose) that is used to measure the progress of the intervention and secondly the learning about what makes 'successful adaptation' so that we can move towards creating well adapted societies.

It will be important to share knowledge from MRE schemes into the future

It will be important to continue to share knowledge and results from countries' MRE schemes at regular intervals into the future. At the moment there are only a limited number of countries (seven) who are currently implementing an MRE scheme therefore there is a limited amount of information from which to gather lessons learned. But nevertheless as these countries are 'earlier initiators' in terms of adaptation MRE, other countries can learn from their experiences, thus speeding up the process of MRE scheme development for others.

In addition, the fact that half of countries are planning to develop an MRE scheme in the future will mean that there is much more information in the future

from which to learn, both about the approaches and successful adaptation. This will provide a good opportunity to share knowledge and learning.

Agreeing on the purpose for the MRE scheme is key

Communicating and agreeing on the purpose for monitoring and evaluating is a key factor when developing an MRE scheme (EC, 2013b) along with acknowledging the tensions and synergies between these different purposes (Spearman and McGray, 2011). The self-assessment survey shows that MRE can be used for a range of purposes thus it is not surprising that it also seems that a variety of approaches are being developed to meet these distinct objectives. This demonstrates that countries are tailoring their approach to meet the purpose of their scheme and recognising that adaptation is context-specific. However, it is recommended that MRE schemes should go beyond considering 'Did we do what we said we would do?' and explore the unintended and unexpected outputs and outcomes which may stem from a policy or project (Pringle, 2011). Often some of the most valuable adaptation insights and innovations stem from things we didn't know would happen and these are not revealed if we stick to a rigid examination of performance against predetermined objectives. For example if a city had planned to increase its blue and green infrastructure by creating a park and waterbody to reduce urban heat and be used as a flood management intervention. There could in addition be unintended issues related to biodiversity, however these could be both positive — extension of habitat for existing species or, negative — arrival of a new vector-borne disease. This may be where some of the most important adaptation lessons can be learned.

Since only a few countries are evaluating their implemented adaptation measures there is still debate about 'what successful adaptation looks like'. Thus European countries should not necessarily have common indicators to measure success but should strive for a common understanding of success and also what contributes to failures (Chan, 2013). The British example goes beyond reviewing specific objectives and demonstrates a broader purpose for the evaluation.

The ASC (2012) applies its adaptation toolkit to answer three key questions in the context of a number of key themes or sectors:

1. Is the United Kingdom becoming more or less vulnerable to risks from the current and future climate?

2. Are we seeing sufficient uptake of low-regret adaptation actions?
3. Are long-term decisions systematically accounting for climate risks?

Answering these questions could therefore be considered as the purpose of the approach.

The importance of stakeholder involvement

According to the EC guidelines (EC, 2013b) 'Engaging and involving affected stakeholders' is a key factor when developing an MRE scheme. Stakeholders can range from the agencies that set the objectives to the parties that are the intended recipients of the intervention. They also include the intermediary organisations that are involved in implementing the intervention, such as related ministries, subnational government, sector bodies, expert institutions and the media.

The self-assessment survey shows that stakeholder involvement in the monitoring and evaluation stage of the policy planning process has so far been limited. Where countries have already developed their MRE scheme such as Austria, Finland, Germany and the United Kingdom the examples show that stakeholders were actively involved in the process, often through workshops to enable two-ways discussion. Engaging a wide range of stakeholders means that everyone has a 'voice' and there is a greater chance of identifying an intervention that may be a benefit for one group but is maladaptive (maybe harmful) for another. The risk of maladaptation (EEA, 2013) can be reduced by using MRE for learning, reflection, and improvement of ever-evolving strategies.

Learning from 'top-down' and 'bottom-up' sources

National strategies and implemented actions would be improved if they took into account learning from 'top-down' sources, i.e. relevant international and national sources that may provide examples of methods or measures. They also need to take account of 'bottom-up' sources, e.g. local, regional and sectoral sources of information that may provide knowledge of how social and cultural beliefs influence how particular groups respond to measures. Lessons from international reviews of MRE have concluded that it is useful to look both 'top-down' and 'bottom-up' (Chan, 2013) and countries have demonstrated that they are doing this. Austria, Finland, Germany, Ireland and

the United Kingdom have mentioned that they have plans to include learning from vertical and horizontal actions in their national strategy and this also ensures that the challenge of multiple scales and sectors for adaptation is addressed.

The role of institutions — governance, capacity and communications

It is important to be aware of which agency is carrying out the MRE and how their perspective influences the objectives of the scheme. The self-assessment survey demonstrates that different agencies are responsible for MRE in different countries and this can influence communication, institutional capacity and the objectives of the MRE scheme. The examples demonstrate that in Austria, Finland and Germany it is a national government Ministry or Agency that has responsibility for MRE and in the United Kingdom there is an independent coordinating body. Setting up an independent coordinating body can strengthen communication between relevant institutions, improve synergies, help to identify best practice and lessons learned and make the process transparent (Olivier et al., 2013).

The GIZ discussion paper (Leiter, 2013) states that the information from the MRE scheme not only needs to be used in a way that feeds into the relevant decision-making process, but is also presented in the right way for the target audience (typically different levels of policymakers). Therefore the strength of communications between institutions, as well as the way that information from the MRE scheme is presented to those who need to use it is important for enhancing learning opportunities and building institutional capacity.

Challenges to address when developing an MRE scheme

As discussed earlier there are a number of challenges relating to MRE for adaptation (Bours et al., 2014) and this section considers some of these challenges and reviews how countries are dealing with them.

Adaptation is a continuous process

Adaptation is a process of continual adjustment which, if successful, will enable socio-economic or environmental goals to be achieved despite a changing climate context. The self-assessment survey shows that countries are planning to use the information from their monitoring and evaluation

schemes to revise either their national strategy or action plan (Table 2.14). It also shows that France and Finland are carrying out both a midterm and end of programme review and using the results to feed into a new strategy. It is promising that countries have recognised that adaptation is an iterative process whereby learning from MRE schemes and new information from research are fed back into the process to improve the adaptation interventions. This is also a recommendation by the UNFCCC (2010).

Adaptation cuts across scales and sectors

Climate change is global but adaptation is local. Therefore adaptation interventions should be context specific, reflecting national approaches and prioritising local knowledge and circumstances. The Finnish and British examples demonstrate that the approaches being developed aim to consider evidence across both sectors (horizontal) and scales (vertical). They also consider interdependencies, cross-cutting issues and unexpected issues.

The linked issue to this is that the range of different actions (at different scales) makes it difficult to compare or aggregate results. The desire to aggregate results can lead to an over-dependence on quantifiable indicators which due to the reasons listed below should be cautioned against.

Uncertainties are inherent when dealing with adaptation interventions

As discussed earlier, uncertainty about the scale, timing and spatial nature of how the climate might change (ASC 2012) and how society might respond makes it challenging to define good adaptation. MRE schemes need to acknowledge these many uncertainties and design in appropriate baselines that track contextual changes and flexibility in the approach and indicators.

The British and the Austrian examples show that the approach chosen is flexible and iterative allowing the intervention to adjust over the long time-frames as circumstances change. Another advantage of flexibility in the approach is to avoid lock-in to potentially maladaptive measures.

Measuring progress using indicators

The measurement of progress using indicators for an adaptation intervention is more challenging than for many other fields, including mitigation. This is because of the long time-frames before the outcomes of the adaptation intervention are known, the lack of data, the complexities of generating baselines, uncertainties and attributing the results to the adaptation actions taken (Mullan et al., 2013).

The self-assessment survey shows that 10 countries are implementing or developing indicators. Austria has used 'process-based' indicators that allow them to determine whether progress is on track even if outcomes cannot be determined yet. Some countries e.g. Germany (EEA, 2013 p. 90) have both 'impact indicators' and 'adaptation response indicators'. Progress indicators that focus on activities are also used for international reporting such as National Communications for UNFCCC and Climate-ADAPT. The use of a combination of quantitative, qualitative and 'binary' indicators that form a context-specific suite is supported by an OECD paper. It also recommends that the qualitative indicators are developed and supported by direct dialogue with beneficiaries such as focus groups. (Lamhauge et al., 2011).

In Germany and Austria the indicators are mainly based on existing M&E systems and this is reinforced by the EC Guidance (2013b). The

guidance recommends: not reinventing the wheel — since in some cases existing M&E systems that are already used in other fields can be adjusted to better account for adaptation. Among the many challenges when developing indicators is the availability of data. The data used for quantitative indicators ideally needs to have national coverage, be collected on a regular basis, statistically validated and publicly available. To meet these rigorous standards can be cost and time consuming so using existing data is the logical next step. Hence in Austria (Section 2.8.3) and Germany (Leiter, 2013) the indicators are primarily based on existing data sources.

Lastly the Austrian, British, Lithuanian, German and Finnish examples show that there is variation in both the indicators and the approach. This is positive and reflected in the guidance in that it recognises that schemes and coordinated indicators should not all be the same but tailored to national circumstances.

3 Future directions for national adaptation policies in Europe

Key messages

- In general terms, countries have taken similar pathways in addressing climate change adaptation.
- Nevertheless, it is essential to further improve our understanding of policymaking approaches and of implementation processes at national, regional and local levels.
- A more standardised basis for monitoring, reporting and evaluation schemes and for appraisal methods would facilitate learning across countries, sectors and public and private actors.
- Capacity building and advanced communication methods are key elements to foster adaptation policy at all levels.

Chapter 2 reports the findings of the self-assessment survey submitted by 30 European countries and provides an overview of adaptation policy processes across Europe. This chapter highlights key issues that will shape the future of adaptation at national levels and for which additional work will be needed to further support adaptation policies. In addition, this chapter builds upon the EEA 2013 Adaptation in Europe report, and particularly Chapter 4 'Agenda-setting issues', which includes the adaptation road map for the EEA (EEA, 2013).

Improving the understanding of policymaking approaches at national level

The self-assessment suggests that most countries in Europe follow a similar pathway in moving forwards on adaptation, i.e. set up a coordinating body, invest in a science-policy interface, involve stakeholders in parts of the process, develop a national adaptation strategy (NAS) and a subsequent national adaptation plan (NAP), introduce soft policies for implementation, and, in some cases, reserve funding, and develop monitoring, reporting and evaluation (MRE) schemes.

It is important to better understand how these generic national level approaches to institutionalise climate change adaptation relate to the patterns of policymaking within each country. Too much

difference between the approaches on adaptation and usual patterns of policymaking may cause difficulties for implementing adaptation. In this context, respondents to the self-assessment survey acknowledged different national circumstances. More effort is thus needed to understand the common elements in the different strategies and plans as well as in the governance approaches taken within each country.

Implementing adaptation strategies and plans

The importance of national strategies and plans as vehicles for implementing adaptation in practice needs to be evaluated. Evidence suggests these strategies and plans serve mostly an agenda-setting function and play a limited role in implementation. Moreover, how to foster actual delivery of adaptation action across sectors in a synchronised fashion remains a key question.

Many countries report soft measures for implementation of adaptation policies, such as awareness-raising or mainstreaming of adaptation into sectoral and cross-sectoral policies. However, such measures do not guarantee that the information provided is translated into actions. Neither does the inclusion of climate concerns in non-climate policies necessarily lead to reduced vulnerability. One of the challenges will be to ensure that adaptation is implemented not only in the most vulnerable sectors (e.g. water, agriculture, nature)

but also the less obvious but still vulnerable sectors (e.g. transport, ICT).

As the adaptation agenda matures and increasingly focuses on implementation-related issues, policymakers can draw upon experiences from other societal challenges. In addition, implementation is not one event, but rather an iterative process. In this context, policy learning, knowledge generation and sharing, leadership and developing capacities are important elements of an implementation agenda.

A better understanding of the implementation processes and incentives that can help adaptation to be taken up is required. This will require targeted additional work, but also an increased effort to share information on not only successes but also failures, expanding the information already available in, for example, Climate-ADAPT and building on other national and international efforts.

Advancing monitoring, reporting and evaluation

The survey showed that MRE schemes are still developing in most European countries. Since specific adaptation goals have mostly not been articulated clearly or differ between contexts, MRE methodologies and indicators are also likely to differ. Although revisiting strategies and plans on the basis of a systematic evaluation could be assumed to be the aim of any MRE scheme, there are various reasons why MRE is challenging to accomplish. In some cases the obstacles are methodological, technical, or economic, in other cases the obstacles are political.

Learning from the various MRE schemes and metrics across European countries is important in view of the reporting under the Monitoring Mechanism Regulation (MMR), the UNFCCC processes and the development of the EU scoreboard. In addition, many policy sectors have MRE schemes in place and more work is needed to better understand how adaptation can become an integral part of these schemes.

The current country pages on the European Climate Adaptation Platform (Climate-ADAPT; see <http://climate-adapt.eea.europa.eu>) could be developed further to convey descriptions of monitoring and reporting practice and key results of evaluations. In addition, creating periodic opportunities for representatives of countries to exchange experiences would allow for learning from successes and failures.

Facilitating and improving the use of appraisal tools

The context-specific nature of adaptation and the scarcity of (e.g. economic) data make generic guidance on the identification and prioritisation of adaptation options challenging. Nevertheless, as adaptation policy diffuses from a limited number of institutions at the national or regional level to the thousands of municipalities, companies and other local stakeholders, the availability of a (to some extent) harmonised and easily accessible set of methods and tools would be helpful.

Common frameworks could facilitate the linkage of methods and tools to adaptation questions in a regional and local context. This would usefully include not only quantitative approaches like cost-benefit analysis and multi-criteria analysis, but also qualitative ones such as systematic elicitation of expert knowledge and participatory processes.

Fostering mutual learning between different groups of actors, regions and sectors

The self-assessment survey responses do indirectly suggest that progress in adaptation policy will require activities to build capacity in most institutions and companies and find ways to mobilise the existing capacity. The relative novelty of climate change adaptation policymaking and the fact that climate is just one amongst many concerns of policymakers suggests that such capacity-building can incorporate an active search for integration and synergies, rather than building capacity for adaptation in isolation. Due to the nature of climate change and its impacts, including the long time-frames, knowledge is also continuously being refined and there is a need for initiatives that can be developed or strengthened in an iterative manner.

Capacity can be built by openly and transparently exchanging experiences, methods and approaches. Additional efforts to bring pieces of existing information together (e.g. those from various city networks such as ICLEI) and improve access to and knowledge of adaptation activities on various levels would enhance the exchange of experiences at the level where adaptation often takes place.

Systematic data collection targeting stakeholders at the regional and municipality level across Member States and amongst private firms would be helpful to create a better understanding of activities, main successes, failures and remaining challenges, and

how the local actions are related to adaptation planning at higher administrative levels.

Reaching out to the private sector

The private sector is responsible for a large part of investments in buildings and infrastructure, many of which are likely to be affected by climate change impacts. Many companies, especially those whose value chains depend on ecosystem services (food and beverages, forestry, fisheries, apparel, renewable energy, tourism) are vulnerable to climate change and thus, challenged in terms of adaptation.

The self-assessment does not provide detailed information about the actual preparedness for climate change in the private sector, and, with a few notable exceptions like the insurance sector, little is known about private sector adaptation from the literature across Europe. A targeted dialogue between government, research institutions and vulnerable private sector parties on climate risks and climate change preparedness would not only fill a knowledge gap, but also allow for public bodies to support private sector parties to take actions in view of reducing their vulnerability, e.g. by raising awareness and by using their knowledge and experiences in co-producing relevant knowledge and services related to risk management and response options.

Communicating adaptation

While effective communication is key to motivate and support adaptation policy and practice, it has

received very little attention so far. The choice of means (websites, social media, printed material, mass media, workshops, amongst others) depends on the specific goals of the communication and the resources available. Elements of a good communication strategy include the development of solid content (sound science, target group framing), the inclusion of non-scientific factors (emotions, norms and values), the involvement of skilled messengers as well as a process for its evaluation (Wirth et al., 2014).

One specific challenge is that terms describing steps and main elements in the adaptation policy process (e.g. implementation, prioritisation) can be interpreted differently. Even the term 'adaptation' itself can be interpreted differently — it can refer to adjustments of current policies, new policies, a policy process, or actual outcomes. This may seem an academic or linguistic issue, but can have serious implications for the interpretation of adaptation policies in Europe, their comparison, and even their actual societal impacts. Although the term 'adaptation' has positive connotations to many and may provide opportunities (e.g. additional funding, more attention), some cases have illustrated that avoiding the term altogether is more fruitful, particularly where climate change is controversial and thus provides fuel for discussion about the need for adaptation.

Defining terms clearly or at least making different interpretations explicit is an important component of any communication strategy and can help avoid misunderstandings, enhance the comparability of assessment results, and avoid potential barriers to advancing adaptation policy.

Glossary

Adaptation

Adaptation consists of actions responding to current and future climate change impacts and vulnerabilities (as well as to the climate variability that occurs in the absence of climate change) within the context of ongoing and expected societal change. It means not only protecting against negative impacts of climate change, but also building resilience and taking advantage of any benefits it may bring. Various types of adaptation can be distinguished, including anticipatory, autonomous and planned adaptation (EEA, 2013).

Adaptation is defined by the IPCC as the adjustment of natural or human systems to actual or expected climate change or its effects in order to moderate harm or exploit beneficial opportunities (IPCC, 2007) and by United Nations Development Programme (UNDP) as a process by which strategies to moderate, cope with and take advantage of the consequences of climatic events are enhanced, developed and implemented (UNDP, 2005). The European Commission Adaptation White Paper (2009) states that adaptation aims at reducing the risk and damage from current and future harmful impacts cost-effectively or exploiting potential benefits.

In the IPCC 2014 report, adaptation is defined as 'the process of adjustment to actual or expected climate and its effects'. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

Adaptation actions/options

Adaptation actions/options are adaptation measures considered for implementation.

Adaptation actions/options can be clustered in four main types (EEA, 2013):

- 'Grey' adaptation actions are used to reduce vulnerability to climate change and create

resilience. Examples include dyke building and beach restoration to prevent coastal erosion.

- 'Green' adaptation actions make use of nature. Examples include introducing new crop and tree varieties, allowing room for rivers to naturally flood onto floodplains, and restoring wetlands.
- 'Soft' adaptation actions are managerial, legal and policy approaches that alter human behaviour and styles of governance. Examples include early warning systems or financial infrastructure that can insure against damage from natural disasters.
- 'Combined' actions are making use of all of these three types. In fact, the best results are often achieved by combining actions. For example, flood risk in a particular area can be addressed by a combination of 'green' and 'grey' actions, or 'grey' and 'soft' actions.

Adaptation measures

Adaptation measures are implemented adaptation actions/options. They are technologies, processes and activities directed at enhancing our capacity to adapt (building adaptive capacity) and at minimising, adjusting to and taking advantage of the consequences of climatic change (implementing adaptation).

Adaptation policy process

The adaptation policy process consists of the initiatives undertaken by government or administration at various levels of governance and during the different phases of the policy cycle with the aim to foster adaptation to climate change. The adaptation policy process will often lead to developing adaptation strategies and action plans. In the context of this report the adaptation policy process comprises the following stages:

1. adaptation process has not started;
2. agenda-setting (i.e. adaptation is politically recognised as important);

3. formulation (i.e. responsible actors respond by formulating adaptation policies);
4. decision (i.e. policymakers have adopted an adaptation policy);
5. implementation (i.e. measures foreseen in the policy are being implemented);
6. monitoring and evaluation (i.e. review and updates of policy/actions).

Adaptive capacity

The IPCC 2007 defines 'adaptive capacity' as the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Awareness of the need for adaptation as a response to climate change

Awareness of the need for adaptation has a public dimension and is reflected in awareness of the public at large, including within communities, business and organisations. It also has a political dimension that is reflected in adaptation reaching the national political agenda and in the willingness to take adaptation actions. In addition, awareness of the need for adaptation is also reflected in the provision of, and need (by public and policy) for, scientific evidence.

Capacity-building

IPCC 2007 defines 'capacity-building' as developing the technical skills and institutional capabilities in countries to enable their participation in all aspects of adaptation to, mitigation of, and research on climate change.

Climate adaptation policy

'[the] actions taken by governments including legislation, regulations and incentives to mandate or facilitate changes in socio-economic systems aimed at reducing vulnerability to climate change, including climate variability and extremes' (Burton et al., 2002).

Coordination

Horizontal coordination mechanisms refer to institutions and processes in place to support integration of adaptation into sector policies. It entails that actors responsible for different policy

areas within an administrative level (e.g. national) exchange information and adjust their activities so as to ensure that adaptation efforts result in coherent action responding to the unavoidable impacts of and, where possible, benefiting from climate change.

Vertical coordination mechanisms refer to institutions and processes in place to support integration of adaptation through multiple administrative levels within a country (i.e. national, provincial, regional, local/city level). This entails that information on and approaches to adaptation are transferred and exchanged effectively within each policy area from the national to the subnational levels and vice versa.

Disaster risk

The likelihood over a specified time period of severe alterations in the normal functioning of a community or society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery (IPCC SREX, 2012, p. 558).

Evaluation

A systematic and objective determination of the effectiveness of an adaptation intervention in the light of its objectives. It is also a judgement of the measures relevance, efficiency, equity and overall utility. There are many different types of evaluation. An ex ante or midterm evaluation focuses on ways of improving a project or programme while it is still happening. In contrast, an ex post evaluation seeks to judge the overall effectiveness of an intervention, usually after a project or programme has been completed.

Financing instruments

- Project-based public support: Implementing adaptation is facilitated with the help of public funding on the basis of projects (e.g. research projects including test cases where implementation is carried out, financing adaptation measures to be implemented regionally/locally).
- Explicit budgetary allocations: A dedicated part of public finance is earmarked to finance adaptation implementation. This may lead to project-based adaptation, and hence in some cases may be overlapping with project-based public support.

- Insurance mechanisms: To equitably transfer the risk of a loss, insurances help to avoid or minimise human and economic losses following climate change-related events.
- Public-private-partnerships (PPPs): A venture between a government service and the private sector which is funded and operated through a partnership. PPPs can be a useful tool to combine financial and knowledge resources from both the public and private sectors on specific projects in order to foster adaptation implementation.

Knowledge

In the context of this section, knowledge refers mainly to scientific and technical evidence that is relevant to risk, vulnerability and adaptation to climate change. Knowledge generation refers to the production of scientific-technical evidence relevant to climate change adaptation such as research programmes and risk/ vulnerability assessments (based on Edelenbos et al., 2011). Knowledge use refers to the application of scientific-technical evidence relevant to climate change adaptation in support of well-informed policy decision-making (based on Davies, 2004).

Implementation

Implementation in the context of the policy cycle framework is defined as 'to put a public policy into effect'. Once policymakers decide on, formulate and adopt a policy, then it is implemented, i.e. activities identified in the policy document are translated into concrete actions. Implementing adaptation is a dynamic iterative learning process, and monitoring and evaluation help to adjust policy responses and actions to accommodate, for examples, the availability of new information such as changes in climate and socio-economic conditions (IPCC, 2014). Adaptation action that is taken by independent of government policies are considered to be 'autonomous' and not captured by the self-assessment survey.

Indicators

An indicator provides evidence that a certain condition exists or certain results have or have not been achieved and can be either quantitative or qualitative. Two distinct types of indicators can be used: a process-based approach seeks to define the key stages in a process that would lead to the best choice of end point (process indicators), without specifying that point at the outset and an

outcome-based approach seeks to define an explicit outcome, or end point, of the adaptation action (outcome indicators).

Monitoring

To keep track of progress made in implementing an adaptation intervention by using systematic collection of data on specified indicators and reviewing the measure in relation to its objectives and inputs, including financial resources.

National adaptation interventions

National adaptation interventions include preparing a country for climate change, developing and implementing national strategies, action plans and specific policies.

National adaptation plan/National action plan (NAP)

A national document that articulates the implementation of a country's climate change adaptation strategy. In most cases, the NAP presents adaptation measures and provides information for implementation (e.g. responsibilities, financial resources).

National adaptation strategy (NAS)

A national document that articulates a country's strategic vision with regard to climate change adaptation.

Planning adaptation

In context of this report, planning adaptation activities include the following tasks (based on EC, 2013).

1. Identifying possible adaptation options: collecting and describing a wide spectrum of possible adaptation options, including 'soft', 'green', 'grey' and 'combined' measures.
2. Assessing adaptation options: appraising options regarding their effectiveness in addressing potential impacts from climate change, their implementation time-frame, direct and indirect effects in environmental, social and economic terms as well as costs and benefits and other criteria.
3. Prioritising adaptation options: identifying and assessing adaptation options typically detect more adaptation options than can reasonably be

implemented, especially in the short term and taking financial limitations into consideration. Thus, specific adaptation actions need to be prioritised.

Reporting

To provide information about what is happening in relation to adaptation. Reporting is mostly coordinated with either a monitoring or evaluation scheme and reported internally (within an organisation or country). Reporting can also be an external, explicit requirement related to international procedures, for example the National Communications of the UNFCCC or the revised Monitoring Mechanism Regulation (MMR) of the European Union.

Resilience

IPCC 2007 defines 'resilience' as the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change.

In IPCC 2014, resilience is defined as capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganising in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation.

Risk

The word 'risk' has two distinctive connotations: in popular usage the emphasis is usually placed on the concept of chance or possibility, such as in 'the risk of an accident'; whereas in technical settings the emphasis is usually placed on the consequences, in terms of 'potential losses' for some particular cause, place and period. It can be noted that people do not necessarily share the same perceptions of the significance and underlying causes of different risks.

IPCC 2014 provides a new definition on risk. It is defined as the potential for consequences where something of value is at stake and where the outcome is uncertain, recognising the diversity of values. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. Risk results from the interaction of vulnerability, exposure and hazard.

Risk assessment (Climate change)

In general, a climate change risk assessment is an overall process of climate change risk identification, analysis and evaluation of a particular system in order to ensure this system will be resilient to climate change. It includes: the use of climate scenarios to assess the projected climate change impacts to a system, the estimation of the probability of these impacts and then the final estimation of the climate risk to this system. Both quantitative and qualitative techniques can be used to describe and assess risks. Quantitative assessments assign a numerical value to the probability of an event occurring, while qualitative assessments use general description of the magnitude of potential consequences and the likelihood that they will occur (IPCC AR4 WGII, 2007).

Sensitivity

Sensitivity is the degree to which a system is affected, either adversely or beneficially, by climate variability or change. The effect may be direct (e.g. a change in crop yield in response to a change in the mean, range or variability of temperature) or indirect (e.g. damages caused by an increase in the frequency of coastal flooding due to sea-level rise) (IPCC AR4 WGII, 2007).

Stakeholders

In the context of this report, stakeholders have been clustered into the following groups:

- government officials from national level (e.g. policymakers, public administration, government agencies)
- government officials from subnational level (including provincial, regional and local levels)
- private sector
- interest groups (e.g. farmers' associations, NGOs)
- scientists/researchers
- the general public.

The scale used for the level of stakeholder involvement is as follows:

- information given = information has been provided to stakeholders (e.g. websites, newsletters, reports and informative meetings);

- information gathered = information has been collected from stakeholders (e.g. online survey);
- consultation = feedback on policy draft proposals has been obtained from stakeholders (e.g. written feedback on policy drafts);
- active involvement = stakeholders have actively been involved in, and have had the possibility to shape decision-making in the adaptation policy (e.g. advisory committees);
- partnerships = decision-making power is redistributed through negotiation between responsible authority and stakeholders;
- empowerment = final decision is in the hands of the stakeholders.

Active involvement, partnerships and empowerment are considered 'deeper' forms of stakeholder involvement in the context of this report. Country responses brought up an additional form of involvement, co-creation, where multiple public and private sector stakeholders work together and share responsibility for developing knowledge, options and solutions. Elements of co-creation can be found in both partnerships and empowerment.

State of adaptation

In the context of this report the scoring of the state of adaptation has used the following scale:

- 0 = adaptation is not relevant for my country
- 1 = need for adaptation not recognised and no measures implemented yet
- 2 = coordination activities for adaptation started
- 3 = some adaptation measures identified for the sector but not yet implemented
- 4 = portfolio of adaptation measures identified and implementation (of some) launched
- 5 = portfolio of adaptation measures implemented
- 6 = portfolio of adaptation measures in place and monitored/evaluated

Subnational level

Subnational in the context of this report includes provincial, regional and local administrative levels.

Transnational cooperation

Transnational cooperation covers both cross-border cooperation between (neighbouring) countries and transboundary cooperation among countries with shared transboundary resources (e.g. water, protected areas) or otherwise shared interests. In the context of this report transnational cooperation refers to cooperation within Europe and thus excludes international cooperation with developing countries. Transboundary cooperation between regions within a country is not considered here.

Uncertainty

An expression of the degree to which a value (e.g. the future state of the climate system) is unknown. Uncertainty can result from lack of information or from disagreement about what is known or even knowable. It may have many types of sources, from quantifiable errors in the data to ambiguously defined concepts or terminology, or uncertain projections of human behaviour. Uncertainty can therefore be represented by quantitative measures, for example, a range of values calculated by various models, or by qualitative statements, for example, reflecting the judgement of a team of experts.

Vulnerability

The IPCC provides various definitions for the term 'vulnerability'.

Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity (IPCC, 2007).

Vulnerability is the propensity or predisposition of a person or group to be adversely affected (IPCC SREX, 2012).

Vulnerability is the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC, 2014).

(Climate change) vulnerability assessment

Generally, a climate change vulnerability assessment is aimed at informing the development of policies

that reduce the risks associated with climate change. Climate change vulnerability assessments are conducted in a variety of contexts, and for a diverse group of stakeholders motivated by rather different concerns.

Two generations of assessments of vulnerability to climate change can be distinguished:

- first-generation vulnerability assessments, which are characterised primarily by the evaluation of climate impacts in terms of their relevance for society and by the consideration of potential adaptation;

- second-generation vulnerability assessments, which assess the adaptive capacity of people, thus shifting the focus from potential to feasible adaptation.

Presently, an assessment of vulnerability to climate change include a sensitivity analysis for the system under study and an evaluation of the adaptive capacity of this system in order to determine how and where this system is vulnerable to climate change (IPCC AR4 WGII, 2007; Füssel and Klein, 2006).

Acronyms

ASC	Adaptation Subcommittee
CAF	Cancun Adaptation Framework
CBA	Cost–benefit analysis
CBSS	Council of the Baltic Sea States
CIRCLE	Centre for Innovation, Research and Competence in the Learning Economy
CMCC	Centro Euro-Mediterraneo sui Cambiamenti Climatici (Euro-Mediterranean Center on Climate Change)
CUNI	Univerzita Karlova Charles University
EAA	Environment Agency Austria
Eionet	European Environment Information and Observation Network
EPA	Environment Protection Agencies
ESBSR	EU Strategy for the Baltic Sea Region
EUSDR	EU Strategy for the Danube Region
FFCUL	Foundation Faculty of Sciences — University of Lisbon
FOEN	Federal Office for the Environment (in Switzerland)
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Federal Enterprise for International Cooperation)
HELCOM	Baltic Marine Environment Protection Commission (Helsinki Commission)
ICLEI	Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
MMR	Monitoring Mechanism Regulation
MRE	Monitoring, reporting and evaluation
MRV	Monitoring, reporting and verification
NAP	National adaptation plan
NAS	National adaptation strategy

NGO	Non-governmental organisation
NRCs	National Reference Centres
OPCC	Observatoire Pyrénéen du Changement Climatique
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PNACC	Plan Nacional de Adaptación al Cambio Climático
PPP	Public-private partnership
SEA	Strategic Environmental Assessment
SYKE	Suomen ympäristökeskus (Finnish Environment Institute)
UFZ	Helmholtz-Zentrum für Umweltforschung (Helmholtz Centre for Environmental Research)
UKCIP	UK Climate Impacts Programme
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
UPM	Universidad Politécnica de Madrid (Technical University of Madrid)
WFD	Water Framework Directive
WHO	World Health Organization

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