



EUROPEAN
COMMISSION

Brussels, 16.4.2013
SWD(2013) 134 final

COMMISSION STAFF WORKING DOCUMENT

Guidelines on developing adaptation strategies

Accompanying the document

**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

An EU Strategy on adaptation to climate change

{COM(2013) 216 final}
{SWD(2013) 131 final}
{SWD(2013) 132 final}
{SWD(2013) 133 final}
{SWD(2013) 135 final}
{SWD(2013) 136 final}
{SWD(2013) 137 final}
{SWD(2013) 138 final}
{SWD(2013) 139 final}

COMMISSION STAFF WORKING DOCUMENT

Guidelines on developing adaptation strategies

Accompanying the document

**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

An EU Strategy on adaptation to climate change

Table of Contents

Background and introduction to the guidelines.....	5
Consultation process.....	5
Current efforts in adaptation policy-making	5
Structure of the guidelines.....	7
The Guidelines	8
Step 1: Preparing the ground for adaptation.....	8
Step 1.a. Obtain high-level support	8
Step 1.b. Set up the process.....	9
Step 1.c. Estimate human and financial resources needed and identify potential sources of funding for the long term	12
Step 1.d. Collect information	12
Step 1.e. Communicate and raise awareness	15
Concluding step: key principles for adaptation.....	16
Step 2. Assessing risks and vulnerabilities to climate change.....	16
Step 2.a. Analyse how past weather events have affected your country	17
Step 2.b. Undertake a climate change risks and vulnerability assessment.....	17
Step 2.c. Take trans-boundary issues into account.....	18
Step 2.d. Develop an approach for addressing knowledge gaps and for dealing with uncertainties	20
Concluding step: Select your country's main concerns and set your strategic direction	20
Step 3. Identifying adaptation options.....	21
Step 3.a. Collect appropriate adaptation options given your country's main concerns	21
Step 3.b. Explore good practices and existing measures.....	22
Step 3.c. Describe adaptation options in detail	22
Step 4. Assessing adaptation options.....	22
Step 4.a. Assess possible options in terms of time, cost, benefits and efforts.....	22
Step 4.b. Assess cross-cutting issues, trade-offs and synergies of adaptation options.....	23
Step 4.c. Prioritise adaptation options and select preferred ones	23
Concluding step: Prepare a strategy document and get political approval.....	25
Step 5: Implementation	26
Step 5.a. Identify and make use of entry points for adaptation into existing instruments and/or create new instruments for adaptation (Mainstreaming).....	27
Step 5.b. Seek agreements with stakeholders responsible for implementation.....	28
Concluding step: Develop an action plan.....	28

Step 6: Monitoring and evaluation	29
Step 6.a. Develop appropriate M&E provisions for both adaptation policy's objectives and selected adaptation options	29
Step 6.b. Identify indicators.....	31
How does the EU Support?	33
Knowledge base.....	33
Mainstreaming framework	33
Funding instruments and organisations	33
Annexes	36
Annex 1 – Key principles for adaptation.....	36
Annex 2 - Self-check.....	37
Annex 3 - Further information sources	40
Annex 4 - References	41
Annex 5 - Glossary	42
Annex 6 - Overview of available guidelines	49

An EU Strategy on adaptation to climate change

BACKGROUND AND INTRODUCTION TO THE GUIDELINES

This document contributes to achieving the first objective of the EU Adaptation Strategy. It provides a first answer to identified barriers to the uptake of adaptation strategies at national level. It builds on and aims to make more operational the so-called Adaptation Support tool¹, one of the key features of Climate-ADAPT. This tool was developed together with Member States and other stakeholders during the preparation of Climate-ADAPT.

Consultation process

A comparative analysis of existing national adaptation strategies as well as national adaptation efforts to develop policies for adaptation has been conducted. In addition to the Adaptation Steering Group meetings, seven workshops were organized with representatives from Member States between January and September 2012.² These workshops aimed to inform the development of the EU Adaptation Strategy and offered an arena for sharing knowledge and experience on adaptation policy and practice. In particular, they were used to discuss needs and expectations of the guidelines on developing adaptation strategies. The meetings were structured in a way to gain comparable results and to provide good coverage for feedback on the needs and expectations from Member States.

This document takes stock of and can be complemented with the various guidance documents reported in Annex 6. They cover a wide spectrum of issues to be addressed when developing adaptation policy-making, from local adaptation strategies to sectoral aspects, but they also show a gap, as no resources currently target adaptation policy-making for EU Member States.

Hence, building on the state of the art in adaptation policy development, the EU guidelines on developing adaptation strategies³ aim to support EU Member States in the process of developing, implementing and reviewing their adaptation strategies to be able to (better) cope with a changing climate.

Current efforts in adaptation policy-making

As of January 2013, 15 EU Member States have adopted a national adaptation strategy: Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Ireland, Lithuania, Malta, the Netherlands, Portugal, Spain, Sweden and the UK.

Although there is no “one-size-fits-all” framework for adaptation in place, certain aspects of good adaptation are common. In particular:

¹ <http://climate-adapt.eea.europa.eu/web/guest/adaptation-support-tool/step-1>

² EPA Interest Group Climate Change Adaptation (5th and 6th of March 2012 in Dessau/Germany and on 27th and 28th of August 2012 in Helsinki); EIONET Meeting in Brussels (22 and 23th of May 2012); Member State Meeting for Southern Europe to support the development of the EU strategy (29th of May 2012 in Rome); CIRCLE 2 SHARE Workshop Supporting the development of the EU strategy for adaptation to climate change – Views and Challenges in Eastern Europe (27 and 28th of June 2012 in Vienna); Second Nordic International Conference on Climate Change Adaptation from 29-31th of August in Finland; Joint EIONET and Member State Expert groups on Maritime Spatial Planning and Integrated Coastal Zone Management from 11-12 September 2012 in Copenhagen

³ Strategies shall be understood in this document as an umbrella term for adaptation policies (including strategies, action plan and potentially sectoral plans).

- Sectoral focus: All adaptation strategies, or their related action plan, have been developed with a sectoral focus, reflecting the need for cross-government adaptation working groups to drive implementation;
- Mainstreaming: Integrating and mainstreaming adaptation with existing national programmes and policies is central to all present adaptation strategies;
- Stakeholders' involvement: Varying approaches have been taken on stakeholder involvement in the development process of existing adaptation strategies, from centralised to relatively decentralised. Centralised approaches have involved a small core group of administrations only while decentralised approaches have engaged a wide range of state and non-state stakeholders;
- Communication and awareness-raising: all Member States acknowledge that without effective communication and awareness-raising, implementation of the adaptation strategy and associated actions will be very challenging;
- An evolving process: all adaptation strategies appear to be intended as evolving documents which will be reviewed and updated to take account of advancing climate change science, research and technology.

At the same time, some limiting factors for successful adaptation remain:

- Absence of considerations for cross-border impacts: only one Member State, Belgium, explicitly considers the potential cross-border impacts of climate change and climate change adaptation.
- Further need for climate change risks and vulnerability assessments: only a few Member States have engaged in the preparation of detailed risk and vulnerability assessments.
- Lack of action plans: Only a few strategies encompass concrete action plans, namely Austria, Finland, Germany, Denmark, France, Malta and Spain. Much of the adaptation work undertaken to date can be summarised as awareness raising or preparing the ground for adaptation.
- Lack of monitoring and evaluation: Monitoring and evaluation (M&E) and adaptation indicators remain relatively poorly developed in most countries. Nevertheless, the attention being paid to M&E is growing with the awareness to draw on sharing lessons learnt and existing good practice in other areas or domains;
- Lack of funding: Few of the strategies define funding sources for adaptation action. This prerequisite for strategy implementation seems to be lacking in many countries together with establishing clear responsibilities for taking action.

EU Member States are faced with a number of barriers which might hinder successful adaptation policy making and implementation. At the stakeholder meetings to support the development of the EU Adaptation Strategy, participants mentioned the lack of human and financial resources and the lack of political commitment/will as key barriers. Furthermore, they raised the issue of uncertainty and reported that the lack of dedicated research hinders the adaptation policy process. In addition, the communication of relevant information to decision-makers was named as a challenging task. This goes in line with the need to create a common understanding for adaptation (e.g. distinction between mitigation and adaptation) among all affected stakeholders.

Most barriers are context-specific and process-dependent so that well-designed policy processes and targeted interventions might help to avoid/overcome barriers. But being aware of possible barriers and looking into good practice examples for resolving them may help to set specific actions in order to overcome them.

The guidelines intend to advance a common understanding of important aspects relevant to any adaptation process and provide clear terms of reference on how to address the above-mentioned barriers. They highlight key principles for successful adaptation processes and deliver a common basis for cooperative adaptation activities between different actors/stakeholders. In addition, the guidelines present various approaches taken by EU Member States in order to foster knowledge transfer and lessons learnt among them. To allow a wide uptake of the guidelines among national level policy and decision-makers in Europe, an easy to apply approach for adaptation is presented.

Additional information on barriers in adaptation policy making and suggestions on how to overcome them can be found in [Clar et al. 2012](#)⁴

Member States using the guidelines will be reminded of the main gaps currently identified in adaptation policy-making, as well as of successful approaches and good practice examples that address those gaps⁵. Following the recommendations of the guidelines would facilitate a good adaptation process including proactively removing barriers that might otherwise occur.

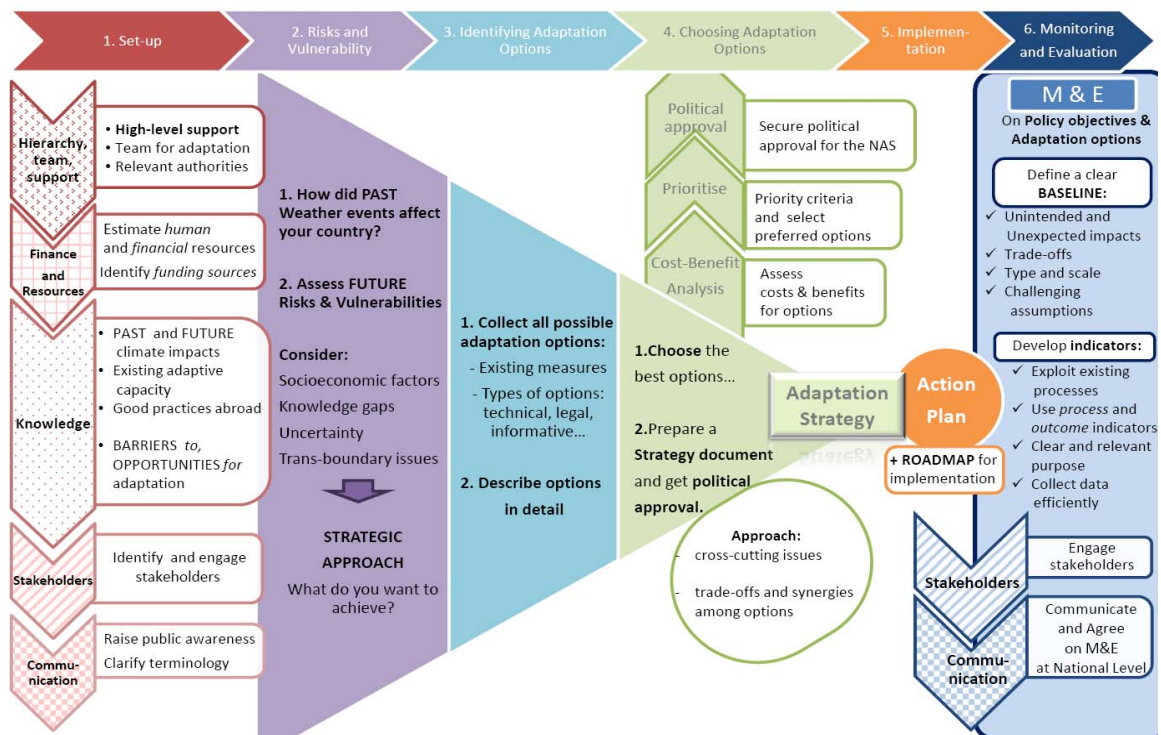
Structure of the guidelines

The guidelines are organized along the six steps of the adaptation support tool provided under CLIMATE-ADAPT⁶. Step 1 of the adaptation support tool must be understood as introducing key elements important to build the basis for a successful adaptation process. **The remaining five steps of the adaptation policy process should be considered as iterative and closely interlinked phases.**

⁴ <http://www.adaptgov.com/wp-content/uploads/2012/03/Clar-Barriers-guidelinesinadaptation-policy-A86-Tscience.pdf>

⁵ Each practical example presented in the guidelines was discussed with and drafted by Member States' representatives.

⁶ <http://climate-adapt.eea.europa.eu/web/guest/adaptation-support-tool/step-1>



THE GUIDELINES

Step 1: Preparing the ground for adaptation

Following the guidelines mentioned in this step will help address:

- the need to obtain and assure high level support;
- the risk of inadequate coordination and clarity about roles and responsibilities;
- the lack of funding, and its consequences during the implementation phase (see Step 5);
- the inadequate use of already available information;
- the lack of awareness or understanding of climate change issues.

Step 1.a. Obtain high-level support

High-level support can be triggered by recommendations from a higher level of governance, the way the EU Adaptation Strategy emphasizes the need for adaptation action at Member State level, or it could be triggered by legal obligations, even coming from a single sector. To ensure long term commitment for adaptation from political decision-makers or senior public management (which goes beyond the legislative period), raising awareness might be necessary at first.

Visit the European **CLIMATE-ADAPT platform**⁷ for relevant information on adaptation activities in European countries

Practical example 1

⁷

<http://climate-adapt.eea.europa.eu/web/guest/countries>

Calling for the preparation of national, regional and local adaptation strategies in Italy

An event that was significant for early adaptation activities in Italy was a National Conference on Climate Change, which was organised by the Ministry for the Environment, Land and Sea in September 2007. This event involved a wide range of stakeholders at the national, regional and local level, along with representatives from government institutions and NGOs, with a special session devoted to young people. The presence of the President of the Italian Republic and the participation of the Prime Minister and various Ministries made the event a very high level conference. During the two-day event, the most relevant national TV news and journals gave a wide coverage to the Conference.

The Conference included a series of preliminary workshops focusing on the most critical issues, such as desertification, erosion, coastal flooding, biodiversity loss, glaciers and snow cover loss, hydro-geological risk, health and the hydro-graphic area of the river Po. During the Conference, the problems concerning the changes in the level of vulnerability brought about by climate change and the available adaptation options were discussed. These led to final outcomes including a climate manifesto for sustainable adaptation and environmental safety, which called for the preparation of a National Adaptation Strategy and 13 actions for sustainable adaptation, including the improvement of monitoring, research and knowledge on climate change impacts.

The Conference represented an important opportunity for collecting and organizing the most relevant available information on climate change and its impacts. Information is already available on specific vulnerable sectors such as health, desertification, glaciers and snow cover, and hydro-geological risk. Although these provide a good starting point to begin the process of developing an adaptation strategy, many relevant knowledge gaps have been identified.

Some arguments to make a good case for adaptation

Climate change is no longer merely a future scenario; it is already in progress, and its effects are being felt in many locations. Examples include increasingly frequent heat waves and droughts, melting glaciers and permafrost, increases in heavy precipitation, the earlier start of the growing season, etc. All of these are indications of our changing climate. Adaptation to climate change must start now.

In the coming decades, despite all our efforts and achievements in climate mitigation, the challenges involved with adaptation to climate change will grow. There is a widespread consensus that adaptation measures represent an indispensable complement to climate mitigation.

Through adaptation measures, the adverse impacts of climate change on natural, social, and economic systems can be reduced or avoided, thus minimising damages and costs. As climate change progresses, the opportunities for successful adaptation will shrink and the associated costs will increase.

Adaptation has many points of contact with other strategies and is often closely linked to their objectives. Progress in adaptation can thus achieve a variety of goals. It is particularly important to implement adaptation measures at the regional and local levels, where the effects of climate change are directly felt.

The effects of climate change should not be seen exclusively as a burden. It is also important to identify potentially profitable opportunities in climate change.

Because of the long life-spans of new construction projects, buildings, and infrastructure, it is important to take future climate change into account now, in the planning and development stages.

Step 1.b. Set up the process

➔ **Establish a core team for adaptation**

To sustain an adaptation process in the long term, a clear mandate for the management of the adaptation process should be given to an organisation or a smaller group of people employed by the government. The precise responsibilities of the core team might be context-specific but can range from steering the process within the public authority to formulating policy drafts, from acting as contact point for adaptation to communicating adaptation internally and externally, etc. Members of the core team should have long-

standing experiences with weather/climate-related issues and should be qualified to cover a broad range of issues that might be relevant for the adaptation process.

The following aspects should be considered when establishing a core team for adaptation:

- Determine the members and obtain their consent
- Define the tasks of the group at the first meeting
- Agree upon the structure for collaboration (e.g. frequency of meetings, type of communication within the core team, rules of cooperation)
- Create a schedule and set milestones
- Identify cooperation needs with other administrative bodies and stakeholders
- Communicate, both internal (management) and external (public, etc.) and with decision makers
- Organise a transparent documentation of all steps taken in the process

Practical example 2

Preparing the ground in Poland

The most important step at the early stages of adaptation activity in 2010 was the creation of a group of stakeholders responsible for decisions on adaptation strategy development. The group consisted of a Steering Committee and seven thematic working groups, including representatives from interested Ministries and their research institutes.

Political commitment to adaptation was gained as a result of the government's official adoption of the EC's White Paper on adaptation in April 2009. Earmarking financial resources for adaptation work from the ministerial or state budgets was the biggest challenge to launch work in key areas, which were identified by the working groups. Numerous experts were able to start work on developing an adaptation strategy as soon as the financial resources were available.

➔ Liaise with other relevant administrative bodies

All relevant authorities (e.g. responsible for health, civil protection, transport, energy, economy, finance, education, etc.) need to be informed and involved in the adaptation process, receiving a clear mandate to take decisions in their fields of responsibility. This applies as well to the core team discussed above.

Look at the **PEER** report⁸ for various institutional settings across Europe

Their degree of involvement may vary from providing and exchanging information to building adaptive capacity or to taking decisions on adaptation within their sphere of authority.

It is also useful to make use of existing platforms and institutional set-ups. In particular, the national platforms for disaster risk reduction⁹, which many EU Member States have established, provides a multi sectoral platform that could facilitate interaction between disaster risk reduction and adaptation stakeholders.

⁸ http://www.peer.eu/fileadmin/user_upload/publications/PEER_Report1.pdf

⁹ The Hyogo Framework for Action: Building resilience to disasters calls for the creation of such multi sectoral platforms as a main mechanism for coordination and implementation of the disaster risk reduction agenda. See Overview of National Platforms in Europe available at <http://www.unisdr.org/we/inform/publications/19617>

Practical example 3

Setting up an inter-institutional working group to coordinate the development of a National Adaptation Strategy in Bulgaria

For the Republic of Bulgaria, the first step in the process of preparing a National Adaptation Strategy (NAS) was for the Ministry of Environment and Water to hold an initial stock-taking technical workshop. Representatives from other government institutions, the Bulgarian Academy of Sciences and non-governmental organizations took part in the workshop. The main objective of the event was to determine the range of stakeholders who should be involved in the development of the Strategy.

As an outcome of the workshop, an inter-institutional working group involving representatives of all concerned stakeholders (government institutions, organizations, academics, NGOs) was established by order of the Minister of Environment and Water. The inter-institutional working group has the responsibility to assist and coordinate the development of a National Adaptation Strategy.

➔ Identify affected stakeholders and involve them in the adaptation process

Cooperation with relevant stakeholders, including interest groups, NGOs or those from the private sector, can be set up with different levels of involvement, e.g. access to information, consultation on specific issues of concern to participatory involvement throughout the whole process. The level of involvement can also change over the course of the adaptation process (e.g. high level when defining objectives vs. low level when working on an evaluation scheme). But when starting the process, the aims of the process as well as the role of stakeholders need to be clear and communicated in order to manage expectations.

Some key points when involving stakeholders should be taken into account:

- Every stakeholder involvement process is different and thus, a diversified skill set (e.g. moderation, mediation, adaptation related knowledge) is needed to deal with the various possible developments in the phases of involvement;
- Stakeholder involvement processes are resource intensive (e.g. human, financial) and thus, a clear process design should be available right from the start in order to calculate resources needed by stakeholders as well as the organization team;
- Short handouts about the process as well as minutes documenting the discussions and key results within the process should be prepared in order to guarantee the continuous information exchange and transparency;
- Stakeholders need to be informed about the intended use of results and give their approval in case of planned publication.

Practical example 4

Engagement in the development of the Austrian National Adaptation Strategy

Active involvement of affected actors accompanied the development of the Austrian NAS from summer 2008 until summer 2011. 100 different organisations (e.g. federal and provincial ministries or related institutions such as Railway Austria; interest groups such as the Chamber of Agriculture; and social/environmental NGOs) participated in the process which was split into two phases:

- Phase I: from summer 2008 until autumn 2010, to discuss the sectors agriculture, forestry, electricity, tourism and water;
- Phase II: from autumn 2010 until summer 2011, to examine the sectors natural hazards, health, building/construction, biodiversity/ecosystems and transport infrastructure.

Both phases were initiated and performed by the Environment Agency Austria (EAA) with financial support from the Climate- and Energy funds. Two professional external moderators provided their

Practical example 4

Engagement in the development of the Austrian National Adaptation Strategy

expertise for the process design and chaired the meetings.

The main aims of the broad involvement were the following: (i) to raise awareness for climate change and the need of adaptation among affected actors, (ii) to provide a platform to discuss opinions, experiences, needs, preferences, (possible) conflicts and to develop balanced solutions (or at least recommendations), (iii) to enhance the quality of the NAS by including knowledge and experience of affected actors (particularly in regard to adaptation measures) and (iv) to increase the acceptance of NAS as well as the commitment for implementation.

The original aims of the broad involvement process have been, to a large extent, successfully achieved. The experiences showed clearly that a cross-cutting and complex theme such as adaptation to climate change needs to be addressed with inter- and transdisciplinary approaches that allow to involve all affected actors.

Step 1.c. Estimate human and financial resources needed and identify potential sources of funding for the long term

Funding is available in several EU funding instruments, some national, regional and local funds, as well as from some international financing institutions, such as the European Investment Bank or the European Bank for Reconstruction and Development. Accessing and combining funding, especially from public and private sources below the EU level, is crucial. EU programmes which are most likely to provide co-funding under shared management for adaptation (many already do) include: the CAP (mainly the European Agricultural Fund for Rural Development); the Cohesion fund; the European Regional Development Fund (particularly through INTERREG); Horizon 2020, the EU's new programme for research and innovation which aims to allocate 35% to climate-related expenditure; the European Social Fund; the European Maritime and Fisheries Fund. (See section on EU support for additional information)

Other key sources of EU funding include the LIFE programme and the Competitiveness and Innovation Framework Programme, targeting mostly small and medium enterprises.

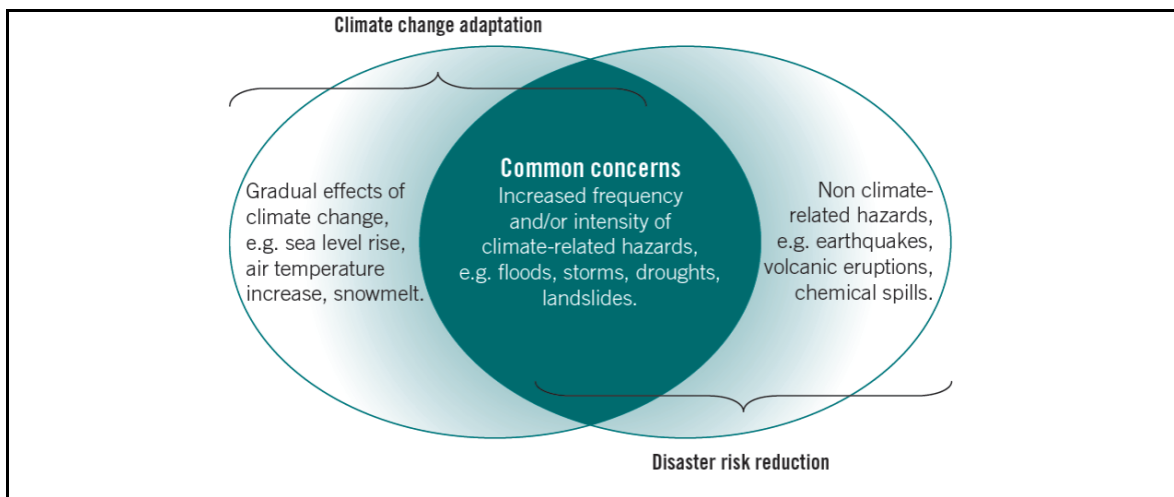
When implementing adaptation action, mainstreaming that aims to create synergies and prevent unnecessary costs will become crucial. Adaptation action can be integrated at low cost into existing instruments for sectoral policies.

Step 1.d. Collect information

➔ Get a first overview on actual and potential future climate change related effects

When starting the process of climate change adaptation planning, a first screening of existing work on possible climate change related effects in the short, medium and long term should be done. Several sectors/themes might be affected: agriculture, forestry, water management, fishery, biodiversity and ecosystem services, health, energy, tourism, transport, construction/buildings, economic/industry, civil protection/disaster risk reduction, social issues. A broad first overview on possible climate change related effects will help to trigger the process and develop a case for adaptation and provides a basis for a more in-depth analysis at a later stage. In addition, it helps to foster the discussion on adaptation policy relevant aspects such as objectives, priority sectors, vulnerable groups...

Common concerns of climate change adaptation and disaster risk reduction



➔ Identify ongoing activities with relevance for adaptation

Adaptation should not be performed in isolation. Relevant instruments and ongoing adaptation actions (although possibly not carried out under the headline of “adaptation”) in place should be identified, such as for instance disaster risk prevention, biodiversity protection or land use planning policies. In addition, existing sectoral or regional adaptation strategies/plans in the country should be identified.

This can be done in close cooperation with colleagues from other authorities and affected stakeholders with the following guiding questions to help identifying ongoing activities relevant for adaptation:

- Have you ever been confronted with the topics of climate change or adaptation in your work?
- Have projects or studies on the effects of climate change been conducted on behalf of your organisation or department, or are such studies planned?
- Are you aware of studies or projects on the topic of climate change or adaptation from other sources (universities, other research institutions, governmental ministries, other states, etc.) that are important for your field of work?
- Are there measures already in place that contribute to adaptation to climate change, even if they are not specifically identified as adaptation measures?
- Have targeted adaptation measures already been implemented?
- Are there existing tools, strategies, processes, etc., that are important or could be used for adaptation to climate change?
- What networks or initiatives relevant to adaptation are already active or could be used for adaptation?

Practical example 5

Early adaptation activities in France

There were three important events in France that provided the impetus to develop the National Adaptation Strategy in 2006. Firstly, in 1999 a fund for research dedicated to climate impacts and adaptation was established. The research programme is called ‘Management and Impacts of Climate Change’ (GICC - Gestion et Impacts du Changement Climatique) and aims to develop the knowledge to support public policies and consider climate change from the perspective of impacts as well as from that of mitigation

Practical example 5

Early adaptation activities in France

measures and climate change adaptation measures. Secondly, the National Observatory for the Effects of Global Warming (ONERC) was created by law in 2001, tasked specifically with adaptation to climate change. And thirdly, the severe heat wave of 2003 resulted in 14,000 deaths in France, providing a very real example of the impacts of climate change in France.

Together these three events provided sufficient motivation to prompt the development of the country's Adaptation strategy.

➔ Explore good practices within or outside the country

Adaptation practices that work well in one area can usually be transferred to tackle similar situations in other areas. However, the performance of individual measures may depend on the scope of the problem and the specific scale of implementation. Making use of existing information on good adaptation practices and experiences can also optimise individual resource and effort management.

Explore the case studies section and the prevention good practice inventory on the [CLIMATE-ADAPT Platform](http://climate-adapt.eea.europa.eu/sat)¹⁰ as well as national databases.

Practical example 6

Bringing together scientists and policy makers to formulate an adaptation framework in Greece

Although the concept of adaptation was already familiar to the Greek scientific community, the climate policy focus for many years was on mitigation as a result of the Kyoto Protocol ratification. However, one event that highlighted the adaptation issue and moved it onto the political agenda in Greece was the summer of 2007 with its record-breaking temperatures. Several impacts of the extremely hot weather had an immediate effect on the public and resulted in extended droughts, heat waves and devastating fires that caused biodiversity loss, property loss and loss of life. This event raised public awareness and prompted a number of ad-hoc political initiatives which concentrated on both recovery from the event and also on possible ways to improve the country's resilience and response to extreme weather events.

Up to that point there was no existing overarching adaptation strategy and most adaptation measures adopted in Greece came as part of a broader network of existing policies that applied to the specific areas of identified vulnerabilities. In the recent years conversations have been mostly focused on the possibility of adopting a more adaptation-oriented strategy, in which the existing measures would officially be considered as part of a comprehensive approach to prepare for the future climate.

Two public events that took place in June 2011 have also contributed to this approach, bringing together scientists and policy makers:

1. The 'Adaptation to Climate Change in the Mediterranean Area' workshop, held by the National Centre of Environment and Sustainable Development (NCESD). The invited speakers were from political institutions, research organizations and the public sector. The presentations were organized into three categories: the 'scientific approach', the 'policies and institutions approach', mainly referring to the European and international background, and the 'Priority Sectors in Greece' session. At the end of the event, a very useful conversation took place on the topic of 'Are the activity sectors prepared for climate change?', bringing together all aspects of adaptation to climate change in Greece.

2. A dissemination event was hosted jointly by the Bank of Greece and the Climate Change Impacts Study Committee on the occasion of the publication of the 'Environmental, Economic and Social Impacts of Climate Change in Greece' study. This study provided the first integrated approach to evaluating the future climate, identifying vulnerabilities and proposing sectoral adaptation measures based on a cost-benefit analysis conducted for three scenarios ('Inaction Scenario', 'Mitigation Scenario' and 'Adaptation

¹⁰

<http://climate-adapt.eea.europa.eu/sat>

Practical example 6

Bringing together scientists and policy makers to formulate an adaptation framework in Greece

Scenario'). The innovative aspect of the study was that for the first time economic and social evaluations of the measures were provided together to form a good basis for policy makers.

Both events helped to formulate a more complete framework on adaptation to climate change in Greece and proposed a starting point for organizing the preparation of a National Adaptation Strategy.

Step 1.e. Communicate and raise awareness

➔ **Clarify the terminology**

When working with other services and stakeholders, but also when informing the general public on the issue of adaptation, important terms need to be clarified in order to build a common language and reach a common understanding. Agreed international definitions could be first considered¹¹ and defining key terms specific to the local characteristics could then be a task for the core team. Once agreed, a glossary could be added to the adaptation policy documents.

Check the Adaptation glossary (cf. Annex 4) and the [CLIMATE-ADAPT](#) glossary¹²

➔ **Communicate climate change and the needs for adaptation**

This should be undertaken within and outside the responsible authorities in order to raise awareness, enhance acceptance and motivate to take adaptation actions. Wirth and Prutsch (2013) identify several aspects to be taken into account when communicating climate change adaptation.

Sharing information is, among others, an essential pre-condition for good adaptation. Information on climate change, impacts and possible adaptation actions should be bundled and refined in user-oriented ways to reach different audiences. Good practice examples from other countries might further foster the adaptation process and allows learning.

Various formats for communication exist and can prove useful such as personal consultations, internet communication/platforms and mass media to spread information on climate change, impacts and possible adaptation actions.

A **national web-portal** gathering tailored information on climate change and climate change adaptation in the national language may reveal to be an excellent tool for disseminating relevant information. Such platform should be connected with other existing portals on sectoral policies (e.g. biodiversity, water) and disaster risk prevention/management.

Find links to existing national web-portals in Annex 3

¹¹ Such as the UNISDR terminology on disaster risk reduction available at http://www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf

¹² <http://climate-adapt.eea.europa.eu/glossary>

Practical example 7

Raising public awareness of adaptation in Slovenia

Raising public awareness is an important first step, if not a prerequisite, prior to developing climate policy. In Slovenia, much of the credit for raising awareness of the importance of climate change can be given to Dr. Lučka Kajfež-Bogataj, Head of the Department of Agrometeorology at the Biotechnical faculty of the University of Ljubljana. Dr. Kajfež-Bogataj was the Vice-President of the IPCC WG2 from 2002 – 2008, during which time the IPCC produced the Fourth Assessment Report and was awarded a Nobel Prize in 2007. Due to this high-level recognition of their work, Dr. Kajfež-Bogataj became very famous in Slovenia and used this influence to enhance the understanding of the causes of climate change and the impacts.

The success of awareness-raising, alongside other elements, is evident in several surveys. Eurobarometer surveys on public attitudes towards climate change show that Slovenians are among the most concerned Europeans about climate change. The survey “Europeans’ attitudes towards climate change” from July 2009 showed that people in Slovenia considered climate change the most serious problem the world was facing at the time. A significant proportion of Slovenia’s citizens said that they had taken some action to tackle climate change and, what is more, the survey conducted in Slovenia in 2009 and 2010 indicated that around three quarters of Slovene residents thought immediate action is required in order to tackle climate change.

Concluding step: key principles for adaptation

Following the key principles listed in Annex 1 and tailoring them to context-specific

conditions will most probably lead to good adaptation outcomes. As adaptation operates at different spatial and societal scales, success should be evaluated against different criteria at these different levels. Elements of effectiveness, efficiency, equity and legitimacy are important in judging success.

Key principles of adaptation (cf Annex 1)

Guiding principles¹³ for adaptation to climate change in Europe, ETC/ACC 2010

Step 2. Assessing risks and vulnerabilities to climate change

Following the guidelines mentioned in this step will help address:

- the lack of specific knowledge on climate change impacts and adaptation;
- the insufficient coordination for knowledge exchange and dissemination;
- the insufficient use of existing resources and available methodologies;
- the absence of internalisation of cross-border considerations;
- how to overcome uncertainty and knowledge gaps in order to avoid inaction.

The elements presented below aim to develop a comprehensive picture of current and future climate change risks as well as further stress-factors to be expected. This can also help to identify opportunities arising from climate change and provide information on how to cope with uncertainty.

¹³

http://acm.eionet.europa.eu/reports/ETCACC_TP_2010_6_guid_princ_cc_adapt

Step 2.a. Analyse how past weather events have affected your country

Considering past weather events will help to gain a better understanding of how a country might be affected by climate change impacts in the longer term. It can help to determine a country's sensitivity to current weather and thus, provide significant insight for adaptation needs. Relevant existing work, such as national risk assessments¹⁴, which many Member States have already carried out, can provide an excellent starting point for answering these questions.

Information can be obtained from national Met Offices.

Additional workshops with affected stakeholders might help get to insight from practitioners.

Step 2.b. Undertake a climate change risks and vulnerability assessment

As a first step, available information for your country's future threats (e.g. sectoral vulnerability assessments) and opportunities should be collected and analysed. Relevant assessments have been carried out for most European countries and within several research projects¹⁵. The European Environment Agency has just adopted a report on climate change impacts and vulnerability in Europe¹⁶. At international level, the Intergovernmental Panel on Climate Change's (IPCC) 5th Assessment Report will be adopted in 2014 and will provide the state of the art on expected impacts, adaptation and vulnerability at global level. In addition, the Commission proposal for Horizon 2020 includes ambitious research objectives on climate change in general, and climate change adaptation in particular.

If the available information base is not sufficient for elaborating adaptation responses, additional assessments might need to be carried out. Various approaches for risk assessments are available, e.g. from the UK¹⁷ and Germany. As a minimum request, the assessment should provide the following information:

- Trend of various climate variables (e.g. average temperature, heat days, intensive rainfall events, snow cover), based on one or ideally on a range of different climate scenarios, for instance as developed in the Special Report Emission Scenarios (SRES) scenarios produced by the IPCC;
- Expected (direct and indirect) impacts (threats, opportunities) by identifying the most relevant hazards as well as the areas of the country, region or city that are at most risk given an overlay of spatial distribution of total population, vulnerable populations, economic activities and economic value;
- Timescale, with differentiated impacts expected in the short-term (2020s), medium-term (2050s), and long-term (2080s/2100);
- An indication on the level of confidence (e.g. high, medium, low) for such impacts, with a view of facilitating the decision making process given the degree of uncertainty attached to the results;

¹⁴ Based inter alia on the Commission's Risk Assessment and Mapping Guidelines for Disaster Management SEC(2010) 1626 final.

¹⁵ <http://climate-adapt.eea.europa.eu>

¹⁶ EEA Report No 12/2012

¹⁷ http://ccra.hrwallingford.com/CCRAREports/reportviewer.html?sector=intro&link=LinkTarget_1

- Assessment of the socio-economic development and other non-climatic factors: Such factors, e.g. megatrends such as demographic change, use of resources, market trends, have a significant influence on a vulnerability to climate change.

Check the **CLIMATE-ADAPT Platform** for an overview on available risk assessments for [countries](#)¹⁸ and across [Europe](#)¹⁹ as well as for relevant [research projects](#)²⁰.
The [UKCIP's Local Climate Impact Profile](#)²¹ tool (LCLIP) may be a useful reference

Finally, it must be ensured that the climate risk assessment is tailored to policy-making needs. That is, it must be prepared introducing requirements for policy-relevant outcomes and end-user involvement. Policy-science interfaces can be fostered for a continuous dialogue on priority issues.

Practical example 8
UK Climate Change Risk Assessment 2012
<p>The UK's Climate Change Risk Assessment (CCRA) was published on 25 January 2012, and is the first assessment of its kind for the UK and the first in a 5 year cycle.</p> <p>The CCRA presents the latest evidence on the risks and opportunities of climate change for the UK to 2100. For the first time, it provides a national overview of potential risks based primarily on the UK Climate Projections, which were published in 2009. Its findings, particularly related to those risks that require early action, will inform the development of adaptation plans by the UK Government and the Devolved Administrations.</p> <p>The CCRA methodology is novel in that it has allowed for comparison of over 100 risks (prioritized from an initial list of over 700) from a number of different sectors based on the magnitude of the impact and confidence in the evidence base. A key strength of this analysis involved using a consistent method and set of climate projections to look at current and future risks and opportunities. The methodology was developed through a number of stages involving expert peer review and is a repeatable methodology that is not dependent on changes in long term plans between the 5 year cycles of the CCRA.</p> <p>More information is available at: http://www.defra.gov.uk/environment/climate/government/risk-assessment/ and http://ccra.hrwallingford.com/CCRAReports/reportviewer.html?sector=intro&link=LinkTarget_1</p>

Step 2.c. Take trans-boundary issues into account

Most direct and indirect impacts of climate change are of cross-border nature. Trans-boundary issues create interdependencies between countries (e.g. hydrological, social and economic ones in the case of water).

Thus, a country should seek to establish contact with neighbouring countries to inform about the adaptation process and areas of concern with regard to cross-border impacts and identify approaches for coordination over different political, legal and institutional settings. Joint adaptation and disaster risk management efforts might further need to be based on the identification of common threats (e.g. by undertaking mutual risk assessments) and must be in line with each country's adaptation objectives. A good starting point is to identify areas relevant to adaptation action in which there has been

¹⁸ <http://climate-adapt.eea.europa.eu/web/guest/countries>
¹⁹ <http://climate-adapt.eea.europa.eu/web/guest/vulnerabilities-and-risks>
²⁰ <http://climate-adapt.eea.europa.eu/web/guest/research-projects>
²¹ www.ukcip.org.uk/lclip/

traditional transboundary cooperation (e.g. river basin management) and seek to involve the managing authorities in your adaptation policy.

Investing in cross-border cooperation is also a way to minimize the costs of adaptation action and to maximize its benefits by developing synergies in adaptation measures and integrating consequences for neighborhood jurisdictions.

Cross-border activities addressing climate change and jointly developing adaptation responses are already taking place in European macro-regions such as in the Alpine Space, the Carpathians, North West and South East Europe, the Baltic sea and under the Danube strategy. Another transboundary activity at regional level is the currently on-going development of an adaptation strategy for the Pyrenees.

All of these large-scale activities involving several countries receive funding from the EU. In addition, European policies already help address some of the transboundary issues associated with climate change. For instance, the Floods Directive and the Water Framework Directive require transboundary cooperation in the water sector. Also, European and pan-European early warning and detection systems for weather-driven natural disasters exist such as the European Flood Awareness System²², the European Forest Fire Information System²³ and the European Drought Observatory²⁴. The Union Civil Protection Mechanism also provides a framework for reinforced cooperation between the EU Member States to effectively prevent, prepare for and respond to both natural and man-made disaster risks, including actions such as risk assessments and planning, exchange of good practices, improving the knowledge base, training and exercises²⁵.

Examples for [transnational cooperation](#) can be found on the **CLIMATE-ADAPT Platform**²⁶

Practical example 9

The Belgian approach to trans-boundary issues

Belgium has a long tradition both in practical research as well as in fundamental science. Climate change is one of the more recent research subjects. Therefore the Belgian National Climate Change Adaptation Strategy mentions national (e.g. CCI-Hydr, CLIMAR, CcASPAR) and international projects (e.g. TIDE, SCALDWIN, Future Cities, AMICE, CRUE-flooding, IWRM-net-water-management, Blast, Past4future, CLICK-EU). Joining these international projects helps knowledge sharing between Belgium and other European countries, helps building partnerships and enhances transboundary cooperation.

For this international research the different scientific institutions contribute to the projects. European funding support enables these international projects (i.e. Interreg, Circle-2 and FP7).

Research in Belgium is dispersed among a variety of institutions and partners with funding from different sources. This gives the advantage to be very concrete and helpful but there is a danger for overlap and inefficient use of resources or fragmentation of the funding. Therefore the Belgian National Climate Change Adaptation Strategy and the national and regional working groups give a constant overview of the different projects running in Belgium, be it at local, regional, national or international level to enhance knowledge sharing, coordination and dissemination.

22

www.efas.eu/

23

<http://forest.jrc.ec.europa.eu/effis/>

24

<http://edo.jrc.ec.europa.eu/edov2/php/index.php?id=1000>

25

http://ec.europa.eu/echo/policies/prevention_preparedness/prevention_en.htm

26

<http://climate-adapt.eea.europa.eu/web/guest/transnational-regions>

Step 2.d. Develop an approach for addressing knowledge gaps and for dealing with uncertainties

Inherent to any decision-making process, uncertainty and knowledge gaps are particularly emphasised as a challenge when working on climate change adaptation. Still, this is not a reason for inaction as even under those conditions, investing in flexible, low-regret adaptation action is in the self-interest of most public and private actors. There are ways to successfully address those challenges.

First, the quality of the information on which the assessments are based as well as existing knowledge gaps need to be made explicit. Research, social learning, exchange of good practice and stakeholder cooperation can help reduce the lack of knowledge (e.g. regarding plausible climate change impacts).

Second, when future society and environment might undergo rapid and unexpected change, the future does not appear to be predictable through simple extrapolation of historical trends. This can happen in the case of climatic developments and systems' response to them, but also in terms of socio-economic developments (e.g. economic crises, unexpected conflicts). Therefore it is important that the development of an adaptation policy does not assume a single future. It is crucial to identify, prepare for, and practice actions under several future scenarios.

The **CLIMATE-ADAPT Platform** provides comprehensive [guidance on uncertainties in climate change](http://climate-adapt.eea.europa.eu/web/guest/uncertainty-guidance-ai).²⁷

Concluding step: Select your country's main concerns and set your strategic direction

The strategic direction should be defined in terms of what is intended to be achieved (short-term by the 2020s, medium-term by the 2050s, long-term by the 2080/2100s), based on climate change, socio-economic development and other non-climatic factors. Main concerns may be impacts that:

- Are faced already today;
- Will increase due to climate change;
- Will affect systems with long life span or key infrastructure (e.g. transport infrastructure);²⁸
- Will affect systems irreversibly;
- Will increase due to additional non-climate drivers (e.g. problems with health issues will increase due to climate change and the growing group of vulnerable elderly).

Practical example 10

Identifying priority sectors and areas of vulnerability in Poland

During the development of the National Adaptation Strategy, a strategic vision was elaborated by the Project Manager with his core team from the Institute of Environmental Protection – National Research Institute. Priority sectors were identified through evaluating responses to two questionnaires addressed to the members of the Working Groups and the Steering Committee. The first questionnaire helped to determine the most important climate parameters for particular economic sectors and regions of Poland.

²⁷

<http://climate-adapt.eea.europa.eu/web/guest/uncertainty-guidance-ai>

²⁸

In that respect, please refer to the Commission Staff Working Document on adaptation to climate change and infrastructure (SWD(2013)137)

Practical example 10

The second questionnaire was concerned with the identification of elements of particular vulnerability within sectors and physical regions relating to selected climate parameters which were identified earlier. The information from these questionnaires helped to identify and agree on priority sectors.

Step 3. Identifying adaptation options

Following the guidelines mentioned in this step will help address:

- the lack of concrete actions often observed in the preparation of adaptation policy-making;
- the difficulty in identifying relevant actions, and their potential co-benefits.

Adaptation options aim to address the previously identified concerns to bring negative impacts at an acceptable level. Further, adaptation options may allow taking advantage of any positive opportunities that arise from climate change. Adaptation options can range from actions that build adaptive capacity (e.g. sharing information, creating supportive institutional framework) to concrete adaptation measures (e.g. technical solutions, insurance mechanism). Once the main concerns have been identified, possible adaptation options shall be collected.

Practical example 11

Early adaptation measures in Italy

Although the development of the Italian National Adaptation Strategy (NAS) is at a very initial stage, it's important to highlight that selected adaptation measures have already been implemented. The Civil Protection Department has played a relevant role in implementation. It is the operative arm of the President of the Council, tasked with the protection of the country's people and goods, and consists of central and peripheral State administrations, regions, provinces, municipalities. The Department provides guidelines for legislation relating to risk prevention, manages information networks that are necessary for risk prevention, and produces and manages exceptional regulations.

Step 3.a. Collect appropriate adaptation options given your country's main concerns

This compilation should focus on adaptation options which are able to accommodate the relevant main concerns that have been identified for the country. Adaptation options can be retrieved from literature review (e.g. CLIMATE-ADAPT Platform, project results such as the ADAM Digital Adaptation Catalogue), from scientific experts and/or colleagues from other authorities as well as through stakeholder involvement. The collection shall encompass a wide spectrum of adaptation options, including technological, informational, organizational, behavioural, ecosystem based and

socio-economic options at all levels, sectoral as well as cross-sectoral.

Step 3.b. Explore good practices and existing measures

Good practice examples for activities and measures in place that already cope with changing climatic conditions (e.g. temperature rise, changes in precipitation patterns, extreme weather events) should be considered and assessed as well. They can provide insights into the adjustments/improvements that may be required to accommodate future climate change. Moreover, it becomes obvious where gaps are and which barriers may exist that hinder successful adaptation.

The **CLIMATE-ADAPT Platform**²⁹ provides a comprehensive [compilation of possible adaptation options for various fields](http://climate-adapt.eea.europa.eu/web/guest/adaptation-measures).

Step 3.c. Describe adaptation options in detail

To be able to compare and prioritise adaptation options, all eligible options should be characterized as concretely as possible. This will also provide an important basis for the implementation. Information should be provided for the following points, as far as this is feasible:

- General aim of the adaptation option
- Spatial scope
- Social, economic and ecological context
- Necessary steps of implementation and maintenance
- Responsible actors and supportive actors for the implementation
- Financial resources required
- Time frame for planning and implementing to be fully effective

Step 4. Assessing adaptation options

Following the guidelines mentioned in this step will help address:

- the difficulties in assessing the costs and benefits of adaptation action, by providing suggestions and methodologies;
- how the identification of relevant measures can then be integrated in a strategic document

When adaptation options have been identified, the next steps are to assess and prioritize the compilation of options based on a detailed description and criteria. The selection of preferred adaptation options should be done in close interaction with all actors involved in the adaptation process.

Step 4.a. Assess possible options in terms of time, cost, benefits and efforts

When assessing appropriate responses to potential impacts from climate change, there is a hierarchy of measures reflecting time, cost, benefits and efforts needed. The assessment of possible options and their comparison should include:

- identifying the risks the option addresses (i.e. each option may have an effect on or treat multiple risks) and by how much the option will likely reduce the risks;

²⁹

<http://climate-adapt.eea.europa.eu/web/guest/adaptation-measures>

- considering the time frame to implement the option and when it shall become effective, reflecting identified risks and the range of urgency to act;
- addressing direct and indirect effects of the option in economic, environmental and social terms (including effects on climate change mitigation) with an emphasis on potential benefits;
- assessing costs and benefits to predict whether the benefits (e.g. avoided damage) of an option outweigh its costs, and by how much in relation to other alternatives (i.e. one can rank alternate options in terms of the cost-benefit ratio). All costs and benefits should be quantified where this is possible and meaningful, otherwise a qualitative assessment shall be delivered;

The **CLIMATE-ADAPT Platform** provides information and guidance for the [costing of adaptation options](#)³⁰.

- considering the barriers to implementation of adaptation actions including budget required, the need of a policy change or introduction of legislation, the expected level of acceptance to stakeholders as well as the extent of research and development needed.

Step 4.b. Assess cross-cutting issues, trade-offs and synergies of adaptation options

Individual policy areas/sectors might follow different objectives leading to proposals for adaptive actions that could potentially create negative side effects for another policy area/sector if not coordinated. Likewise, adaptation responses in distinct policy areas can potentially deliver synergies when mutually designed. There is, therefore, a clear need for coordination across a wide range of political, legal and institutional settings, as well as different information-management approaches and financial arrangements.

Step 4.c. Prioritise adaptation options and select preferred ones

Based on the previous assessment, a selection of suitable adaptation options will be possible and should be carried out. Most often a multi-criteria analysis can prove useful

for ranking and selecting preferred options. This analysis should include a set of criteria, such as:

- urgency with respect to already existing threats,
- early preparatory action (to avoid future damage costs),
- range of effect (options covering multiple risks might be favoured),
- cost-benefit ratio,
- time-effectiveness,
- robustness under a broad range of likely future impacts,
- flexibility for adjustments or reversibility in case of diverging developments,
- political and cultural acceptability,

³⁰

<http://climate-adapt.eea.europa.eu/adaptation-support-tool/step-4-2>

- enhancement of learning and autonomous adaptive capacity, etc.

When uncertainty could become a reason for inaction, applying the principles of adaptive management (e.g. focus on flexible solutions, win-win options, robust measures under a range of possible scenarios) will facilitate decision-making.

Involving affected stakeholders for discussing and deciding on criteria and their weightings for the prioritisation and selection of adaptation options can be useful to identify an appropriate set of options with a high level of acceptance.

Due to the broad range of potential future climate change impacts and their implicit uncertainties, multiple-benefits, no-regret and low-regret adaptation options should be favoured (for key principles cf. Annex 1). Multiple-benefits options provide synergies with other goals such as mitigation, disaster risk reduction or sustainability (e.g. ecosystem based approaches). Examples include water saving devices in regions experiencing drought or insulation of buildings in regions exposed to heat waves. Insisting on options with multiple benefits can also facilitate the funding of related measures, by pulling resources and putting the emphasis on shared benefits which outweigh the costs of investments.

The forthcoming "Guidelines for Project Managers: Making vulnerable investments climate resilient"³¹ propose a methodology to assess how projects can be affected by climate change and the type of adaptation options to be considered.

Practical example 12

Multi-criteria-analyses for the Netherlands

In the Netherlands a 'qualitative assessment' of adaptation options was carried out to provide a Routeplanner to 2050. The project, coordinated and executed by the Environmental Economics and Natural Resources Group (Wageningen University), resulted in an inventory of adaptation options, a qualitative assessment of the effects of the adaptation options for the Netherlands in the long run, a database which allows to rank the various options according to a set of criteria and a relative ranking on the basis of these criteria. Finally the best available information on costs and benefits of various adaptation options is given.

Well-informed decisions on how to adapt rely on having a full picture of the expected changes in climate but also on the different adaptation options and their related effects both in terms of costs and benefits. The results can be used by policy makers to decide which adaptation options to choose from a socio-economic perspective in the Netherlands. The Routeplanner project is subdivided in several subprojects. In the Routeplanner 3 project, the objective was to review the literature and to consult stakeholders to provide a systematic assessment and overview on adaptation options in the Netherlands, with special focus on spatial planning. Adaptation options identified include financial measures (taxes and insurance systems), legal interventions (spatial planning, command and control) and communication tools. The sectors (by climate change impacts) for which adaptation options were assessed include:

- Sea level rise
- River discharge
- Groundwater level
- Storms
- Heat stress
- Drought stress

³¹

Available on <http://ec.europa.eu/clima/policies/adaptation/>

Practical example 12

Multi-criteria-analyses for the Netherlands

- Growth stress

For more details on the project see the full report and peer reviewed paper here:

<http://www.enr.wur.nl/UK/Routeplanner+Report/>

Concluding step: Prepare a strategy document and get political approval

Once the main concerns have been identified and preferred adaptation options have been selected a strategic framework for adaptation (strategy) can be established. This should be a *reference* document, summarising from the previous steps the following points:

- General aim of adaptation and strategic direction
- Approach chosen to develop the strategy, including cooperation with authorities and other stakeholders (e.g. interest groups, NGOs, private sector)
- Knowledge base and good practices (if explored), including a gap analysis
- Main concerns caused by climate change and other influencing factors
- Uncertainties in climate change, future developments and adaptation
- Objectives for adaptation (for selected policy areas/sectors and/or themes)
- Framework for action, including:
 - Provision for preparing an action plan and/or sectoral plans
 - Setting a timeframe for developing concrete actions
 - Determining responsibilities and resources needed
 - Criteria for exploring, assessing and selecting adaptation options
- Coordination and synergies between national and sub-national as well as sectoral (e.g. disaster risk prevention and management plans Member States are developing) and trans-boundary adaptation responses
- Activities for awareness raising, communication on adaptation and capacity building
- System and timeframe for revision of strategy, including provisions for monitoring and evaluation (cf. recommendations under step 6)
- Outlook

➔ Get political approval

When the documents for the adaptation strategy are on the table and a (wider) consultation has been carried out, the political approval is essential for having a framework in place for implementing adaptation actions. So far, only few countries such as the UK and France use specific legislation for adaptation. Several countries are in the process of discussing or drafting new adaptation-related legislation (e.g. Slovenia). The EU Adaptation Strategy also provides political justification for adaptation action.

The [CLIMATE-ADAPT Platform](#)³² provides an overview on adaptation activities of EEA member countries and the political status

Step 5: Implementation

The guidelines included under this step provide:

- suggestions on how to link adaptation strategies and action plans;
- concrete recommendations and potential instruments to mainstream adaptation into existing sectoral policies.

Having a strategic document on adaptation adopted, a potential next step to implement the strategy is to prepare an action plan which sets out what needs to be done to convert adaptation options into action, specifying by whom and when and allocating sufficient resources. However, it should be noted that concrete action plans and/or sectoral plans can also be elaborated as an integrated part of the national adaptation strategy (cf. practical example 13).

Practical example 13

The Austrian National Adaptation Strategy with an integrated action plan

The Austrian NAS consists of two parts: Strategy document and action plan for 14 sectors (agriculture, forestry, water, tourism, energy, natural hazards, housing and construction, civil protection, health, ecosystems and biodiversity, transport infrastructure, spatial planning, economy, and urban green spaces):

Framework of NAS

1. Introduction
2. Policy background
3. Aims of NAS
4. Approach in developing NAS
5. Climate change in Austria
6. Challenges of adaptation
7. Social aspects of climate change
8. Guiding principles for adaptation
9. Criteria for prioritisation of adaptation options
10. Status-quo of adaptation in Austria
11. Ongoing research on climate change adaptation and open research questions
12. Good-practice examples
13. Communication and education
14. Global context of climate change
15. Needed resources for future adaptation process
16. Next steps

Action plan:

- a. Relevance of the sector
- b. Sectoral vulnerability assessment
- c. Recommended adaptation options

The development of the strategy with its integrated action plan started in 2007 and was accompanied by a broad stakeholder involvement process (cf. practical example 4). In particular the action plan can be seen as a joint effort by renowned scientific experts and relevant stakeholders complementing proposed adaptation options with their knowledge and expertise. The Austrian NAS has been adopted on the 23rd of October

³²

<http://climate-adapt.eea.europa.eu/web/guest/countries>

Practical example 13

The Austrian National Adaptation Strategy with an integrated action plan

2012.

Step 5.a. Identify and make use of entry points for adaptation into existing instruments and/or create new instruments for adaptation (Mainstreaming)

Adaptation should not be performed in isolation from existing policies (e.g. legislation, funding systems), management structures (e.g. networks) and processes (e.g. in decision making). Thus, to allow synergies, instruments in place with relevance for adaptation should be reviewed and modified to cope with current and future impacts of climate, and including via better considerations for disaster risk management practices. Integrating adaptation through reviewing and modifying existing instruments shall not be restricted to the environmental sector or to the public authority; it also refers to economic sectors and private organisations.

➔ Identify key instruments for integrating adaptation

Key instruments to serve as entry points for integrating adaptation include, inter alia: legislation, regulations, existing strategies, standards, planning tools, assessment frameworks, research and development programmes, networks and working groups.

The starting basis for the identification of possible entry points are the characteristics of each adaptation option (cf. step 4.a.). As part of this screening, departments and experts with jurisdiction over each of the instruments should be consulted.

➔ Determine the need for action with respect to modifying existing instruments

Based on the screening, all identified instruments shall be assessed in terms of their suitability to integrate adaptation by checking the instruments against preferred adaptation options (cf. step 4.d.) and answering the following questions:

- Which adaptation options are already covered by existing instruments and how? If covered, is the instrument sufficiently addressing the option's objective? Are any modifications necessary?
- Which adaptation options could be covered by existing instruments if the aspect of adaptation was added? Who needs to be consulted for the modification and what efforts are needed?
- What prevents/impedes the integration of adaptation into existing instruments? How can these conflicts be resolved?
- Which adaptation options cannot be implemented through existing instruments and must be facilitated by establishing new instruments?

➔ Establish new instruments

There may be cases where the modification of existing instruments alone is insufficient to handle the adaptation needs and new instruments for implementing adaptation must be developed. These might be of legislative, economic, informal or cooperative nature.

Opportunities will emerge under the next Multi-annual Financial Framework (2014-2020), which includes a proposal for increasing the share of climate-related expenditure

(i.e. for climate change mitigation and adaptation as a whole) to at least 20% of the EU budget.

Step 5.b. Seek agreements with stakeholders responsible for implementation

To secure implementation of your strategic framework on adaptation, close collaboration and agreements will be needed with all affected stakeholders. This shall include:

- Identifying and appointing **roles and responsibilities** for implementing selected adaptation options (including the private sector);
- Developing and agreeing upon a detailed **timetable for action** including a **timeframe for revision**;
- Estimating **resources needed** for implementation and seeking to allocate **sufficient budget** (if possible) within the chosen timeframe of the strategy.

Concluding step: Develop an action plan

It should summarise the selected adaptation options and instruments and provide a roadmap for implementation. The following issues should be addressed:

- Preferred adaptation options (cf. suggestions under steps 3.a. and 3.b.) and ways for implementation (mainstreaming into existing instruments and/or creating new instruments, c.f. step 5.a.) including opportunities and synergies;
- Roles and responsibilities, explicitly considering the need for coordination between authorities at all levels;
- Detailed timetable for implementation and provisions for revision;
- Estimation of human and financial resources needed;
- Funding possibilities;
- Open research questions and ways to close knowledge gaps;
- Potential barriers to action and mechanisms to overcome these;
- Mechanisms to monitor and evaluate the implementation success.

Overview of possible instruments for adaptation			
Instruments	Strong	Weak	Ideal for
Legal instruments (laws, regulations, policies, decrees)	Strong and rapid controlling effect Effective achievement of objectives	Unpopular/ politically risky Inflexible in achieving objectives, requires monitoring Often complicated and expensive to implement (for the regulators and the regulated)	Ensuring a minimum standard Emergency situations
Economic instruments (taxes, fees, tax incentives, grants, interest-free loans, public procurement)	Behaviour control through economic incentives rather than bans/requirements Makes use of market mechanisms, flexible in implementation	Unpopular (taxes) or expensive (grants) Achievement of objectives is not always ensured because behaviour changes are uncertain	Fostering innovation Creation of niche markets Alternative to legal instruments
Informational instruments (studies, brochures, websites, campaigns, events, labels, etc.)	Apolitical, unproblematic because of cost-effectiveness and limited interference in personal freedoms Fosters awareness and individual responsibility	Only indirect and frequently weak or uncertain effects Effectiveness is difficult to assess	New problems whose resolution is in the self-interest of individuals Promoting awareness
Partnership instruments (voluntary agreements among companies, partnerships, collaborative	Politically unproblematic because not mandatory Pools resources of several actors	Complex process (high transaction costs) Achievement of objectives uncertain	Problems that one actor alone cannot solve because of a lack of resources (e.g. money, knowledge, contacts)

projects, etc.)	Cost-efficient for the public sector	Often ineffective	
Hybrid planning/strategic instruments (plans, strategies, action plans, programmes, etc.)	Facilitates a holistic view Presents an overview and establishes connections Combines several instruments, exploiting their strengths and avoiding their weaknesses	Implementation is often difficult (due to low levels of political interest over longer periods) Requires the cooperation of several actors	Systematic approach to the solution of complex problems

Step 6: Monitoring and evaluation

The guidelines included under this step provide:

- concrete suggestions to plan an effective monitoring and evaluation process, an element currently missing in most adaptation strategies;
- suggestions on the type of indicators to be considered.

As governments increasingly invest in adaptation it becomes essential to ensure the effectiveness, efficiency and equity of adaptation interventions. Yet 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. Learning what works well (or not) in which circumstances and for what reasons is critical (Anderson 2011). The development of an adaptation strategy presents an opportunity to consider how to best monitor and evaluate adaptation progress and performance.

Monitoring and evaluation of adaptation requires pragmatism (what is possible to monitor and evaluate at the level concerned?) and a clear sense of purpose (what do we hope to achieve through this process?). For national-level M&E approaches it is important that they ‘look’ both downwards and upwards, so that national level decisions are informed by sub-national experiences and nations are able to share their adaptation progress effectively with the wider international community.

The delivery of an adaptation strategy and/or action plan provides a useful focus for monitoring and evaluating progress in adapting to climate change. However, implementing an adaptation strategy will involve numerous stakeholders, sectors and communities working at a range of spatial scales and over differing periods of time, adding complexity to monitoring and evaluation processes. Furthermore, autonomous adaptation will be occurring alongside planned efforts, which need to be anticipated and taken into account as well.

See [UKCIP's 'AdaptME' Toolkit](http://www.ukcip.org.uk/adaptme-toolkit/)³³ for further information on how to overcome adaptation M&E challenges

Step 6.a. Develop appropriate M&E provisions for both adaptation policy's objectives and selected adaptation options

Successful implementation must be supported by appropriate arrangements to monitor and evaluate whether the adaptation policy is “on track” and is achieving its objectives and to learn how future adaptation efforts might be enhanced. M&E arrangements for the implementation process should focus on two key questions: ‘Are we doing the right things?’ and ‘Are we doing things right?’ In answering these questions, it will be important to ensure that relevant stakeholders are engaged and emphasis is placed on a process of continuous learning.

³³ <http://www.ukcip.org.uk/adaptme-toolkit/>

Provisions to monitor and evaluate selected adaptation options need to focus on the outcomes of implemented adaptation activities, i.e. how effectively they respond in practice to reduce identified risks and enhance climate resilience. Monitoring and evaluating responses are also important to avoid potential maladaptive developments.

The process for M&E can be made manageable through careful preparation. Thus, it is important to put the emphasis on:

- **Tailoring the M&E approach to the type and scale of the activity:** While for some objectives and adaptation options core indicators (for process and outcome) can be established, it might be appropriate for others to focus on an aggregate assessment. For risk reduction measures, an overall risk assessment may be more suited than, for example, for measures aimed at increasing people's awareness.
- **Acknowledging trade-offs:** M&E approaches need to be proportionate to the investment. Recognise and reflect on the trade-offs in the design of the M&E approach and consider whether these can be justified.
- **Defining clearly the baselines as reference for M&E:** Carefully defined baselines are essential in order to measure what has been achieved through implementation. Baselines need to be defined for all components of M&E, including assumptions for autonomous adaptation taking place without any intervention.
- **Considering the unintended and unexpected:** The M&E approach should not simply consider 'did we do what we said we would do?' but be sufficiently flexible to explore the unintended and unexpected. This may be where some of the most important adaptation lessons can be learnt.

Practical example 14

Evaluation of the Implementation of Finland's National Strategy for Adaptation to Climate Change (2008-09)

Finland is one of the few European Countries to have already undertaken an evaluation of its National Adaptation Strategy. The main objective of the evaluation of the Adaptation Strategy was to determine the progress made in different sectors since the strategy came out in 2005. The approach employed was to compare the adaptation measures identified in the Strategy to measures launched in different sectors. This was achieved through survey of stakeholders to determine whether and how the measures presented in the strategy have been launched in different sectors. A preliminary indicator of the level of adaptation attained was developed using five steps each of which incorporate a statement describing adaptation progress. This approach enabled evaluators to compare progress across 15 sectors and a number of cross-cutting themes.

Further detailed on the approach and results from this study can be found here: http://climate-adapt.eea.europa.eu/viewaceitem?aceitem_id=408

- **Communicating and agreeing on the purpose for monitoring and evaluating:** There are numerous reasons that might drive M&E efforts, including a need to account for public funds; to learn what works (or not) and why; to track progress; ensure equity and social justice; or to measure efficiency and effectiveness. All are equally valid, but it is important to acknowledge the tensions and synergies between these purposes.
- **Engaging and involving affected stakeholders:** All stakeholders with a role and responsibility for implementation need to be part of the M&E process. Early on stakeholder involvement will ensure continuous monitoring of their own

adaptation activities throughout the implementation phase. Engagement with stakeholders can also help with gathering relevant data for M&E.

Practical example 15

Measuring progress – emerging lessons from the UK

The Adaptation Sub-Committee (ASC) to the UK's Committee on Climate Change (CCC) was established under the Climate Change Act 2008 to advise Government on its work on the national Climate Change Risk Assessment, and ensure that the Government's Adaptation Programme enables England to prepare effectively for the impacts of climate change. Previous ASC work identified the key components for assessing preparedness for climate change. Drawing on this analysis and work by other countries on measuring progress, the ASC recently developed an adaptation assessment toolkit. The ASC assessment toolkit has two main components:

1. Monitoring changes in climate risks using indicators. These fall into three broad categories i) indicators of risk, ii) indicators of adaptation action, and iii) indicators of climate impact.
2. Evaluating preparedness for future climate. This involves analyzing decision-making to assess if the amount of adaptation occurring is sufficient to address climate risks, now and in the future. As acknowledged in previous ASC reports, early adaptation efforts to address priority climate risks should i) promote the uptake of low-regret adaptation options that deliver benefits whatever future climate unfolds, and ii) ensure that decisions with long-lasting or systemic consequences take future climate change into account.

The ASC's work has identified a number of evidence gaps that need to be filled to allow for a more comprehensive assessment. Working with the Government and its delivery partners, the Committee will continue to refine and improve its suite of adaptation indicators. This work will inform the Committee's first statutory assessment of how the National Adaptation Programme is addressing the risks from flooding and water scarcity over time, due in 2015.

Further information is available in the ASC progress report:

<http://www.theccc.org.uk/reports/adaptation/2012-progress-report>

Step 6.b. Identify indicators

Performance indicators often play a critical role within M&E systems. Measurable indicators are attractive to policy and decision makers as they provide quantifiable, seemingly unambiguous 'evidence' of progress and performance. When identifying **appropriate indicators** both for monitoring and evaluating the process and the outcomes, take account of the following:

- Do not reinvent the wheel: Many indicators of adaptation performance may already be measured through existing processes, while existing M&E systems can be adjusted to better account for adaptation;
- Recognise that M&E systems are dependent on proxy indicators which are also subject to a range of other influences, i.e. achievements can often not solely be attributed to sound adaptation practice but can be a result of other influencing factors;
- Develop a combination of process and outcome indicators, recognising that in some cases adaptation outcomes cannot be determined for many years;
- Indicators must serve a clear purpose and should be relevant. Another important factor in choosing indicators is whether data can be collected effectively and efficiently; collecting data should not be more costly than the value of the information they provide.

Quantitative indicators are a useful evaluation tool however a single indicator is just one measure of performance; it does not provide the full picture. Using indicators alongside data from other evaluation methods such as interviews, focus groups or expert solicitation can provide a richer picture of performance.

Practical example 16

Developing national adaptation indicators in Germany

Following the adoption of the DAS (German Strategy for the Adaptation to Climate Change), the Federal Environment Agency (UBA) designed a comprehensive set of tools to support the DAS. An integral part of this was an Indicator System to aid adaptation. The DAS Indicator System and the Adaptation Report are being developed in a multi-stage process on behalf of the BMU. In terms of the DAS, the Indicator System is primarily a tool employed at the Federal level. Its purpose is to facilitate the process of implementing the DAS and to facilitate recording the success or failure of adaptation measures taken.

The Consultation Project entitled 'Indicators for the German Adaptation Strategy' was initiated in December 2008 and completed in March 2010. It resulted in an initial set of indicators for adaptation at the Federal level and a structure for the Report on Indicators. This set of indicators will be consolidated in an R&E project that was scheduled to run from the beginning of 2010 until the beginning of 2011. As the work on indicators progresses, the task will be to find additional indicators able to reflect the political progress in the process of adapting to climate change in the whole of Germany. In this context, one of the most important questions will be whether the Federal Government is creating the appropriate regulatory framework to support adaptation.

Further details on the approach can be found here: <http://www.umweltdaten.de/publikationen/fpdf-l/4031.pdf>

Practical example 17

Linking implementation monitoring indicators to the French Adaptation Plan

In France, every measure detailed in the Adaptation Plan is associated with at least one indicator. These indicators are used to monitor the implementation and sometimes the impacts of an adaptation measure. The Adaptation Plan was adopted in July 2011, but evaluation is still at the early stages because most of the adaptation measures are not yet finished, even if more than 80% of actions have started.

HOW DOES THE EU SUPPORT?

Knowledge base

The [European Climate Adaptation Platform](#)³⁴ contains information and various tools for the process of adaptation, including:

- Database on FP4 to FP7 RTD, ESPON and Interreg/ETC projects
- Risks and vulnerability assessments (including maps) from European, national and international organisations
- Guidelines (regional and sectoral level)
- EU or pan-European databases of case studies and implemented measures collected at EU and national levels.
- Decision-support tools (e.g. Quick-scan)
- Means of exploring data bases of key reports from EC's service contracts and key organisations in the EU working on adaptation
- Key stakeholders, implementing organisations (e.g. EIB) and counterparts at EU and national levels
- Country information and case studies that allow to learn from other initiatives
- Climate change impacts and vulnerability indicators and assessments
- Frameworks for developing adaptation indicators

The EU is also active via the [European Environment Agency's work on climate change](#)³⁵ and the [Climate Change research at Joint Research Centre](#)³⁶.

Mainstreaming framework

Mainstreaming climate change adaptation in EU policies is a particularly active pillar in terms of adaptation policy making at EU level. The European Climate Adaptation Platform (Climate-ADAPT) provides an up-to-date overview and state-of-play of initiatives and main policy developments to integrate adaptation into EU sector policies. The key policy initiatives for mainstreaming adaptation are listed in Table 3.1 of the EEA report on adaptation in Europe³⁷ in connection with 9 key sectors: water management, marine and fisheries, coastal areas, agriculture and forestry, biodiversity, infrastructure, finance and insurance, disaster risk reduction and health. These initiatives consider in turn the most vulnerable areas in Europe (e.g. mountains, coastal areas, river flood prone areas, the Mediterranean, and the Arctic).

Funding instruments and organisations

The Commission is proposing to allocate at least 20% of the EU budget to climate action in the coming budget period, 2014-2020.

A sizeable share of the EU budget will be implemented by the Member States and regions though shared management with the European Commission. Shared management involves the five EU funds mentioned below. These funds will be implemented on the basis of programmes drawn up by the Member States and agreed with the Commission.

³⁴ <http://climate-adapt.eea.europa.eu/>

³⁵ <http://www.eea.europa.eu/themes/climate>

³⁶ <http://ec.europa.eu/dgs/jrc/index.cfm?id=2290>

³⁷ http://www.eea.europa.eu/publications#c14=&c12=&c7=en&c9=all&c11=5&b_start=0

The Member States will include climate action in the programmes and report on the implementation and climate related expenditure.

During the programming it is important to provide information and communication and raise the awareness of possible climate action, both mitigation and adaptation actions, among authorities, beneficiaries and other stakeholders, including also training and specialised expertise. Investments in climate adaptation and disaster risk management should be encouraged.

Furthermore, the Member States will address the required administrative capacity of authorities and beneficiaries to ensure the efficient implementation of the funds including on climate action.

The Partnership Agreement will set out the Member State's approach to integrated territorial development, which will ensure the coordination of priority interventions supported by all CSF Funds including support of urban, rural, coastal and fisheries areas as well as areas with particular territorial features. The territorial perspective is an opportunity to address climate change impacts, which naturally have important territorial effects.

Large scale infrastructure projects may require dedicated climate and disaster proofing to ensure the resilience to the adverse impacts of climate change and to minimise the emissions of greenhouse gases during its lifespan; and this should be addressed through e.g. the cost-benefit analysis, environmental impacts assessment (EIA), and where relevant strategic impact assessment (SEA), as well as through support such as JASPERS.

Suitable indicators are needed in addition to the tracking of climate related expenditure to assess the impacts of climate actions and support monitoring and evaluation.

The European Regional Development Fund (ERDF) will among others promote energy efficiency in small- and medium-sized enterprises (SMEs), housing and public buildings; production and distribution of renewable energy; low-carbon strategies for urban areas; and resilience to climate change and extreme weather events.

The ERDF will support European Territorial Cooperation (ETC), for example cross-border co-operation between Member States, including climate action in the fields covered in national programmes by ERDF and ESF.

The Cohesion Fund will among other support the shift towards a low-carbon economy in all sectors, climate change adaptation and risk prevention and management, and may pursue climate action in relation to transport and environmental investments.

Climate change may lead to a range of adverse impacts such as coastal and river flooding of buildings; extreme weather events (heat waves, storms) and shortage of cooling water (due to drought) affecting energy production and infrastructure; temperature extremes and fires may impact on human health; changes in winter conditions and snowfall will impact winter tourism while temperature extremes and fires may impact tourism in the south; all transport modes will be affected by e.g. flooding, storms, winter extremes, heat waves, and soil erosion; and the water sector may be affected by flooding, water scarcity and changes in water quality and salinity,

The European Social Fund (ESF) will among other support the shift towards a low-carbon and climate-resilient economy through reform of education and training systems, adaptation of skills and qualifications, as well as up-skilling of the labour force.

The European Agricultural Rural Development Fund (EAFRD) will among other support climate action in relation to forest area development, establishment of agro-forestry systems, investments improving the resilience and environmental value of forest ecosystems, organic farming, Natura 2000 and Water management.

The European Maritime and Fisheries Fund (EMFF) will among other promote climate action in relation to the energy efficiency of fishing vessels as well as energy audits and schemes, insurance of aquaculture stock with regard to extreme weather events, and the implementation of local development strategies including operations to mitigate climate change.

Common Provisions Regulation for the five funds (ERDF, ESF, CF, EAFRD, EMFF)

The proposal for the *Common Provisions Regulation (CPR)*³⁸ governing the five funds stipulates, in article 8 on Sustainable Development, that *climate change mitigation and adaptation* shall be promoted in the preparation and implementation of Partnership Agreements and programmes for the five funds, and that Member States shall provide information on the support for climate change objectives using the methodology adopted by the Commission.

The Common Provisions Regulation defines eleven³⁹ thematic objectives including: (4) *supporting the shift towards a low-carbon economy in all sectors* and (5) *promoting climate change adaptation, risk prevention and management*. Hence, the overall framework for the five funds includes climate change mitigation and adaptation.

³⁸ CPR: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52012PC0496:EN:NOT>
Amended proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund covered by the Common Strategic Framework and laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and repealing Council Regulation (EC) No 1083/2006

³⁹ The eleven thematic objectives are:
(1) strengthening research, technological development and innovation;
(2) enhancing access to, and use and quality of, information and communication technologies;
(3) enhancing the competitiveness of small and medium-sized enterprises, the agricultural sector (for the EAFRD) and the fisheries and aquaculture sector (for the EMFF);
(4) supporting the shift towards a low-carbon economy in all sectors;
(5) promoting climate change adaptation, risk prevention and management;
(6) protecting the environment and promoting resource efficiency;
(7) promoting sustainable transport and removing bottlenecks in key network infrastructures;
(8) promoting employment and supporting labour mobility;
(9) promoting social inclusion and combating poverty;
(10) investing in education, skills and lifelong learning;
(11) enhancing institutional capacity and an efficient public administration.

ANNEXES

Annex 1 – Key principles for adaptation

Adaptation to climate change refers to adjustments in natural and human systems in response to actual or expected climate change impacts, which moderate harm or exploit beneficial opportunities (Adger *et al.*, 2007).

Adaptation is a complex task: it affects all levels of decision-making, all regions as well as most sectors. Adaptation needs to be structured as a cross-sectoral, multi-level and inter-regional activity bringing together actors with different knowledge, interests and values (Grothmann, 2011; Lebel *et al.*, 2010).

Several principles in the adaptation policy process are commonly recognized as key factors for good adaptation. These principles (*based on UKCIP, 2005; Adger et al. 2005; Prutsch et al. 2010; Brown et al. 2011*) are:

1. Adaptation needs to be **sustainable** – adaptation responses should not add to climate change or limit the mitigation efforts. In addition, it should not cut the ability of other parts of the natural environment, society or business to carry out adaptation elsewhere (e.g. using ground water for irrigation in dry regions which causes a decreasing groundwater level and limits the available amount of drinking water). Where possible, foster adaptation efforts that enhance the capacity of natural systems to boost resilience by buffering climate risks.
2. Work in **partnership** – identify and engage with affected actors (e.g. from public authorities, NGOs, business) at all relevant levels and ensure they are well informed and encouraged to work on adaptation.
3. Adaptation needs to be **evidence-based** – making full use of the latest research,

data and practical experience so that decision-making is well-supported and informed.

4. Manage climate and non-climate risks using a **balanced approach** – climate change is only one aspect of multiple stresses that influences social, natural and economic development. Thus, adaptation must take a holistic approach that includes managing both, climate and non-climate risks.
5. Address risks associated with past and current **climate variability** and **weather extremes** – this should be the starting point for anticipatory actions to address risks and opportunities associated with longer-term climate change. It is important to ensure coordination and **close synergies with disaster risk reduction/management**
6. The response to climate impacts should be **prioritised** – for example, by focusing more attention on sectors that are most affected by the weather and climate, those which have long-term lifetimes or implications, where significant investment is

involved or high values are at stake, or where support for critical national infrastructure is involved.

7. Adaptation must be **tailored** to the scale required by the climate change challenge (e.g. national/sectoral/cross-border) - solutions need to be modified for individual situations, also addressing responsibilities and financing.
8. Adaptation should be **flexible** - although there is still uncertainty over the future climate, we should consider options now in certain fields (e.g. in sectors with long-term planning horizons) and make decisions that can be adjusted easily. Thus, the value of no/low regrets and win-win adaptation options in terms of cost-effectiveness and multiple benefits should be recognized as well as the value of a phased approach to adaptation.
9. Adaptation needs to be **transparent** - fully communicate the effects of various adaptation options, both in the near and long term and providing as much detail as possible. Adaptation decisions are also value-laden, e.g. regarding the level of risk to be accepted. Thus, it is vital that decisions are made transparent in order to be able to agree on solutions that are fair and balanced.
10. Review the **effectiveness, efficiency, equity and legitimacy** of adaptation decisions continuously in order to gradually improve them according to the evolution of evidence and knowledge on climate change impacts. This requires monitoring and re-evaluations of risks.

Annex 2 - Self-check

Preparing the ground for adaptation

- ☐ Support for adaptation guaranteed at high level
- ☐ A core team on adaptation in place
- ☐ Institutional cooperation set up
- ☐ All affected stakeholders involved
- ☐ Human and financial resources secured in the long term
- ☐ A first overview on climate-related impacts gained
- ☐ Ongoing activities with relevance for adaptation identified
- ☐ Common understanding on climate change adaptation gained
- ☐ Overview on relevant information gained and access provided
- ☐ Target group-specific formats for awareness raising carried out
- ☐ Potential barriers identified and ways explored how to address them
- ☐ An approach on how to deal with uncertainties developed

Assessing risks and vulnerabilities to climate change

- ☐ A systematic overview on past weather events, their consequences and response actions in place
- ☐ Understanding of future climate change gained
- ☐ Non-climatic stress factors identified and considered
- ☐ Main concerns are identified that require an adaptation response
- ☐ Transboundary issues taken into account
- ☐ Knowledge gaps and uncertainties in climate change summarized and made explicit

Identifying adaptation options

- ☐ Gaps and barriers that hindered an adequate response in the past identified and understood
- ☐ A full portfolio of adaptation options considered
- ☐ Suitable adaptation options were described in detail

Assessing adaptation options

- ☐ A prioritisation system of adaptation options developed in cooperation with stakeholders
- ☐ Possible synergies and conflicts identified and taken into account
- ☐ Cost-benefits of options assessed
- ☐ Preferred adaptation options selected for implementation
- ☐ Adaptation strategy developed and politically adopted

Implementation

- ☐ Action plan developed
- ☐ Steps for implementation set

Monitoring and evaluation

- ☐ Appropriate M&E provisions for both your adaptation policy's objectives and selected adaptation options developed
- ☐ Appropriate indicators developed

Annex 3 - Further information sources

- Database on European research projects:
 - [CIRCLE-2 Info Base](#)
 - [FP7 on Climate change](#)
 - [Cordis on FP4 to FP7 projects](#)

- National web-portals (in english)
 - [Austria](#) (in German)
 - [Cyprus](#) (in Greek)
 - [Denmark](#)
 - [Finland](#)
 - [France](#)
 - [Germany](#) (KomPass will be available in english in late 2012)
 - [Ireland](#)
 - [Lithuania](#)
 - [Netherlands](#)
 - [Norway](#)
 - [Portugal](#) (in Portuguese)
 - [Slovenia](#)
 - [Spain](#)
 - [Sweden](#) (in Swedish)
 - [UK](#)

- Online adaptation-toolkits
 - [UK](#): Adaptation Wizard
 - [Scotland](#): Climate change adaptation Toolkit
 - [Norway](#): Guide to climate change Adaptation
 - [Germany](#): KlimaLotse (german)

Annex 4 - References

The core of the guideline is based on the following work:

ETC/ACC (Prutsch, A., Grothmann, T., Schauser, I., Otto, S. & S. McCallum) (2010): Guiding principles for adaptation to climate change in Europe. Technical paper 2010/6.

Prutsch, A., Felderer, A., Balas, M., König, M., Clar, C. & R. Steurer (planned for 2013): Methods and tools for adaptation to climate change. Environment Agency Austria, Vienna. (Publication in German language).

Pringle, P. (2011): AdaptME: Adaptation monitoring and evaluation toolkit. UKCIP, Oxford, UK.

UKCIP (2010): The UKCIP Adaptation Wizard V 3.0, UKCIP, Oxford

Further references:

Adger, W.N., Vincent, K., 2005. Uncertainty in adaptive capacity. *External Geophysics, Climate and Environment* 337(4), 399-410.

Adger, W.N., Agrawala, S., Mirza, M.M.Q., Conde, C., O'Brien, K., Pulhin, J., Pulwarty, R., Smit, B., Takahashi, K., 2007. Assessment of adaptation practices, options, constraints and capacity. *Climate Change 2007: Impacts, Adaptation and Vulnerability*. In: M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden, C.E. Hanson (Eds.), *Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 717–743). Cambridge University Press, Cambridge, UK.

Anderson, S. (2011): Assessing the effectiveness of climate adaptation. *Lessons from adaptation in practice IIED*.

Brown, A., Gawith, M., Lonsdale, K., Pringle, P., 2011. *Managing adaptation: linking theory and practice*. UKCIP, UK.

Grothmann, T., 2011. Governance recommendations for adaptation in European urban regions: Results from five case studies and a European expert survey. In K. Otto-Zimmermann (ed.), *Resilient Cities - Cities and Adaptation to Climate Change - Proceedings of the Global Forum 2010* (pp. 167-175). Hamburg: Springer.

Lebel, L., Grothmann, T., Siebenhüner, B., 2010. The role of social learning in adaptiveness: insights from water management. *International Environmental Agreements: Politics, Law and Economics*, 10 (4), 333-353.

UKCIP, 2005. *Identifying Adaptation Options*. UK Climate Impacts Programme, Oxford.

Wirth, V. & Prutsch, A., 2013. *Communicating climate change adaptation. Lessons learned from 10 OECD countries*. Environment Agency Austria, Vienna. (Publication in German language).

Annex 5 - Glossary

This glossary provides common definitions of the terms used frequently by the climate change community. It was taken from the European Climate Adaptation Platform. The Platform compiled the most relevant terms from various reports, including the IPCC's 4th assessment reports of the different working groups (Working Group I, II and III) and the UN ISDR.

Abrupt climate change

The nonlinearity of the climate system may lead to abrupt climate change, sometimes called rapid climate change, abrupt events or even surprises. The term abrupt often refers to time scales faster than the typical time scale of the responsible forcing. However, not all abrupt climate changes need be externally forced. Some possible abrupt events that have been proposed include a dramatic reorganisation of the thermohaline circulation, rapid deglaciation and massive melting of permafrost or increases in soil respiration leading to fast changes in the carbon cycle. Others may be truly unexpected, resulting from a strong, rapidly changing forcing of a nonlinear system.

Adaptation

Adaptation is an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory, autonomous and planned adaptation. There are different ways in which adaptation can be framed; an inventory has been made by the Dutch Climate Changes Spatial Planning research programme.

Adaptive capacity (in relation to climate change impacts)

Adaptive capacity describes 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. Adaptive capacity can be framed in many different ways; an inventory has been made by the Dutch Climate Changes Spatial Planning research programme.

Baseline/reference

The baseline (or reference) is the state against which change is measured. It might be a 'current baseline', in which case it represents observable, present-day conditions. It might also be a 'future baseline', which is a projected future set of conditions excluding the driving factor of interest. Alternative interpretations of the reference conditions can give rise to multiple baselines.

Climate

Climate in a narrow sense is usually defined as the 'average weather', or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. The classical period of time is 30 years, as defined by the World Meteorological Organization (WMO).

Climate change

Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the United Nations Framework Convention on Climate Change (UNFCCC), which defines 'climate change' as: 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'. Climate change can be framed in different ways; an inventory has been made by the Dutch Climate Changes Spatial Planning research programme.

Climate (change) scenario

A plausible and often simplified representation of the future climate, based on an internally consistent set of climatologically relationships and assumptions of radiative forcing, typically constructed for explicit use as input to climate change impact models. A 'climate change scenario' is the difference between a climate scenario and the current climate.

Climate sensitivity

In IPCC reports, equilibrium climate sensitivity refers to the equilibrium change in the annual mean global surface temperature following a doubling of the atmospheric equivalent carbon dioxide concentration. Due to computational constraints, the equilibrium climate sensitivity in a climate model is usually estimated by running an atmospheric general circulation model coupled to a mixed-layer ocean model, because equilibrium climate sensitivity is largely determined by atmospheric processes. Efficient models can be run to equilibrium with a dynamic ocean. The effective climate sensitivity is a related measure that circumvents the requirement of equilibrium. It is evaluated from model output for evolving non-equilibrium conditions. It is a measure of the strengths of the climate feedbacks at a particular time and may vary with forcing history and climate state. The climate sensitivity parameter (units: $^{\circ}\text{C} (\text{W m}^{-2})^{-1}$) refers to the equilibrium change in the annual mean global surface temperature following a unit change in radiative forcing. The transient climate response is the change in the global surface temperature, averaged over a 20-year period, centred at the time of atmospheric carbon dioxide doubling, that is, at year 70 in a 1 % yr⁻¹ compound carbon dioxide increase experiment with a global coupled climate model. It is a measure of the strength and rapidity of the surface temperature response to greenhouse gas forcing.

Climate system

The climate system is defined by the dynamics and interactions of five major components: atmosphere, hydrosphere, cryosphere, land surface, and biosphere. Climate system dynamics are driven by both internal and external forcing, such as volcanic eruptions, solar variations, or human-induced modifications to the planetary radiative balance, for instance via anthropogenic emissions of greenhouse gases and/or land-use changes.

Climate variability

Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all spatial and temporal scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability).

Cost-benefit analysis

Monetary measurement of all negative and positive impacts associated with a given action. Costs and benefits are compared in terms of their difference and/or ratio as an indicator of how a given investment or other policy effort pays off seen from the society's point of view.

Disaster

A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. Comment: Disasters are often described as a result of the combination of: the exposure to a hazard; the conditions of vulnerability that are present; and insufficient capacity or measures to reduce or cope with the potential negative consequences. Disaster impacts may include loss of life, injury, disease and other negative effects on human physical, mental and social well-being, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation.

There are different ways in which disasters can be framed. See for example an inventory made for the disaster reduction community.

Disaster risk

The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period. Comment: The definition of disaster risk reflects the concept of disasters as the outcome of continuously present conditions of risk. Disaster risk comprises different types of potential losses which are often difficult to quantify. Nevertheless, with knowledge of the prevailing hazards and the patterns of population and socio-economic development, disaster risks can be assessed and mapped, in broad terms at least.

Disaster risk management

Disaster risk management stands for a systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster. Comment: This term is an extension of the more general term "risk management" to address the specific issue of disaster risks. Disaster risk management aims to avoid, lessen or transfer the adverse effects of hazards through activities and measures for prevention, mitigation and preparedness. There are different ways in which risk management can be framed. See for example inventories made for the disaster reduction community or for the Dutch Climate Changes Spatial Planning Programme.

Disaster risk reduction

The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Emission scenario

An emission scenario is a plausible representation of the future development of emissions of substances that are potentially radiatively active (e.g. greenhouse gases, aerosols), based on a coherent and internally consistent set of assumptions about driving forces (such as demographic and socioeconomic development, technological change) and their

key relationships. Concentration scenarios, derived from emission scenarios, are used as input to a climate model to compute climate projections. In IPCC (1992) a set of emission scenarios was presented which were used as a basis for the climate projections in IPCC (1996). These emission scenarios are referred to as the IS92 scenarios. In the IPCC Special Report on Emission Scenarios (Nakienovi and Swart, 2000) new emission scenarios, the so-called SRES scenarios, were published, some of which were used, among others, as a basis for the climate projections presented in TAR-IPCC (2001) and 4AR-IPCC (2007).

Extreme weather event

An extreme weather event is an event that is rare at a particular place and time of year. Definitions of rare vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile of the observed probability density function. By definition, the characteristics of what is called extreme weather may vary from place to place in an absolute sense. Single extreme events cannot be simply and directly attributed to anthropogenic climate change, as there is always a finite chance the event in question might have occurred naturally. When a pattern of extreme weather persists for some time, such as a season, it may be classed as an extreme climate event, especially if it yields an average or total that is itself extreme (e.g. drought or heavy rainfall over a season).

Global warming

Global warming refers to the gradual increase, observed or projected, in global surface temperature, as one of the consequences of radiative forcing caused by anthropogenic emissions.

Greenhouse effect

Greenhouse gases effectively absorb thermal infrared radiation, emitted by the Earth's surface, by the atmosphere itself due to the same gases, and by clouds. Atmospheric radiation is emitted to all sides, including downward to the Earth's surface. Thus, greenhouse gases trap heat within the surface-troposphere system. This is called the greenhouse effect. Thermal infrared radiation in the troposphere is strongly coupled to the temperature of the atmosphere at the altitude at which it is emitted. In the troposphere, the temperature generally decreases with height. Effectively, infrared radiation emitted to space originates from an altitude with a temperature of, on average, $-19\text{ }^{\circ}\text{C}$, in balance with the net incoming solar radiation, whereas the Earth's surface is kept at a much higher temperature of, on average, $+14\text{ }^{\circ}\text{C}$. An increase in the concentration of greenhouse gases leads to an increased infrared opacity of the atmosphere, and therefore to an effective radiation into space from a higher altitude at a lower temperature. This causes a radiative forcing that leads to an enhancement of the greenhouse effect, the so-called enhanced greenhouse effect.

Greenhouse gas (GHG)

Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. This property causes the greenhouse effect. Water vapour (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4) and ozone (O_3) are the primary greenhouse gases in the Earth's atmosphere. Moreover, there are a number of entirely human-made greenhouse gases in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances, dealt with under the Montreal

Protocol. Beside CO₂, N₂O and CH₄, the Kyoto Protocol deals with the greenhouse gases sulphur hexafluoride (SF₆), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).

Hazard

A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Likelihood

The likelihood is described as an occurrence, an outcome or a result, where this can be estimated probabilistically.

Maladaptation

Action or investment that enhances vulnerability to climate change impacts rather than reducing them. E.g. in the face of rising sea-levels it would be maladaptive to build new key infrastructure on a shallow coastline (UKCIP).

Measures

Adaptation measures 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 (delivering adaptation).

Mitigation

An anthropogenic intervention to reduce the anthropogenic forcing of the climate system; it includes strategies and measures to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks. Examples of mitigation measures are renewable energy technologies, waste minimization processes and public transport commuting practices, etc.

Natural hazard

Natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Prevention

Prevention is an outright avoidance of adverse impacts of hazards and related disasters. Comment: Prevention (i.e. disaster prevention) expresses the concept and intention to completely avoid potential adverse impacts through action taken in advance. Examples include dams or embankments that eliminate flood risks, land-use regulations that do not permit any settlement in high risk zones, and seismic engineering designs that ensure the survival and function of a critical building in any likely earthquake. Very often the complete avoidance of losses is not feasible and the task transforms to that of mitigation. Partly for this reason, the terms prevention and mitigation are sometimes used interchangeably in casual use.

Projection

The potential evolution of a quality or set of quantities, often computed with the aid of a model. Projections are distinguished from predictions in order to emphasise that projections involve assumptions — concerning, for example, future socio-economic and

technological developments, that may or may not be realised — and are therefore subject to substantial uncertainty.

Resilience

Resilience describes 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. There are different ways in which resilience can be framed; an inventory has been made by the Dutch Climate Changes Spatial Planning research programme.

Risk

Risk is a combination of the probability of an event and its negative consequences. Comment: This definition closely follows the definition of the ISO/IEC Guide 73. 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. There are different ways in which risk can be framed. See for example inventories made for the disaster reduction community or for the Dutch Climate Changes Spatial Planning Programme.

Scenario

A plausible and often simplified description of how the future may develop, based on a coherent and internally consistent set of assumptions about driving forces and key relationships. Scenarios may be derived from projections, but are often based on additional information from other sources, sometimes combined with a narrative storyline.

Socio-economic scenarios

Scenarios concerning future conditions in terms of population, gross domestic product and other socio-economic factors relevant to understanding the implications of climate change.

Threshold

A threshold is a level of magnitude of a system process at which sudden or rapid change occurs. A point or level at which new properties emerge in an ecological, economic or other system, invalidating predictions based on mathematical relationships that apply at lower levels.

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

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. There are different ways in which vulnerability can be framed; an inventory has been made by the Dutch Climate Changes Spatial Planning research programme.

Annex 6 - Overview of available guidelines

Multi-level						
1	IPCC technical guidelines for assessing climate change impacts and adaptations	1994	Carter, T., Parry, M., Harasawa, H. & S. Nishioka	Intergovernmental Panel on Climate Change (IPCC)	Not defined	No specific sector
2	Handbook on Methods for Climate Change Impact Assessment and Adaptation Strategies	1998	Feenstra, J.F., Burton, I., Smith, J.B. & R.S.J. Tol (Eds.)	United Nations Development Programme (UNDP)	Not defined	No specific sector
3	Climate adaptation. Risk, uncertainty and decision-making	2003	Willows, R. & R. Connell	UK Climate Impacts Programme	Not defined	No specific sector
4	Adaptation Policy Frameworks for Climate Change	2004	Lim B. & E. Spanger-Siegfried (Eds.)	United Nations Development Programme (UNDP)	Multi-level	No specific sector
5	Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments	2007	Snover, A.K., L. Whitely Binder, J. Lopez, E. Willmott, J. Kay, Howell D. & J. Simmonds	The Climate Impacts Group, King County, Washington, ICLEI	Multi-level	No specific sector
6	Climate change adaptation action plan guidance	2008	grabs project	grabs project	Multi-level	No specific sector
7	Compendium on methods and tools to evaluate impacts of, and vulnerability and adaptation to climate change	2008	Erica Pinto, Robert C. Kay, Ailbhe Travers	United Nations Framework Convention on Climate Change (UNFCCC)	Multi-level	No specific sector
8	Designing climate change adaptation initiatives	2010	Lafontaine, A., Vergara, C & G. Quesne	United Nations Development Programme (UNDP)	Multi-level	No specific sector
9	Klimatote: Leitfaden zur Anpassung an den Klimawandel (online, but also a document available)	2010	Christian Kind, Till Mohns	Adelphi, Umweltbundesamt	Not defined	No specific sector
10	Managing adaptation: linking theory and practice	2011	Brown, A., Gawith, M., Lonsdale, K. & P. Pringle	UK Climate Impacts Programme (UKCIP)	Multi-level	No specific sector
11	Climate change guide (online)	2011	Climate Adaptation Programme Norway	Climate Adaptation Programme	Local level	No specific sector

12	Climate Change adaptation toolkit	?	Scottish Government		Multi-level	No specific sector
	Local level					
13	How can local authorities stimulate & support behavioural change in response to climate change?	2005	Alexander, Ballard & Associates with Rosslyn Research Ltd	Espace	Local level	No specific sector
14	Adapting to climate change impacts - a good practice guide for sustainable communities	2006	Land Use Consultants in association with Oxford Brookers University, CAG Consultants and Gardiner & Theobald	Department for Environment, Food and Rural Affairs (DEFRA) and three Regions Climate Change Group	Local level	Build environment
15	Adapting to climate change: a case study companion to the checklist for development	2007	Three Regions Climate Change Group	Government Office for London	Local level	No specific sector
16	Local government climate change adaptation toolkit	2008	ICLEI Oceania	Local Governments for Sustainability Oceania (ICLEI)	Local level	No specific sector
17	Canadian communities guidebook for adaptation to climate change	2008	Bizikova, L., Neale, T. & I. Burton	Environment Canada's Adaptation and Impacts Research Division	Local level	No specific sector
18	Chicago Area Climate Change Quick Guide: Adapting to the Physical Impacts of Climate Change	2008	Parzen, J. (Eds)	Chicago Climate Task Force	Local level	No specific sector
19	Preparing for Climate Change. A guide for local government in New Zealand	2008	Mullan, B., Wratt, D., Dean, S., Hollis, M., Allan, S., Williams, T., & G. Kenny	Ministry for the Environment New Zealand	Local level	No specific sector
20	Climate Change Impacts and Spatial Planning. Decision Support Guidance	2008	Espace	Espace	Multi-level	Spatial planning
21	A guidance Note for Scotland's local authorities	2009	Local Climate Impact Profile (LCIP)	Local Climate Impact Profile (LCIP)	Local Level	No specific sector
22	Climate Change Adaptation Strategies for Local	2009	IFRC, Red Cross / Red Crescent	International Federation of Red Cross and Red Crescent Societies (IFRC)	Local Level	No specific sector

	Impact		Climate Centre, Ken Westgate			
23	Climate Change Emergencies and European Municipalities: Guidelines for Adaptation and Response	2009	Langlais, R. (Eds.)	Nordic Center for Spatial Development (NordRegio)	Local level	No specific sector
24	Climate Change Information for Effective Adaptation A Practitioner's Manual	2010	Kropp, J., Scholze, M.,	Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)	Local level	No specific sector
25	Elaborer un plan d'adaptation aux changements climatiques : guide destiné au milieu municipal québécois (« Elaborating an adaptation plan to climate change : guideline for Quebec municipalities »)	2010	Caroline Larrivée, Impacts et adaptation, Ouranos	Ouranos	Local level	No specific sector
26	Stadtklimatolse (online)	2011	Greiving et al.	Federal Ministry of Transport, Building and Urban Development and the Federal Institute for Research on Building, Urban Affairs and Spatial Development	Local level	No specific sector
27	Villes et adaptation au changement climatique (« cities and adaptation to climate change »)	2010	Février Elvyne, Garnaud Benjamin, Hallegatte Stéphane, Vigié Vincent	Observatoire National sur les Effets du Réchauffement Climatique (ONERC)	Local level	No specific sector
28	Adapting to climate change. An introduction for Canadian Municipalities	2010	Bano Mehdi (Eds.)	Natural Resources Canada,	Local	No specific sector
29	Assessing the climate change fitness of spatial planning. A guidance for planners.	2011	Pütz, M., Kruse, S., Butterling	Projekt CLISP, ETC Alpine Space Programm	Multi-level	No specific sector
Regional level						
30	Changement Climatique :	2007	Emmanuel RONDIA,	Rhône-Alpénergie-Environnement	Regional level	No specific

	Comment s'adapter en Rhône-Alpes (« Climate Change : How to adapt in Rhône-Alpes »)		Sabrine BERTHAUD, Laurent COGERINO, Aude MATRAS, Claire MORAND			sector
31	Towards Climate Change Adaptation in the Baltic Sea Region	2007	Hilpert, K., Mannke, F., Schmidt-Thomé	Geological Survey of Finland, Espoo.	Regional level	No specific sector
32	Design of guidelines for the elaboration of regional climate change adaptation strategies	2009	Ribeiro, M.M., Losenno, C., Dworak, T., Massey, E., Swart, R., Benzie, M. & C. Laaser	European Commission (EC)	Regional level	No specific sector
33	Adaptation toolkit for the North Sea Region in a changing climate	2011	Van Oostrom et al.	Interreg project CPA	Regional level	No specific sector
National level						
34	UKCIP Adaptation Wizard (online, but also document available)	2010	UKCIP	UKCIP	National level	No specific sector
Sectoral issues						
Water						
35	Guidance on water and adaptation to climate change	2009	UNECE Water	United Nations Economic Commission for Europe (UNECE)	Multi-level	Water
36	River basin management in a changing climate – a Guidance Document	2009	EC	European Commission (EC)	National level	Water
37	Climate Change in Water Management	2010	Ludwig, F. & R. Swart	National Research Programme Knowledge for Climate	Not defined	Water
38	Handbook on Climate Change Adaptation in the Water Sector. A Resilient Approach that Integrates Water Management and Community Development	2010	Japan International Cooperation Agency	Japan International Cooperation Agency	Not defined	Water
39	Climate Change Handbook for Regional Water Planning	2011	Schwarz et al.	US Environmental Protection Agency Region 9 and California Department of Water Resources	Regional level	Water

	Coastal and marine issues					
40	Local strategies for addressing Climate Change	2009	NOAA Coastal Services Center	National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center	Local level	Coastal Services
41	Climate Change Adaptation Planning Manual For Coastal Alaskans and Marine Dependent Communities	2011	Johnson, T.	Alaska Sea Grant Marine Advisory Program	Multi-level	No specific sector
	Health					
42	Methods of assessing human health vulnerability and public health adaptation to climate change	2003	Kovats, S., Ebi, K.L. & B. Menne	World Health Organization (WHO)	Multi-level	Health
43	Climate change and communicable diseases in the EU Member States. Handbook for national vulnerability, impact and adaptation assessments	2010	Lingren E. & K. L. Ebi	European Centre for Disease Prevention and Control (ECDC)	National level	Health
44	Guidance on water supply and sanitation in extreme weather events	2010	Sinisi, L. & R. Aertgeerts	World Health Organization (WHO)	Regional level	Health
	EIA/SEA					
45	Strategic Environmental Assessment and Adaptation to Climate Change	2008	Risse, N. & N. Brooks	Organisation for Economic Co-operation and Development (OECD)	National level	SEA
46	Incorporating Climate Change impacts and adaptation in environmental impact assessments: Opportunities and challenges	2010	Shardul Agrawala, Arnaldo Matus Kramer, Guillaume Prudent-Richard and Marcus Sainsbury	Organisation for Economic Co-operation and Development (OECD)	Not defined	EIA
	Nature conservation					
47	Conservation Action Planning Guidelines for	2009	Nature Conservancy's Central	Nature Conservancy's Central Science Division	Multi-level	Nature conservation

	Developing Strategies in the Face of Climate Change		Science Division			
	Business sector					
48	Adapting to Climate change: A Guide for Businesses in Scotland	2010	Lorraine FitzGerald,	Scottish Climate Change Impacts Partnership (SCCIP)	National level	Businesses
	Development					
49	Adapting to climate variability and change. A guidance manual for development planning	2007	Anderson, G. (Eds.) ³	United States Agency for International Development (USAID)	Not defined	No specific sector
50	Climate Guide	2007	Red Cross/Red Crescent Climate Centre	Red Cross/Red Crescent Climate Centre	Not defined	No specific sector
51	Climate change, Adaptation and mitigation in development programs	2008	Mani, M., Markandya, A. & V. Ipe	World Bank	Not defined	No specific sector
52	Integrating climate change adaptation into development co-operation. Policy Guidance	2009	OECD	OECD's Environment Policy Committee (EPOC) and Development Assistance Committee (DAC)	Multi-level	No specific sector
	Specific elements of an adaptation policy framework					
53	Climate Vulnerability and Capacity Analysis. Handbook	2009	Daze, A., Amrose, K. & C. Ehrhart	Cooperative for Assistance and Relief Everywhere (CARE)	Local level	No specific sector
54	Shaping climate-resilient development: a framework for decision-making	2009	ECA	Economics of Climate Adaptation (ECA)	Multi-level	No specific sector
55	AdaptME: Adaptation monitoring and evaluation	2011	Pringle, P.	UK Climate Impacts Programme (UKCIP)	Multi-level	No specific sector