



Guidelines on Member States' adaptation strategies and plans

Contents

➤ Introduction	Page 2
➤ Key features of adaptation policy	Page 4
➤ Key steps in developing or updating adaptation strategies / plans	Page 5
Step 1: Setting the institutional framework and ensuring stakeholder buy-in	Page 6
Step 2: Conducting climate change risk and vulnerability assessments	Page 11
Step 3: Identifying and prioritising adaptation options	Page 17
Step 4: Developing an action plan and implementing adaptation actions	Page 19
Step 5: Monitoring and evaluation	Page 22
➤ Annex I – Adaptation strategy template example	Page 25
➤ Annex II – New areas of adaptation policy	Page 29
Just resilience	Page 29
Maladaptation	Page 29
Nature-based solutions	Page 31
Climate stress testing	Page 32

Introduction

Recent extreme events – forest fires, droughts, floods, and fatal heat waves –

both across Europe and the world, have demonstrated that the consequences of climate change are hitting our societies harder and faster than science has projected. The increase in extreme weather events and natural disasters has a growing impact on the physical and mental health of people, on the rest of nature and on economic assets. **The Intergovernmental Panel on Climate Change (IPCC) Sixth assessment report**¹ stated that “global adaptation is predominantly slow, siloed and incremental” and “even with emission reductions sufficient to meet the Paris Agreement goals, transformational adaptation will be necessary”.²

Regrettably, these events as well as the IPCC report have also pointed to the lack of preparedness and the disproportion between the climate threats and response mechanisms and structures in place. While there is uncertainty in estimating future climate risk, what the end game looks like temperature-wise by 2100 - good, bad, or ugly - does not really change the options facing climate adaptation policymaking today. To increase societal preparedness to the intensifying impacts of climate change, it is clear that the public sector must play an even greater role in bringing about the climate resilience and sustainable investments that are needed. There is also a need to further develop and establish the right regulatory conditions and planning capabilities so that the different actors and markets can follow with confidence and certainty and channel investments into resilience.

The 2013 European adaptation strategy encouraged all EU Member States to adopt comprehensive adaptation strategies. The Commission also published Guidelines on developing adaptation strategies to help EU Member States in preparing their adaptation strategies. Between 2013 and 2018, the number of EU Member States with adaptation strategies sharply rose from 15 to 25, and by 2020 all EU Member States had prepared their strategies. However, these vary greatly in scope, delivery, and method of implementation.

The **2018 Governance Regulation of the Energy Union and Climate Action** addresses climate change adaptation in two ways. First, they set current reporting obligations for EU Member States on adaptation to climate change. Second, they state that each EU Member State must set out in its integrated national energy and climate plan, where relevant, other objectives and targets, including, among other dimensions, adaptation goals.

To respond to the evolving situation and to instill structural change, the new **EU strategy on adaptation to climate change** (2021) outlined an increased ambition and was broadened to cover new areas and priorities to contribute to the EU’s journey towards climate resilience, calling for a review of the 2013 Guidelines on developing adaptation strategies.

In addition, in July 2021, the **European Climate Law** entered into force. Whereas previously, the Governance Regulation obligations around adaptation were rather procedural in nature, the Climate Law established a ‘duty’ to adapt. Specifically, it established the requirement to ensure continuous progress in enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change in accordance with Article 7 of the Paris Agreement. The Climate Law contains provisions for national adaptation strategies and plans (alongside the Union level) and articulates expectations for the quality of an adaptation policy and its outcomes. It requires the Commission to regularly assess the consistency of relevant national measures with progress on adaptation, and to

¹The Working Group II contribution [Climate Change 2022: Impacts, Adaptation and Vulnerability](#).

² According to the IPCC (2023) [AR6 Synthesis Report, Summary for policy makers](#), transformative change is supported by “adaptation and mitigation actions, that prioritise equity, social justice, climate justice, rights-based approaches, and inclusivity”. These are also considered to “lead to more sustainable outcomes, reduce trade-offs... and advance climate resilient development”.

issue recommendations where it finds that an EU Member State's measures are inconsistent with ensuring progress in enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change.

In line with these provisions, the purpose of these guidelines are:

- To support EU Member States in **revising their adaptation strategies and drafting / revising their adaptation plans** in meeting the adaptation related challenges they face, taking into account the differences in their administrative structures and the adaptation planning pathways they have already taken.
- To highlight the **key features** that are essential for delivering quality adaptation policy and results. Since climate change impacts require a more systemic and urgent response, adaptation strategies and plans that do not integrate all policy domains and are not embedded into decision-making at all levels are no longer sufficient means to do this. Therefore, the principles apply to the overall national adaptation policy framework whereas adaptation strategies and plans support the delivery of good adaptation outcomes.
- To provide **an example of a template outlining a structure for the strategy** that will make it easier to access and compare these strategies and to ensure a comparable overview of the state of preparedness and planned actions at EU level.
- To **enhance adaptation policy with new areas.**

In addition to these guidelines, the [Adaptation support tool](#) (AST) developed and maintained by the European Environment Agency (EEA) provides a greater depth of detail, and good examples of implementing principles, processes and options for moving beyond the ground covered in the guidelines.

Concrete adaptation pathways and demonstrations of transformative solutions are also being developed with regional authorities across Europe through the [Horizon Europe Mission on adaptation to climate change](#) launched in September 2021.

Key features of adaptation policy

Strong adaptation strategies and plans are needed to ensure that societal, political and economic

preparedness advances steadily (in line

with the European Climate Law) and aims to get ahead of the climate crisis (the ultimate practical justification). That said, the successful implementation of strategies and plans is determined by the stakeholders' commitment and the resources available to them. The following features are essential for (re)crafting strong adaptation strategies and plans, underpinned by a supportive legal framework, and delivering high quality adaptation policy.

Some of these features represent the substantive building blocks of adaptation policy, while others relate more to processes and means. Together, they amount to a set of preconditions needed to achieve a high quality adaptation outcome, with a broader, faster, and more systemic response to climate change.

What (substantive building blocks)

1 **Legal frameworks laying down the 'duty to adapt' at national level**, including binding, regularly updated (sectoral) adaptation goals to measure overall progress in building resilience to climate change impacts.

2 **Regularly updated adaptation strategies and plans** in place, framing the overall adaptation policy and its implementation at strategic and operational levels (*in line with the adaptation goals in point 1 above*).

3 **Adaptation policy priorities** identifying **sectors or areas** to be involved and covered by adaptation planning and **impacts or risks** that need to be addressed in adaptation planning. The priorities should be set out in order of **targets and objectives**, followed by clear adaptation pathways setting up the process of how to achieve them through the sequence of **options and actions** (*reflected in adaptation strategies and plans in point 2*).

4 **Regularly updated and robust climate change impact and vulnerability assessments** based on the latest climate science to identify the populations, essential infrastructure (assets) and sectors (activities) particularly vulnerable to climate change, setting the overall strategic direction of adaptation policy and continuously informing decision-making (*feeding into points 1,2 and 3*).

5 **Stress testing of (critical) infrastructure and systems** as a key input into climate change risk assessments (*feeding into point 4*).

How (processes and means)

6 **Sufficient, knowledgeable personnel and financial resources across all related institutions and administrative departments** for the coordination of activities and implementation of actions at all levels of governance (national, regional, local).

7 **Engagement of all relevant stakeholders** (private sector, NGOs, certain communities, etc.) that are particularly exposed / vulnerable and / or have knowledge / resources / capacities to inform and / or implement the adaptation actions.

8 **Multi-level coordination and mainstreaming**, both horizontal (e.g., across the ministries) and vertical (e.g., with other layers of public administration), when planning and implementing adaptation actions.

9 **Continuous monitoring and evaluation of implementation** of adaptation actions, covering processes as well as effects and outcomes, and endowed with the necessary instruments. Infrastructure for the monitoring of adaptation outcomes may have important synergies with early warning.

Key steps in developing or updating adaptation strategies / plans

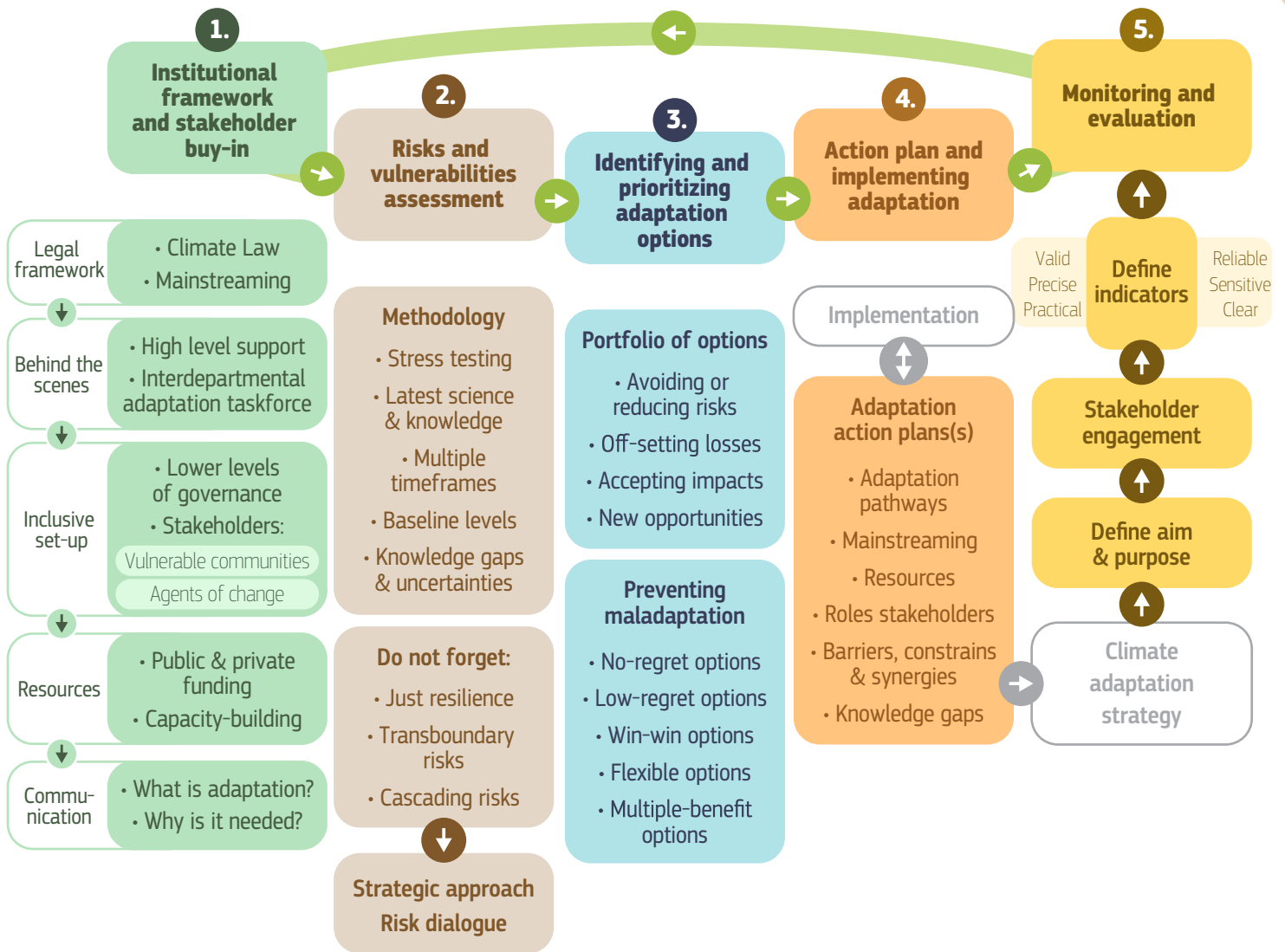


Figure 1 - Overview of the preparatory steps in developing or updating adaptation strategy / plan.

Source: European Commission

Key steps in developing or updating adaptation strategies and plans are summarised in Figure 1 before the more detailed sections below.

✔ Step 1: Setting the institutional framework and ensuring stakeholder buy-in

Strengthening the ambition and effectiveness of climate adaptation policies, strategies, and plans is essential considering the increasing impacts of climate change throughout the European Union (EU).

The first step in strengthening the ambition might be adopting a legal framework ('climate law') for national climate policy to set up binding, regularly updated adaptation goals to measure overall progress in building resilience. National climate laws can also provide additional backing to adaptation policy frameworks set out in adaptation strategies and plans.

To support the delivery of good adaptation outcomes, strategies and plans need to be regularly updated.³

Furthermore, greater emphasis in these documents is required on integrating climate adaptation into other policies in relevant sectors, also called '**mainstreaming**,'⁴ while focusing more clearly on the direct outcomes of adaptation efforts.

Involving all levels of government and civil society is therefore crucial in developing an effective climate adaptation strategy and / or plan. Sufficient skilled staff, technical tools and financial resources across all parts of the related institutions and administrative departments at all levels of governance (national, regional, local) are essential to develop, coordinate, and implement adaptation strategies and plans.

Ensuring coordination among neighbouring EU Member States is crucial for effective adaptation measures in border areas, where exposure to risks is not only limited to one side of the border but affects both neighbouring EU Member States. For this reason, adaptation measures in border regions can only be effective when jointly set up.

✔ Step 1a: Obtaining high-level support

High-level political support, i.e., from the prime minister's office, presidential office is a significant factor in helping to mobilise and engage governmental and civil society actors in mainstreaming climate adaptation. It also ensures high-level and long-term commitment to adaptation policies, strategies, and plans.

✔ Step 1b: Setting up the process

Establishing a national interdepartmental adaptation taskforce

Adaptation strategies are key tools in enhancing societal preparedness against unavoidable impacts of climate change, protecting the most vulnerable and impacted populations and sectors. Those strategies need to provide a basis for coordinated government action. To ensure the necessary engagement and successful integration of climate adaptation into different sectoral policies it is suggested that an interdepartmental taskforce or committee be created and led under the prime minister's office (or equivalent). This group should be responsible for the oversight of the development of the climate adaptation strategy and / or plan. It should be also given a clear mandate to manage its implementation.

Step 1 of the guidelines will help to:

- Prepare the process for climate adaptation strategies;
- Construct institutional frameworks that involve relevant stakeholders;
- Involve sub-national governments;
- Mobilise resources for climate adaptation;
- Communicate the need for adaptation.
- Integrating climate policy into sectoral policies (mainstreaming).

³Article 5(4) of the European Climate Law: *Member States shall regularly update the strategies and include the related updated information in the reports to be submitted under Article 19(1) of Regulation (EU) 2018/1999.*

⁴The mainstreaming must be conceived as a two-way process: it should also consider the contribution of other sector policies to adaptation action.

Ministries and / or agencies related to sectors with an increased risk of climate change impacts should be identified and involved in this taskforce. Key ministries to be involved include climate change, environment / nature, public health, civil protection / interior affairs, infrastructure, energy, economic affairs / finance, agriculture, forestry, fisheries, water management, and employment and social affairs. Cross-border actors should also be involved to ensure coordinated actions among neighbouring EU Member States in border regions. It is recommended practice for each of the identified administrations to appoint an 'adaptation officer' to ensure continuous involvement of the respective ministries into adaptation planning.

Involving regional and local level of governance

The phrase **'think globally, act locally'** becomes ever more important when discussing climate adaptation strategies and plans. Local and regional administrations are key drivers of adaptation since many climate adaptation interventions take place at the local and regional level and depend therefore on context-specific conditions. Local governments play a key role in fostering public engagement and local action, by informing people of the benefits of climate adaptation for their region. Furthermore, local governments possess a lot of vital information on potential localised climate adaptation measures that are viable in their area. The interdepartmental adaptation taskforce should therefore ensure meaningful exchanges with sub-national authorities to include their expertise in adaptation policymaking and to support regional / local activities in line with the national adaptation policy. Specific consideration should be given on how to involve the regional and local level of governance. For example, by reaching out to regional associations, or interregional local government networks like the Covenant of Mayors, where over 11 000 local and regional authorities representing 341 million people are preparing their communities on how to live with the consequences of climate change.

Identifying and involving stakeholders

Climate change will create uncertainty and impacts throughout the entire society, stressing the importance for the interdepartmental taskforce of **identifying all relevant stakeholder groups** including social partners and civil society organisations, **whose involvement is needed to create robust climate adaptation measures**. Stakeholder participation will **increase the quality of decision-making** for climate change adaptation by ensuring ownership of the process for stakeholders. This in turn **will improve the overall quality of a climate adaptation strategy or plan** created by the interdepartmental taskforce. The process of identifying stakeholder groups can be aided by distinguishing between two groups of stakeholders – agents of change and those potentially impacted by climate change:

- One group of stakeholders are **possible agents of change** that can contribute to the efforts of national and / or regional / local administrations by providing extra information, resources, or capacities. Stakeholders that would fall under this category are research institutes providing or enhancing knowledge bases on climate adaptation, the private sector providing valuable information of better adjustment of adaptation policies or by providing funding, cross-border actors to provide a better understanding of cross-border territories and border regions and non-government organisations, especially local civil society organisations, that help to provide a better understanding of territories, implement adaptation measures and communicate the need for climate adaptation to facilitate change at local and regional level.
- Another group of stakeholders that need to be included in the climate adaptation process are **those with an elevated likelihood of being impacted by climate change**. These are mostly vulnerable communities (including but not limited to people in and at-risk of poverty and social exclusion, persons with disabilities, elderly people and those with pre-existing health conditions, pregnant women, displaced persons, socially marginalised, exposed workers, and children) or advocates and interest groups that represent these vulnerable communities that would otherwise be excluded from the participation process. Unequal exposure and vulnerability to climate impacts of different regions and socio-economic groups worsens pre-existing inequalities and vulnerabilities. Therefore, it is essential to ensure a just transition that reduces the unequal burden of climate risk and ensures equity in the distribution of the benefits of adaptation.

The conceptual separation of these two groups of stakeholders is to ensure a full enough coverage from the necessary angles, but the overlap between them should be recognised and valued. In other words, those particularly vulnerable to climate change can also be possible agents of change even if in some respects their resources are

limited. They may even possess resources, most obviously information about how vulnerabilities to climate change are experienced and the likely effectiveness of interventions, that are less accessible to those not in their position. Furthermore, gender differences in behaviours and attitudes regarding climate change⁵ also underscores the need to ensure the balanced participation of men and women in the process feeding decision-making and in implementation. Children are not typically included in public decision-making but their right to participate in decision-making in all matters that affect their lives is in fact a well-established legal principle. As each generation of children will inherit the environmental damage caused by previous generations, there is a particularly strong argument for engaging younger age groups⁶ in decisions on climate change policy.

It is advised that the interdepartmental taskforce agree upon the role of stakeholders upfront, especially in the case of stakeholders cooperating with the national administration on implementing specific adaptation measures.

✓ Step 1c: Mobilising resources

The costs of climate adaptation are increasing and will accelerate over the next decades due to the increasing level of urgency for adaptation measures. Adaptation finance should therefore increase accordingly. In addition to that, it might be useful to identify the projected or already incurred costs of non-adaptation (i.e., the financial loss and damage associated to climate change) as it may justify re-allocation of existing funds to adaptation. However, this can be a challenge for local, regional and national authorities due to uncertainty about the amount of funds needed given the often unpredictable climate risks and impacts. While traditional sources of public and private funding should be explored, it is suggested to look for innovative funding instruments through cooperation with the private sector⁷. Two good practice examples of innovative funding instruments are:

1. [public-private partnership \(PPP\) for climate adaptation measures in Malmo](#); and
2. [PPP for a new flood proof district in Bilbao](#), briefly described in the case example 1 text box above.

The adaptation finance gap is especially apparent for lower levels of governance responsible for implementing most adaptation measures. In addition to funding being hard to access, this can be a result of lack of in-house capacity and expertise. Targeted assistance to even the smallest local and regional authorities is required to ensure the sufficient capacity and expertise necessary for administration as well as implementation.

The EU finances adaptation to climate change through a wide range of instruments. These include:

- the [LIFE programme](#), the EU's main funding instrument for environment and climate action;

Case example 1: public-private partnership for a new flood proof district in Bilbao, Spain

Bilbao's 'Zorrotzaurre' district is located on a flood-prone industrial peninsula. With increasing extreme precipitation predicted across the Basque country in the future due to climate change and a need for new housing to accommodate the people of Bilbao, a major urban regeneration project is currently underway to redevelop Zorrotzaurre district into a new flood-proof residential quarter. Flood protection includes five key measures: (1) opening the Deusto canal (turning the peninsula into an island), (2) providing a flood protection wall, (3) elevating the ground level by 1.5 meters for new buildings, (4) installing storm water tanks and (5) providing green public spaces that can also absorb flood water.

To achieve this urban regeneration project, a public-private partnership was established for financing and managing the plan. The costs for the redevelopment works will be covered by the public-private partnership, i.e. the owners of the land, according to their share of ownership.



⁵ For example, the literature suggests that men tend to be less concerned than women about climate change when countries are wealthier. See e.g., [Bush and Clayton \(2023\)](#).

⁶ Some good practices and guidelines may be found in [Children's participation in public decision-making – Why should I involve children?](#)

⁷ Further options opening up with the [Taxonomy Climate delegated act](#) activities under climate adaptation.

- [Horizon Europe](#), the EU's key funding programme for research and innovation;
- the [European Regional Development Fund](#), particularly through [INTERREG](#) projects;
- the [Cohesion Fund](#), through investment in environment and Trans-European Transport Networks;
- the [Just Transition Fund](#), to alleviate the negative impacts of the transition for territories most affected by the transition to climate neutrality and resilience.

And [there](#) are many more examples of EU funding instruments that could help to fund adaptation. However, while EU funding can help financing adaptation measures to a certain extent, national and private funding are vital in closing the adaptation finance gap.

These finance streams should be accelerated, and budgets as well as activities should engage both women and men in all levels of the decision-making process.

✔ Step 1d: Continuously communicating the need for adaptation and raising awareness

Communities across the EU are experiencing extreme and volatile weather patterns. The climate communication gap between academia and governments on the one hand, and communities on the other hand can lead to either incorrect action on climate adaptation, or even complete inaction. More systemic climate communication should create awareness in a language that is easily understood. This helps pave the way for communities to take action and engage with climate adaptation measures. Different target audiences (i.e., public sector, communities) require different messages in suitable formats to create a call to action.

Clarifying the terminology

Building a common language that is accessible to all stakeholders is vital in communicating climate adaptation to create a common understanding. The glossary can be built upon agreed international definitions, as seen in the [United Nations Framework Convention on Climate Change \(UNFCCC\) glossary](#) or [IPCC glossary](#), while also adjusting it to local characteristics and contexts.

Communicating climate change and the need for adaptation

Sharing information on the potential impacts of climate change and therefore the need for adaptation as well as mitigation is an essential pre-condition for building resilience. These messages should be refined in a user-friendly way and adjusted in both style and content for different target audiences, reflecting their roles in adaptation policy (e.g., private sector or broader public), their background (e.g., urban or rural environment, gender) and their vulnerability and exposure to risks. Possible barriers to access to information and training should be considered. It is also key to communicate the benefits of climate adaptation measures to increase social acceptance and foster behavioural changes. Also, many adaptation measures have significant co-benefits like for example nature-based adaptation measures that enhance biodiversity and reduce pollution, the creation of local and quality employment opportunities, or the cutting of greenhouse gas emissions. A major, often underused, communication opportunity are the benefits of adaptation for health and well-being: a high level of awareness of the growing health risks that affect everyone will help to explain the need for action and to increase its acceptance.

National, regional and local administrators could get involved, for example, through workshops and field trips to encourage fact-based engagement in climate action. Communities should get involved through public consultations, information-sharing, and through interactive and informal ways like exhibitions, contests, online games, etc. Civil Society Organisations and NGOs are important partners as well, serving as a bridge between stakeholders and climate communication, through their existing experience on climate adaptation on the territory and communities concerned and awareness-raising on the impacts of climate change and the need for climate adaptation. To ensure this communication effectively reaches communities, it needs to be backed up by proper resources, through funding and capacity building.

National or regional web portals or platforms that gather tailored information on climate change and climate change adaptation are an excellent channel for disseminating relevant information. These platforms should be connected with existing portals on sectoral policies (e.g., disaster risk reduction, water, health, biodiversity etc.) to promote climate

mainstreaming. The EU [*Climate-ADAPT*](#) website plays a central role by helping people to access and share data and information on matters related to climate change and climate adaptation. National web portals on climate adaptation have been developed in most European countries as well, which create the opportunity to learn from good practice examples from other countries or regions. These might help to inspire action on climate adaptation. However, web portals and platforms should be complemented by other communication activities to avoid the widening of the digital gap between EU Member States and regions and to ensure access to information for everyone.

For more information on setting up the institutional framework and ensuring stakeholder buy-in, see also the Adaptation support tool section on [*Preparing the ground for adaptation*](#).

✔ Step 2: Conducting climate change risk and vulnerability assessments

After the groundwork has been laid to support a climate adaptation plan or strategy, the second step is a climate change impact and vulnerability assessment. The purpose of this assessment is to establish what the potential climate change impacts will be in a certain area, what risks are associated with these impacts in a certain area or sector, and to prioritise which risks require more immediate responses.

To ensure proper effectiveness of climate adaptation strategies or plans, it is considered good practice to regularly update the assessment – at least in parallel with every update of the strategy / plan. The benefits of doing so include:

- Tracking relevant changes in existing risks and vulnerabilities including physical risks of infrastructure and socio-economic and health impacts on communities;
- Identifying new, emerging risks and vulnerabilities that have the potential for having big economic, social and / or environmental impacts in the future;
- Identifying new opportunities that arise due to climate change.

In general, the assessment should be based on the latest climate science to identify populations, essential infrastructures and sectors particularly vulnerable to climate change, set the overall strategic direction of adaptation policy and continuously inform decision-making.

✔ Step 2a. Developing a comprehensive methodology to assess the impact of climate change

The methodology of the assessment is the foundation for proper estimation of risks and vulnerabilities. It also ensures that the assessment can be executed relatively swiftly again in the future, without developing a new methodology each time. The following elements of a solid methodology are recommended in order to provide a credible assessment of climate risks and vulnerabilities:

- **The assessment should be built upon the latest science and knowledge**, in order to guarantee accuracy and relevance with current predictions on future climate change impacts. Information on trends of current climate conditions and the latest projections on future climate scenarios, including slow on-set and extreme events, should be part of the assessment. Available information for your country's future threats and opportunities can be collected and analysed based on a wide range of reports and vulnerability assessments carried out by the Intergovernmental Panel on Climate Change, the European Environment Agency, the Joint Research Centre or through the Horizon Europe 2020 research programme.
- **The assessment should be based upon the results of stress testing**, focusing particularly on infrastructures and systems providing critical services. Climate stress tests identify potential risks in a designated sector or system (like public health, water safety and security, or food safety and security) due to climate-related hazards, like flooding, heat, drought, storms etc. The first step of a stress test is to identify the potential climate-related hazards in a certain area. The second step involves exploring general vulnerabilities of a certain area of sector to climate hazard, which can be complemented with an in-depth vulnerability assessment. Other stress tests and vulnerability assessments carried out for a wider set of non-climate related disaster risk should also be considered⁸. The results of the stress test can be used for the climate adaptation strategy. The use of 'risk dialogues' in The Netherlands is an example of good practice in translating the results. More on stress testing and risk dialogues can be found in Annex II.

Step 2 of the guidelines will help to:

- Establish the core elements of climate change risk and vulnerability assessment;
- Assess social impacts of climate change;
- Assess cross-border and cascading risks;
- Decide the criteria for 'acceptable' risks and prioritising adaptation needs.

⁸ With reference to risk assessments, scenarios and disaster resilience goals developed according to the [Union Civil Protection Mechanism](#).

- **The assessment should be conducted upon a baseline level**, which should be updated with every update of the assessment. The baseline level here refers to a point of reference related to the state of the climate and the site-specific vulnerability in an area. Carefully designed baselines are essential to measure what has been achieved through implementation at a later stage and improves the process of monitoring and evaluation.
- **The assessment should preferably include quantitative information** regarding the impact of climate change (physical damage, health impact, economic and fiscal impact).
- **The assessment should include a clear timeframe** for the execution of the assessment itself, and a timeframe for expected climate risks in the future. For example, differentiated impacts can be expected in the short-term (2030s), medium-term (2050s) and long-term (2100s).
- **The assessment should address knowledge gaps and uncertainties**, which is a particular challenge when dealing with climate change risks and adaptation. The methodology for stress tests and the design of adaptation strategies more broadly needs to take into account the extent of the knowledge gap. Making knowledge gaps explicit and addressing them in the climate adaptation strategy can also incentivise sharing of good practice, research, and social learning to reduce the lack of knowledge. Furthermore, to address uncertainties, it is vital to develop an assessment and adaptation policy that does not assume a single future, but rather several future scenarios, as discussed before.

✔ Step 2b. Considering social impacts of climate change

Non-climate factors can make a significant difference to vulnerability to climate impacts. Certain social groups and geographical areas are disproportionately affected by climate change due to uneven exposure or pre-existing vulnerabilities to climate change impacts. For example, there is a biologically higher vulnerability of pregnant women, children, the elderly and those living with certain disabilities to many climate impacts. Social risk factors are equally important. For example, financial wealth can mean more resources to adapt, where it is notable that the number of women in poverty is still higher in the EU than the number of men in poverty and there is a strong correlation between female poverty and child poverty. Climate change can therefore worsen existing inequalities, as well as create new ones. According to the [IPCC Synthesis Report 2023, Summary for policymakers](#), “vulnerability is exacerbated by inequity and marginalisation linked to e.g., gender, ethnicity, low incomes, informal settlements, disability, age, and historical and ongoing patterns of inequity such as colonialism, especially for many Indigenous Peoples and local communities”.

It is therefore recommended not just to include the physical impacts of climate change in the assessment, but also social factors, taking into account not only ‘objective’ effects of climate change on different social groups and geographical areas, but also, for example, gender differences in risk perception. This strengthens the creation of ‘just resilience’ in the assessment and adaptation strategy, which is considered key in developing the capacity to adapt and partake in the benefits provided by adaptation actions for vulnerable communities. The importance of just resilience is further elaborated upon in Annex II, with a good practice example found in the text box above.

A particularly important social aspect to cover is the impact on the world of work. Accordingly, the assessments need to present the expected changes in working methods within occupations, including occupational safety and health standards designed in view of the changes in the physical environment, changes in the sectoral composition

Case example 2: adapting to the impacts of heatwaves in a changing climate in Botkyrka, Sweden

Heatwaves in Sweden have been increasing over the past decades, which is leading to increased mortality. In 2010, Botkyrka municipality experienced prolonged high temperatures, which led to problems for the elderly in retirement and nursing homes. Extensive efforts, partly in the frame of a project held within the Climatools programme, have been made in the municipality of Botkyrka to reduce the health risk of heatwaves. Staff in elderly, retirement and nursing homes have been trained on the risks of heatwaves and on what must be done in case of heatwave warnings. If necessary, additional staff can be called in to ensure further support to ensure that proper care is provided. Therefore, during the 2018 heatwave, the municipality was far better prepared and equipped than in previous years. Botkyrka is also supporting actions aiming to improve indoor thermal comfort and to create ‘cool-spots’ in various areas of the city.



of employment, reskilling, and requalification of workers for a just and fair resilience, and job creation in activities, such as construction, directly contributing to adaptation. The involvement of social partners in the planning for all the above developments needs to be ensured.

✔ Step 2c. Considering cross-border and cascading risks

Climate risk is a shared reality, since a climate-related hazard is not necessarily limited to the territory of one single EU Member State but can take place in a cross-border territory, affecting therefore the border regions of two or more neighbouring EU Member States. Even when a climate-related hazard takes place only in the territory of one EU Member State, it can trigger a cascade of consequences that cross national borders to affect people's lives and livelihoods in another. Due to territorial, economic, environmental and social interdependencies between countries, it is therefore recommended that the assessment considers cross-border and cascading risks. Just as climate risk is a shared responsibility, adaptation must be a shared responsibility. Cross-border activities addressing climate change and jointly developing adaptation responses are already taking place in European regions, such as in the Alpine region, the Carpathians, northwest Europe, southeast Europe, the Baltic Sea and between countries of the Danube Basin, all of which are supported through EU funding.

Adaptation can create its own cross-border effects, strengthening the resilience of some at the expense of others, and redistributing vulnerability rather than reducing it. Thus, building just resilience does not just occur on the national scale, but also on the regional, cross-border and international scale. Considerations that can be taken into account with a wider set of countries than just direct neighbours involve trade, climate migration, instability, etc. Risk assessments based on these topics can serve as knowledge bases for designing concrete adaptation measures focused on building resilience either within or beyond national boundaries. Risk assessments on a wider range of disaster risks should also be considered in this context as complementary assessments of transboundary and cascading risks.

✔ Step 2d. Assessing and prioritising identified impacts and vulnerabilities for adaptation strategy

Based on the outcomes of the climate change risk assessment, with the identified impacts and vulnerabilities, key hazards / sectors can be prioritised⁹. The structure of this part of the assessment should follow one of two paths: focusing on either the key hazards and risks across certain sectors or areas, or on the key sectors or areas affected by climate change in the short-term (2030s), medium-term (2050s) or long-term (2100s). It is considered good practice to focus on the following areas or sectors:

- Sectors and / or areas particularly vulnerable to climate change;
- Sectors and / or areas whose activities are key to the resilience of other sectors;
- Sectors and / or areas that have significant importance to the national economy or public health, even if climate change does not form a significant threat at the time of assessment.

The criteria for what risks are deemed 'acceptable' and what risks are not, are highly context dependent, but a good practice example is the Dutch approach in so-called risk dialogues, which is discussed in Annex II.

However, in general, the **main concerns** that require priority response may be impacts and risks that:

- Occur today or are expected to increase due to climate change, socio-economic development, or other non-climatic drivers.
- Are expected to affect critical infrastructure or systems with long life span. Concerns surrounding climate risks to critical infrastructure or systems can be further scrutinised using stress tests, which is discussed in Annex II.
- Are expected to affect systems irreversibly.

⁹ However, the risk assessment can go even further by setting and prioritising necessary adaptation measures.

Furthermore, specific areas or sectors that will be affected by more than one risk should be scrutinised since they create a higher demand for adaptation.

The results of the assessment should be presented in a way that they can facilitate strategic direction in terms of the long-term vision, mid-term strategic objectives or domains and short-term specific objectives. If possible, these objectives should be specific, measurable, achievable, relevant, and time bound (SMART). Assessing whether the objective is SMART is always context dependent and, in some cases, it may not be possible to meet all criteria. For example, the measurability of the objective depends on the existence of a suitable methodology and the availability of the data. However, some examples of SMART objectives are included in the text boxes below.

SMART objective example 1: preventing and reducing impacts of agricultural drought

- The objective targets a **specific** area: agriculture or agricultural land.
- It is **measurable** both in terms of processes and outcomes. The indicators mentioned in the following paragraphs provide some examples of how to approach measuring policy processes and outcomes, allowing for alternative approaches and indicators.
 - Process indicators describe administrative, economic, technological, or ecosystem-based measures that were put in place. For example, the percentage of agricultural land under the Common agricultural policy support¹, volume of financial support provided for implementation of technical measures to reduce soil evaporation or to enhance effective use of irrigation water, etc.
 - Outcomes indicators to measure agricultural drought are often composite indicators, usually built upon indicators of precipitation, evapotranspiration, and soil moisture. An example of such composite indicator is the Combined Drought Indicator developed by the European Drought Observatory, used for detecting and monitoring areas that are affected or are at risk of imminent agricultural drought. An alternative approach might be to consider the total area of agricultural land where the capacity of the natural infrastructure to limit climate change impacts increased.
- The objective is **achievable** given the management practices and technical measures available.
- It is **relevant** to the ultimate goal of building resilience.
- It can be **time bound** at least in terms of the time horizon of the strategy or action plan. In addition, it is recommended to set quantitative targets to prevent and reduce impacts of agricultural drought for the next 5 to 10 years. The evaluation should be conducted every two years to collect data for biennial adaptation progress reports in line with Regulation (EU) 2018 / 1999.

¹ Under the 2023-2027 common agricultural policy, standards for good agriculture and environmental conditions (GAECs) are expected to cover close to 90% of the EU's agricultural land ([Common Agricultural Policy for 2023-2027. 28 CAP strategic plans at a glance](#), link retrieved 10/2/23).

SMART objective example 2: reducing high temperature related risks in the urban landscape

- The objective targets a **specific** area: urban landscape.
- It is **measurable** both in terms of processes and outcomes. The indicators mentioned in the following paragraphs provide some examples of how to approach measuring policy processes and outcomes, allowing for alternative approaches and indicators.
 - Process indicators describe administrative, economic, technological, or ecosystem-based measures that were put in place. For example, specific adjustments of spatial planning regulations, volume of financial support provided for greening urban areas, etc.
 - Outcome indicators can measure:
 - Overall exposure of urban areas to high temperatures. For example, deviation of monthly average temperature from long-term monthly normal, number of tropical nights (when the temperature does not fall under 20°C), number of days of heatwaves etc., providing a useful information in comparison to the data from non-urban areas.
 - Adaptive capacity of urban areas to high temperatures. For example, percentage of green areas in the urban landscape, average distance to the nearest green area¹, proportion of buildings equipped with active or passive cooling, proportion of buildings with installed thermal insulation, etc.
 - Sensitivity of urban areas to high temperature. For example, percentage of urban area classified as highly prone to overheating, etc. Concerning land use data, earth observation services like Copernicus or Landsat have proved to be useful resources.

An important group of indicators for measuring high temperature related risks not only in the urban landscape are health-related indicators. For example, vulnerability to heat exposure or exposure of vulnerable populations to heatwaves, both introduced in the 2022 Europe report of the Lancet Countdown on health and climate change. Another climate-health related indicators relevant for Europe are available at European Climate and Health Observatory.
- The objective is **achievable** given the adaptation options available.
- It is **relevant** to the ultimate goal of building resilience.
- It can be **time bound** at least in terms of the time horizon of the strategy or action plan. In addition, it is recommended to set quantitative targets for reducing high temperature related risks in the urban landscape for the next 5 to 10 years. The evaluation should be conducted every two years to collect data for biennial adaptation progress reports in line with Regulation (EU) 2018 / 1999.

¹ For example, IUCN Urban Alliance is promoting the 3-30-300 rule: that everyone should be able to see at least three trees (of a decent size) from their home, that in every neighbourhood at least 30 percent tree canopy cover should be a minimum, and that a distance to the nearest green space (of at least 1 hectare) should be 300 metres maximum. ([Promoting health and wellbeing through urban forests – Introducing the 3-30-300 rule](#), link retrieved 10/02/23).

SMART objective example 3: strengthening the protection of critical services and critical infrastructure

- The objective targets a **specific** area: critical services and critical infrastructure, i.e., energy and water supply, transport, etc.
- It is **measurable** both in terms of processes and outcomes. The indicators mentioned in the following paragraphs provide some examples of how to approach measuring policy processes and outcomes, allowing for alternative approaches and indicators.
 - Process indicators describe which administrative, economic, technological, or ecosystem-based measures were put in place. For example, in the energy sector, diversification of supply chains to address multiple types of disruptions, relocation of the most vulnerable facilities, etc.
 - Outcome indicators, for example, in the transport sector, can measure:
 - Exposure, including percentage of all accidents associated with weather-related factors, percentage of all expenditures on road maintenance assigned for the recovery of the weather-related damage to infrastructure, percentage of E road network located in areas prone to Q₂₀ flooding¹, etc.
 - Adaptive capacity, including the extent of the infrastructure covered by monitoring and warning systems, percentage of vehicles of city public transport equipped with air condition in passenger compartment, etc.
 - Sensitivity, including the extent of the infrastructure to which the 2021-2027 Technical guidance on the climate proofing of infrastructure does apply, the percentage of inland waterway transport in overall transport performance, etc.
- The objective is **achievable** given the adaptation options available.
- It is **relevant** to the ultimate goal of building resilience.
- It can be **time bound** at least in terms of the time horizon of the strategy or action plan. In addition, it is recommended to set quantitative targets to strengthen the protection of critical infrastructure for the next 5 to 10 years. The evaluation should be conducted every two years to collect data for biennial adaptation progress reports in line with Regulation (EU) 2018 / 1999.

Conducting climate change risk and vulnerability assessments is an integral part of every climate adaptation strategy. In addition to common considerations on the methodology, like uncertainties and timeframes, it is vital to consider the social impacts of climate change by encouraging just resilience and to consider the cross-border and cascading nature of climate change risks. Only then can a proper assessment and prioritisation of impacts and vulnerabilities be completed to ensure a comprehensive climate adaptation strategy.

For more information on conducting the climate change risks and vulnerabilities assessment, see also the Adaptation support tool section on [Assessing climate change risks and vulnerabilities](#).

¹ Floodings that have a return period of 20 years.

✔ Step 3: Identifying and prioritising adaptation options

The following step in developing an adaptation strategy and / or plan is to identify potential adaptation options, to collect relevant information for these options and to prioritise them based on the greatest gain or the prevention of biggest loss.

✔ Step 3a. Identifying adaptation options and creating a portfolio of options

To address the previously identified concerns for climate-related negative impacts, relevant adaptation options can be identified and bundled in a portfolio. **Adaptation options can be considered from a variety of sources**, such as literature reviews (e.g., [CLIMATE-ADAPT platform](#), project results, existing policies), consultation with scientific experts and / or colleagues from other authorities, and through stakeholder involvement. When updating a climate adaptation strategy, successfully implemented adaptation measures should be repurposed and prioritised, while unsuccessfully implemented measures should be reconsidered and adjusted.

Adaptation options are not only aimed at avoiding or reducing exposure to climate risks, including by building flood defences. Adaptation options can also include **accepting climate impacts** and losses by retreating from a certain area. Alternatively, adaptation options can also focus on **taking advantage of new opportunities** through climate change, including different (and even improved) agricultural conditions. **Financial adaptation** can concern risk sharing arrangements transferring risk through disaster insurance, retaining risk according to clearly defined conditions, absorbing part of the impact via personal financial buffers.

For more information on identifying adaptation options and creating a portfolio of options, see also the Adaptation support tool section on [Identifying adaptation options](#).

✔ Step 3b. Assessing and prioritising adaptation options

After adaptation options have been set out, criteria can help to assess and prioritise these options based on a localised context. **Options that contribute in the most effective and efficient way to achieving adaptation targets and objectives should be included in the strategy**. The effectiveness of an adaptation option can be, depending on its type, established. For example, by looking at the potential of the option to reduce a particular risk(s), including the urgency of the climate hazard or risk that the option aims to mitigate. The efficiency of an adaptation option can be established through a cost-benefit analysis that can be conducted also in non-monetary terms.

Particular attention is needed when considering broader social (equality of protection, benefits for health and well-being), economic (burden of adaptation) and environmental (negative spillovers as well as co-benefits with climate mitigation and other environmental goals) objectives and other aspects when assessing adaptation options, **to reduce occurrences of maladaptation**. This is discussed in more detail in Annex II. Other adaptation options that are of a **transformative nature** - such as re-housing a group of people in a certain low-lying area - barriers and overall feasibility, considering social acceptance, social consequences, and budget constraints, should also be considered.

Adaptation options can bring co-benefits in other domains, like biodiversity, climate mitigation, the circular economy, or human health and well-being: such options should be prioritised. As an example of co-benefits, transitioning to a circular economy provides an opportunity for climate adaptation, by reducing our need for resources and retaining the value of existing products and materials, notably in the face of scarcity and volatility of prices. A circular economy also contributes to regenerating nature and ecosystem services.

Step 3 of the guidelines will help to:

- Identify adaptation options;
- Assess and prioritise adaptation options;
- Prevent maladaptation;
- Deal with uncertainty of climate change impacts.

The results of the assessment represent a basis to prioritise adaptation options. This prioritisation should be based preferably on **multi-criteria analyses**.

The future impacts of climate change in certain areas or sectors are uncertain. However, this does not mean adaptation inaction is the correct response. Decision-making processes in the face of uncertainty can be facilitated by focusing on adaptation options that minimise the risks associated with implementation, even when faced with associated uncertainties regarding the risks and benefits of the options:

- **'No-regret options'** are cost-effective under current climate conditions and are worthwhile whatever the extent of future climate change might be, including by avoiding building in high-risk areas or designing buildings to be heat-proof for the summer months.
- **'Low-regret options'** are relatively low-cost and provide relatively big benefits under predicted future climates, including by requiring new developments to harvest rainwater and recycle grey water.
- **'Win-win options'** contribute to adapting to a climate hazard, while also contributing to other social, environmental or economic goal, including nature-based solutions such as installing green roofs and green walls which increases biodiversity or increased planting of trees in open spaces. A good practice example can be found in the case example 3 text box.
- **'Flexible or adaptive management options'** are easily adjustable, with low costs, if climatic circumstances change compared to initial projections.
- **'Multiple-benefit options'** can contribute to multiple goals such as mitigation, disaster risk reduction, environmental management, or sustainability.

Nature-based solutions often offer efficient, cost-effective and adaptative options, which is discussed in more detail in Annex II.

For more information on prioritising adaptation options, see also the Adaptation support tool section on [Assessing adaptation options](#).

Case example 3: green roofs in Basel, Switzerland – combining mitigation & adaptation measures

With 5.71 m² / inhabitant in 2019, the city of Basel in Switzerland has the largest area of green roofs per capita in the world. Initiatives aiming to increase green roofs in Basel were initially driven by energy-saving programmes, and subsequently by biodiversity conservation. Basel has promoted green roofs through investment in incentive programmes, which provided subsidies for green roof installation. Programmes were funded from the Energy Saving Fund, which made up of 5% of all customers' energy bills in the Basel canton. In 2002, an amendment to Basel's Building and Construction Law was passed. The law requires that all new and renovated flat roofs must be greened in addition to associated design guidelines. This requirement was strengthened in 2010 through another law regulation that mandated green roofing for all flat roofs if part of a building retrofit, and in all new buildings with flat roofs. The green roof strategy in Basel is expected to bring adaptation benefits in the form of lower temperatures and reduced surface runoff.



✔ Step 4: Developing an action plan and implementing adaptation actions

An adaptation action plan translates proposed adaptation options into specific adaptation actions that can be implemented. In general, the plan details what needs to be done (by whom and when), resource needs, allocation and availability. Adaptation action plan(s) are therefore an integral part of any adaptation strategy since they facilitate the implementation of adaptation actions. The action plan usually covers a shorter time horizon as opposed to the climate adaptation strategy, and it is revised more regularly. The implementation of a single climate adaptation strategy may therefore be covered by multiple action plans.

Step 4 of the guidelines will help to:

- Turn adaptation options into adaptation actions;
- Create an adaptation action plan;
- Prepare the ground for implementation through adaptation pathways.

✔ Step 4a. Essential elements of an adaptation action plan

Implementation steps and pathways, taking into account the uncertainty of climate change impacts in the short-term (2030s), mid-term (2050s), or long term (2100s). An adaptation action plan can be structured in adaptation pathways, where the implementation scheme for each adaptation option consists of a sequence of measures towards an ultimate adaptation goal. Therefore, adaptation pathways resemble a decision tree and, since measures can be implemented progressively, allow for flexible policy planning. Climate-induced extreme weather events or changes in the projected future climate can trigger a review mechanism to see if an adaptation pathway still meets the adaptation objective.

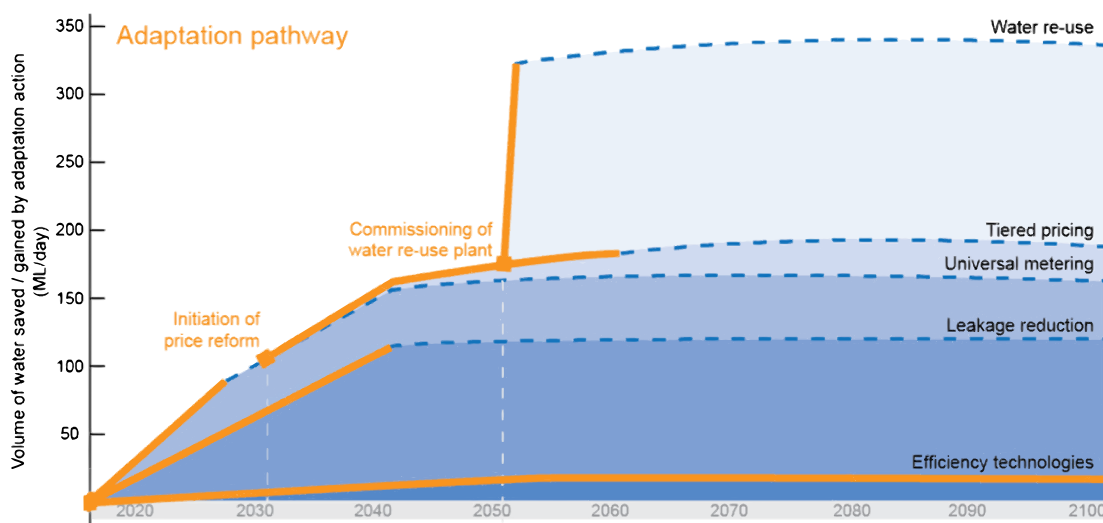


Figure 2 - An example of an adaptation pathway for water resource management.

Source: [Kingsborough et al., 2016](#).

Instruments that offer entry points for implementation and mainstreaming, i.e., integration of adaptation into other sectoral policies and instruments. Adaptation should not be performed in isolation from existing policies. Therefore, creating links between adaptation and existing instruments should be promoted. Synergies with existing national policies and tools should be exploited. Key instruments to serve as entry points for integrating adaptation include: legislation, existing strategies, standards, planning tools, assessment frameworks, research and development programmes, networks and working groups. However, this mainstreaming of adaptation should not be limited to just setting sector-specific goals, options, and actions in the adaptation strategy. It is considered good practice to review the consistency of all relevant measures with adaptation targets and objectives as well as the contribution of every policy to adaptation solutions. A good practice example is discussed in the case example 4 text box.

The **macro-fiscal** aspect of climate adaptation is an important cross-cutting policy area. Climate change has macro-fiscal relevance as it impacts both public expenditure and revenue. However national fiscal frameworks in EU Member States reflect climate change and related fiscal risks only to a limited extent, mostly with budgetary arrangements to cope with the cost of climate-related disasters. To improve fiscal / financial resilience to climate change, budgetary planning, governance, and institutional arrangements could better take into account climate-related fiscal risks and climate-related losses. Policy efforts to reduce the climate protection gap, i.e., the proportion of uninsured losses, would be supportive of this goal too, as they can limit the fiscal cost of climate change and thus preserve resources for investments in adaptation.

Another prominent policy area of significant importance for the implementation and mainstreaming of adaptation is disaster risk management and the role of **civil protection**. Not only are civil protection authorities the first respondents to the expected increasingly severe climate related disaster events (floods, storms, wildfires, etc.), but they also have a broader disaster risk landscape within their remit, addressing other natural disasters (e.g., earthquakes, volcanic eruptions) as well as technological and societal risks (e.g., cyber threats, hybrid threats, industrial accidents). Close synergies in the development of action plans and implementation, including the resource allocation for adaptation and prevention measures and considerations of fiscal resilience are important. Climate adaptation measures and disaster prevention measures for climate related hazards are expected to largely be the same. It is however also important to consider other disaster prevention aspects to make sure maximum synergies between measures (e.g., climate change adaptation of buildings, also considering seismic safety where relevant) and that the principles of ‘doing no harm’ and maladaptation is considered in a wider disaster and societal resilience perspective.

Estimation of investment needs for the adaptation plan or strategy. It is recommended to include an overview of the public and private investment needed or costs to be borne (including the source of financing) to implement the measures laid down in the adaptation action plan or strategy, following the climate risk and vulnerability assessment. The estimation of adaptation investment needs or costs would inform the choices made in the adaptation action plan or strategy and needs to be consistent with any estimations and information on climate adaptation provided under the Member States’ national energy and climate plans¹⁰.

Planning of resources needed for adaptation implementation, in terms of human, financial and knowledge-related resources. It is recommended to have a dedicated adaptation budget, which should be part of a national comprehensive budget for climate change action. The comprehensive budget should cover adaptation as well as mitigation and explore synergies between both.

Roles and responsibilities of implementing actors at all levels, which entails organising communication, cooperation, and coordination between stakeholders. Adaptation to climate change concerns the whole of society, and therefore requires action on all levels of governance and from all sectors of society. The national level should align its adaptation policies with EU and transnational levels, where relevant, while simultaneously supporting the building of climate resilience at the sub-national level. The

Case example 4: **mainstreaming adaptation in water management for flood protection in Isola Vicentina, Italy**

Isola Vicentina (Italy) signed the EU’s Mayors Adapt initiative in 2014 and since then began the process of developing its Municipal water management plan (MWMP) to integrate climate change adaptation into its water management policies. The plan analysed each drainage basin, river and stream flowing through the municipality, evaluating their maximum water flow rate and flood-wave size with different return periods (5, 10, 20, 30, 100, and 300-years). The critical issues identified were the starting point to plan prevention and preparedness measures, as well as around 50 punctual protection measures, such as: (i) adoption of a management and maintenance regulation framework over small private ditches, (ii) one of the three planned water retention areas is now under construction, and (iii) identification of a 10-hectare pilot area to simulate how the preservation of woodlands can improve the resilience of the municipal territory to flooding and landslides.



¹⁰[Commission notice on the guidance to Member States for the update of the 2021-2030 national energy and climate plans](#), section 3.6., contains guidance on estimations of investments needs, including for adaptation measures. The same guidance can be used for adaptation action plans and strategies, including to ensure consistency with NECPs.

sub-national level can in turn provide the national level with knowledge that can help to identify the main adaptation challenges or barriers and monitor and evaluate the adaptation efforts. Furthermore, skills gaps for implementing adaptation measures also need to be addressed by ensuring training and upskilling at all levels of governance, especially at local and regional levels.

Potential barriers, conflicts, and synergies associated with implementation. Barriers could relate to lack of social acceptance of the proposed climate adaptation action or lack of funding. Conflicts could arise with certain economic or social goals of an area, which requires an in-depth stakeholder consultation. Synergies, as discussed before, could also be made with mitigation strategies or co-existing social goals.

Knowledge gaps and uncertainties should be addressed for example, potential climate change impacts in the short- and long-term. However, knowledge gaps and uncertainties should not be a reason for inaction.

Adaptation action plans are essential in reaching the goals described in a climate adaptation strategy. It is crucial that the action plan incorporates flexibility, to mitigate risks associated with uncertainties, and mainstreaming, to ensure proper uptake of climate adaptation in all sectors and layers of society. Only then can a climate adaptation strategy comprehensively and accurately implement adaptation actions.

For more information on developing action plan, see also the Adaptation Support Tool section on [Implementing adaptation](#).

✔ Step 5: Monitoring and evaluation

Monitoring and evaluation of ongoing adaptation efforts are necessary for maintaining accountability and improving the overall adaptation policy.

Although they represent the last step in the adaptation planning cycle, they should be discussed as part of the previous stages of policy development. A clear formulation of adaptation targets, objectives, options, and actions that can be 'easily' measured, monitored, and towards which progress can be assessed and then communicated, enables a more focused monitoring and evaluation system. The difficulty of adaptation compared with other policies is that a successful adaptation *prevents* the negative impacts of climate change. Therefore, the actual benefits are not always visible or measurable.

The prevailing practice focuses on **monitoring and evaluation of processes** set by adaptation policies, responding to the question 'what is being done?'. However, to get a complete picture of the overall effectiveness and efficiency of adaptation policy, it becomes increasingly important to understand the **effects and outcomes** of these processes and associated adaptation actions, responding to the question 'what difference does it make to our vulnerabilities and risks?'. Focusing on the effects and outcomes of adaptation policies can also help to determine whether the strategy / plan is ambitious enough to significantly contribute to build resilience and explore emerging issues that need more attention in the future.

Unlike the prevailing practice, **not only physical, but also social effects and outcomes of adaptation actions**, including their distribution in different population groups, should be monitored and evaluated. This is important to ensure that adaptation actions target and support vulnerable communities and do not have unintended effects of worsening or creating new inequalities.

✔ Step 5a. Defining the aim and purpose of monitoring and evaluation

The first step in developing a monitoring and evaluation system is defining its aim and purpose, as this decision has consequences for the coordination and organisation of the work.

Monitoring and evaluation can serve multiple purposes, the most prominent being tracking the progress and performance of adaptation policy to inform and improve policymaking. It is good to focus not only on the adaptation strategy or plan itself but also on relevant sectoral policies. In this regard, the first step is checking whether and to what extent sectoral policies have integrated adaptation. The second step is regular monitoring of adaptation related actions that are already articulated in sectoral policies.

The secondary purpose of monitoring and evaluation could be to increase accountability within public administrations, improving the knowledge base, learning to adjust ongoing or upcoming processes, or raising awareness of the need for adaptation.

✔ Step 5b. Deciding whom to involve in the process

Deciding who takes overall responsibility for monitoring, reporting, and evaluation, clarifying the roles of different actors and establishing mechanisms to coordinate vertically and horizontally with various actors across sectors and administrative levels are essential for effective monitoring, reporting, and evaluation.

Overall responsibility for monitoring, reporting, and evaluation usually rests with the responsibility for coordinating the process and reporting results. The body responsible for monitoring, reporting, and evaluation can be the same as the body coordinating national adaptation policy or an actor independent from those responsible for planning and implementing adaptation policies. Both approaches have their advantages. On the one hand, a close connection

Step 5 of the guidelines will help to:

- Define the aim and purpose of a monitoring and evaluation system;
- Include stakeholders in the evaluation process;
- Define the indicators of the monitoring and evaluation system.

between monitoring, reporting, and evaluation and policy development can, for example, facilitate learning and uptake of monitoring and evaluation findings in policy development and revision. On the other hand, independence may be desirable especially for evaluation activities.

Engaging stakeholders, in particular those identified under Step 1, and the regional and local level of administration is not only crucial for monitoring, reporting, and evaluation to receive relevant quantitative and qualitative information, data and knowledge, but also for interpreting and deriving relevant messages from available data, answering questions of 'how' and 'why.'

✔ Step 5c. Defining indicators and mixed-method approaches

When monitoring and evaluating adaptation, it is advised to combine quantitative and qualitative methods, as this approach is likely to be more flexible, allowing different data and information sources that can be checked against each other to ensure that the overall narrative of adaptation progress and performance is robust, consistent and contextualised. This approach can also help to overcome some of the limitations of either quantitative or qualitative data used in isolation, as well as provide information and evidence from multiple sources.

Quantitative indicators and indicator sets provide quantifiable, seemingly unambiguous, evidence of progress and performance. When identifying appropriate indicators, both for monitoring and evaluating the process and the outcomes, it is recommended to:

- Make use of pre-existing indicators, if they correspond to the overall aim of the monitoring and evaluation system.
- Make sure that an indicator set provides a coherent and robust picture of adaptation progress and performance.
- Reflect and make explicit all background assumptions, limitations, and uncertainties given by the nature of the indicators.
- Make use of a combination of process, output, and outcome indicators to ensure representativeness and to measure progress on the important or determining actions, rather than secondary issues.
- Consider the resources available, as well as access to data, their regular availability and coherence.

Although the adequacy of every single indicator must be considered within the indicator set framework, each indicator should meet following criteria:

- **Valid:** does the indicator measure the result?
- **Precise:** do stakeholders agree on exactly what the indicator measures?
- **Practical, affordable, simple:** is information available at a reasonable cost? Will it be easy to collect and analyse?
- **Reliable:** is it a consistent measure over time?
- **Sensitive:** when the result changes, will the indicator be sensitive to those changes?
- **Clear:** are we sure if an increase is good or bad?
- **Useful:** will the information be useful for decision-making, accountability, and learning?
- **Owned:** do stakeholders agree this indicator makes sense to use?

Case example 5: 'Mückenatlas': A citizen science project for mosquito surveillance in Germany

Disease agents transmitted to animals and humans by mosquito bites have hit the headlines across the EU, as cases of dengue, chikungunya and West Nile Virus (WNV) have been recorded, especially in southern Europe. However, the spread of mosquito species carrying these disease pathogens (such as viruses, bacteria and parasites that can cause diseases) has also been documented in more northern EU countries, including Germany. Climate change has been recognised as one of the factors contributing to this spread. To address the potential health risks, surveillance, prevention and abatement measures need to be combined. The German 'Mückenatlas' ('mosquito atlas') is an example of how a citizen science project can not only contribute to research, but also supplement traditional monitoring methods to function as an early warning system. The project engages people who submit mosquito samples, which are then identified and used for research by experts. The 'Mückenatlas' therefore contributes to knowledge on native and invasive mosquito species and related diseases in Germany and seeks to establish an information base for policymakers and researchers to assess future risks.



✔ Step 5d. Communication of the results to inform policy and practice

To make the most out of monitoring and evaluation results in improving overall adaptation policy, findings need to be communicated to a wide range of decision-makers, at the right time, and in an appropriate way. A good practice example of engaging stakeholders and informing decision-makers about the results is described in case example 5 of the text box.

To strengthen the use of monitoring and evaluation results in policymaking, it is advisable to:

- Agree on how results will be used prior to developing the monitoring and evaluation system.
- Engage with stakeholders during the strategy and action plan development or revision and discuss preliminary results with them in order to exchange thoughts on how these could be interpreted and communicated.
- Improve communication on monitoring, reporting, and evaluation by using various means and focusing on target groups and given contexts.
- Focus on dissemination, awareness raising and capacity building.
- Use monitoring and evaluation results to make sure that adaptation is a priority on the political agenda of all levels of governance.

Monitoring and evaluating the effectiveness and efficiency of implemented climate adaptation measures is essential to ensure the physical and social effects of the climate adaptation measure are reviewed to assess if the climate adaptation strategy needs updating.

For more information on monitoring and evaluation, see also the Adaptation Support Tool section on [Monitoring and evaluating adaptation](#).

Annex I – Adaptation strategy template example

This template is an example of the structure of a comprehensive adaptation strategy. To some extent, it could also apply to the adaptation plan (see IV. Implementation part of Annex I). The information on the substance of each part is not exhaustive.

I. Introduction (about 10% of the total length)

a. Elemental information about the strategy

- Full title of the strategy, its focus / scope, time frame, scheme of regular updates, etc.

b. Context of the strategy / plan

- Who took the decision to develop the strategy, when, and why.
- How the strategy reflects on the EU strategy on adaptation to climate change.
- Which other EU strategic documents and legislation relate to the strategy and how.
- Which other national strategic documents relate to the strategy and how.
- State of the climate change adaptation policy before developing the strategy.

c. Responsible bodies

- Who will implement the strategy.
- Who will support the development / implementation / monitoring and evaluation of the strategy through consultation, communication, data provision, etc.

d. Target groups

- Who will / might be affected by the implementation.
- Who must comply with the strategy in their everyday work / operation.

e. Terminology

- Explanation of key concepts used in the strategy.

II. Analytical part (about 15% of the total length)

a. Climate change and vulnerability assessment based on the latest science

- Information on past and current climate impacts and risks.
Future trend projections of various climate variables and hazards based on a range of different climate scenarios.
- Outcomes of stress testing under different climate scenarios.
Future projections of socio-economic development and other non-climatic factors and megatrends that might have a significant influence on vulnerability to climate change.

b. Progress assessment

- Information on the approach to climate change adaptation up to now and its interconnectedness with climate change mitigation.

- Evaluation of the previous adaptation strategy / plan in terms of processes and progress in reducing vulnerability and strengthening resilience, preferably based on a comprehensive indicator set.

c. Development of a business-as-usual scenario

- Information on the future development if the strategy is not implemented.

d. Summary of key analyses

Summary of other key analyses important in understanding the problem and its development or as a justification for the action chosen to address the problem.

III. Strategic part (about 45% of the total length)

a. Vision and main strategic direction (about 15% of this section)

Intervention logic and hierarchy of objectives / targets

Identification what needs to be achieved and how by setting the strategic direction.

- Explanation of the hierarchy of strategic and specific objectives.

Vision and strategic areas / sectors

- Information on the strategy's vision.
- Information on strategic areas / sectors: how they relate to the problem; what are the main interlinkages between them; what trade-offs or potential conflicts these interlinkages might entail.

Strategic objectives

- Description of strategic objectives and their relation to the vision / global objective of the strategy.
Impacts, benefits, and target values concerning strategic objectives.

b. Description of objectives / targets within each strategic area / sector (about 30% of this section)

Description of specific objectives and their expected impacts

- Overview of specific objectives and their relation to the strategic objectives, and other objectives.
- Impacts, benefits, and target values concerning specific objectives.

Overview of adaptation options

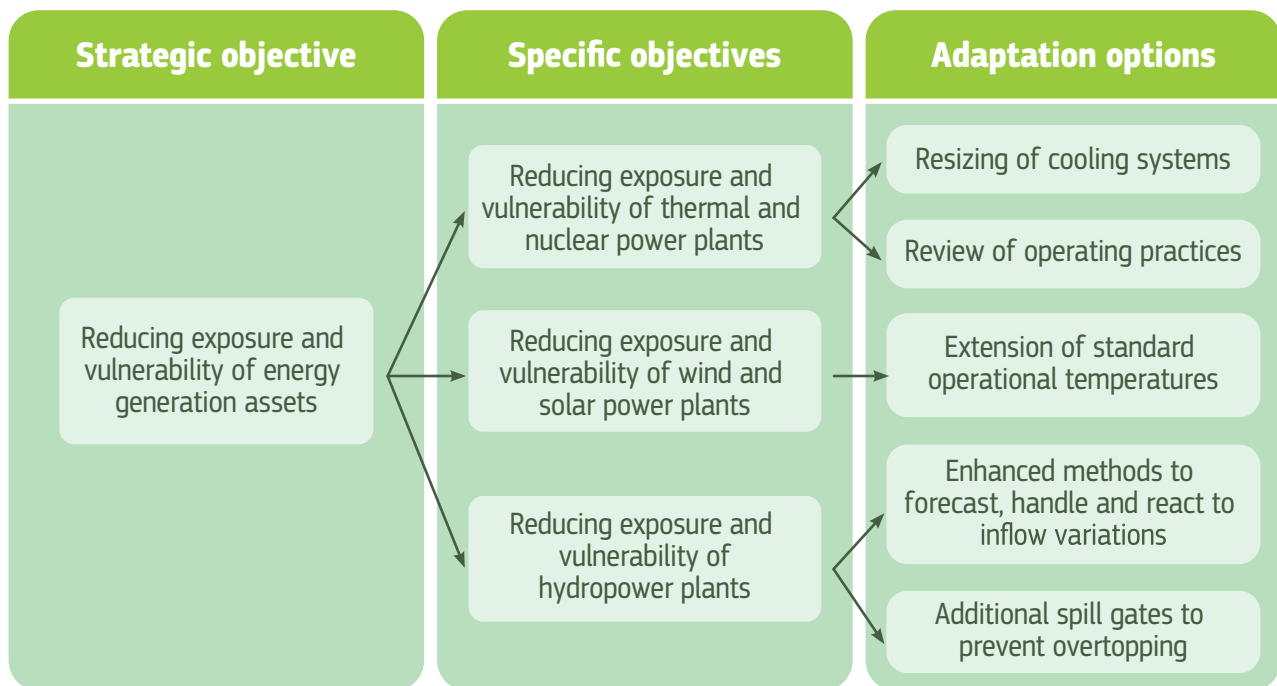
Description of the adaptation options to achieve specific objectives, relying on the latest knowledge and preferring nature-based and ecosystem-based solutions.

Costs, benefits, and impacts of the implementation of each measure.

Results and outcomes of implementation, indicators

Expected results and outcomes of each measure to contribute to the strategy's objectives.

Indicators for monitoring and evaluation of the measures.



IV. Implementation part – action plan (about 25% of the total length)

a. Implementation management

- Information on who is responsible for implementation.
- Information on the system and structure of steering implementation (roles, responsibilities, and mandates of particular actors).
- Define triggering points that would entail changes in implementation, including how these changes would be executed.

b. Implementation plan

- Prioritisation of workstreams.

c. Implementation timeline

- Implementation timeline of particular measures, including responsibilities, continuity of implementation, milestones, etc.

d. Budget and financial resources

- Estimation of the investment needs for the chosen action plan, including which would fall under public budgets and which under the mobilisation of private finance.
- Information on the budget for implementing the strategy and available funding resources.

e. Monitoring and evaluation system

- Information on who is responsible for monitoring and evaluation.
- Information on the system of continuous monitoring and evaluation of the implementation process and progress on achieving the objectives.
- Monitoring and evaluation plan of the strategy, taking into account current reporting obligations.

V. Executive summary (about 5% of the total length)

- Brief summary of key activities, steps, and milestones set out in the implementation of the strategy.

VI. Annex

- Usually, the annex of the strategy includes background documents prepared during the strategy development stage. This can include, e.g., analytical documents (such as SWOT analyses¹¹ or cost-benefit analyses) or documents providing more detail on the implementation of the strategy (such as a more detailed timeline or a comprehensive indicator set).

¹¹ Analyses to identify strengths, weaknesses, opportunities, and threats.

Annex II – New areas of adaptation policy

Just resilience

The most vulnerable groups in society are oftentimes most affected by climate change, thus climate change impact and vulnerability assessments should not neglect the disproportionate consequences on disadvantaged groups of people and geographical areas. To achieve just resilience, it is essential to prevent uneven burdens and to leave no one behind.

- Uneven burdens: certain social groups and geographical areas are disproportionately affected by climate change due to uneven exposure or pre-existing vulnerabilities to climate change impacts, differing economic and political capabilities or differing access to public services and infrastructure. In this regard, climate change can worsen existing inequalities, as well as create new ones.
 - For example, low-income groups are often more exposed and vulnerable to heat as they may live in houses that are not well insulated and don't have money for additional heat protection, e.g., sunscreens. Moreover, they may live in densely populated neighbourhoods lacking green public spaces. Similarly, groups living in low-lying areas and close to riverbeds suffer more from floods and might have a lower ability to relocate due to the lower price of their housing.
 - Furthermore, certain occupations and workers are more affected by climate impacts due to their exposure (i.e. heat stress) or physical burden, for example workers in agriculture, forestry, and construction.
- Leaving no one behind: costs and benefits of adaptation options should be shared fairly.
 - An example of an 'unfair' approach to adaptation, as flood protection measures can be extremely expensive, might be flood management measures that favour affluent individuals with properties in flood prone areas at the expense of communities with less voice in the political life and / or lower economic values at risk.

However, it is important to include just resilience considerations in every step of climate adaptation planning, e.g., when identifying relevant stakeholders to be included in the process, conducting climate change risk and vulnerability assessment, assessing adaptation options, monitoring, and evaluating adaptation efforts, etc.

There is scope to step beyond considering and addressing the uneven burdens of climate change in adaptation policy. For example, gender mainstreaming involves the integration of a gender perspective into the preparation, design, implementation, monitoring and evaluation of policies, regulatory measures and spending programmes, with a view to promoting equality between women and men, and combating discrimination.

For more information on just resilience see also the Climate-ADAPT [Just Resilience policy page](#).

Maladaptation

Every adaptation effort takes place within the framework of constantly changing conditions and is associated with a high rate of uncertainty. Therefore, adaptation is a continuous process, whose outcomes are difficult to predict. In some cases, adaptation efforts can lead to unforeseen, unintended negative consequences, called 'maladaptation'.

The [IPCC](#) defines maladaptation as "actions that may lead to increased risk of adverse climate-related outcomes, including via increased greenhouse gas emissions, increased or shifted vulnerability to climate change, more inequitable outcomes, or diminished welfare, now or in the future".

The degree of success of adaptation efforts is highly context dependent and may vary from transformation to climate resilient pathways on the one hand to making the target group even more vulnerable to climate change on the other hand.

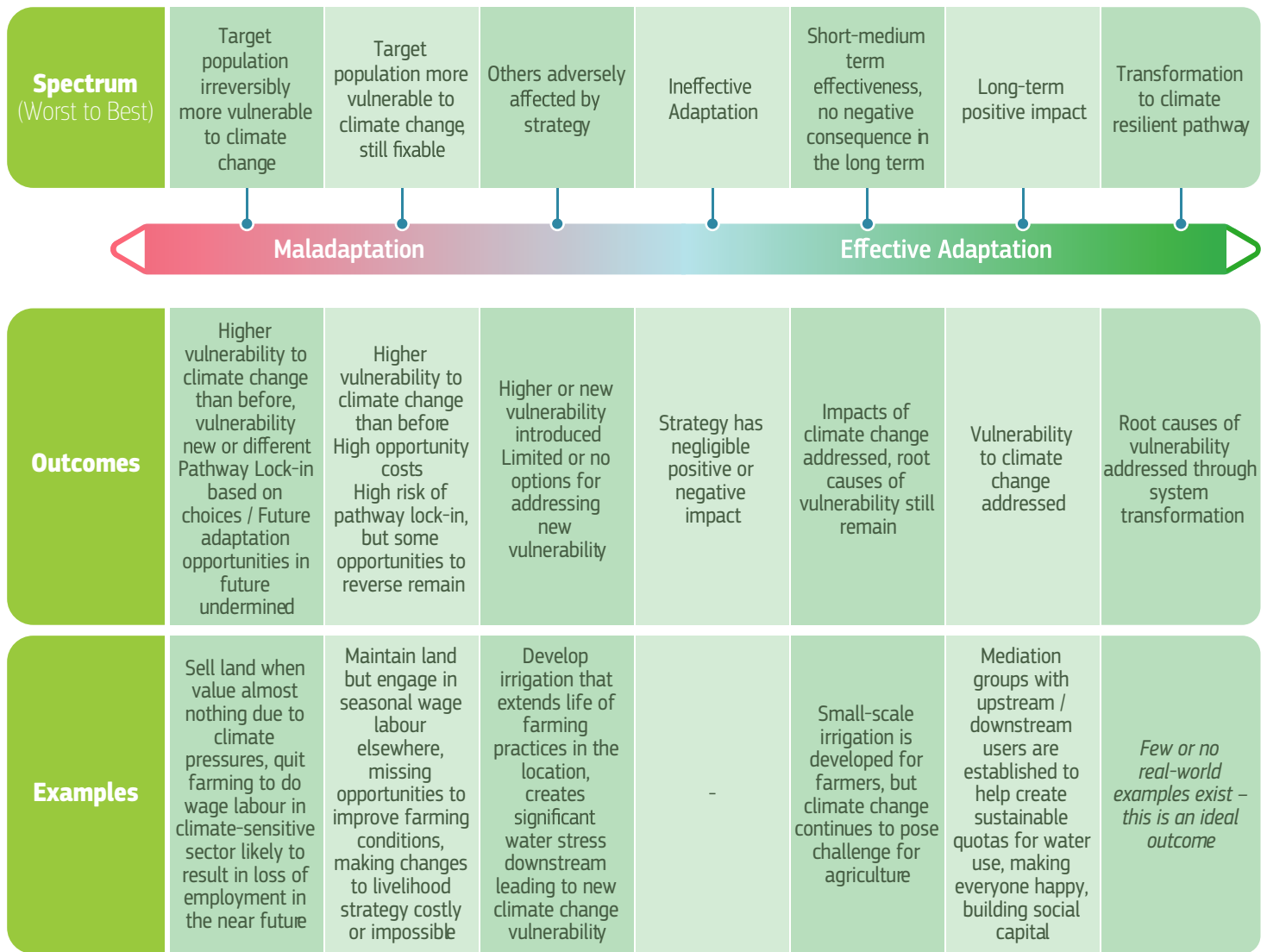


Figure 4 - A spectrum of responses from adaptation to maladaptation.

Source: [Schipper, 2020](#)

Despite the uncertainty and the importance of the context, some general types of maladaptation have been identified to help detect potential cases of maladaptation.

[Schipper \(2020\)](#) recognises three broad categories of maladaptation: infrastructural, institutional, and behavioural maladaptation. The latter two categories particularly stress the importance of taking into account not only the physical but also the social consequences of adaptation options.

[Barnett and O'Neill \(2010\)](#) recognise five types of maladaptation:

1. Increasing emissions of greenhouse gases.

A well-known example of this type of maladaptation is the use of air conditioning or other energy-intensive technologies.

2. Disproportionately burdening the most vulnerable.

For example, higher prices of water disproportionately impact low-income households who pay a higher share of their income for water and have smaller opportunities to reduce their water consumption.

3. High opportunity costs (i.e., economic, social, or environmental costs being high relative to alternatives).

For example, the construction of a dam brings high economic, social, and environmental costs in terms of construction and maintenance costs, resettlement of the population, and changes in the river ecosystem.

4. Reduced incentive to adapt (e.g., by encouraging unnecessary dependence on others, stimulating rent-seeking behaviour, or rewarding complacency).

For example, insurance or subsidies should be designed to provide incentives for adaptation. In the case of agriculture, compensation from crop insurance and / or crop subsidies may otherwise deter adaptation measures by farmers growing crops over seeking alternative approaches to prevent crop failures and becoming reliant on the insurance and subsidies without weighing the risks of planting different crops.

5. Path dependency (reducing the choice of adaptation options available in the future).

For example, desalination plants and other large infrastructural developments are committing capital and institutions to trajectories that are difficult to change in the future, therefore decreasing flexibility to respond to unforeseen changes in environmental, economic, and social conditions, and reducing the portfolio of adaptation options.

To avoid maladaptation as much as possible, policymakers need to fully understand the context of the situation they are addressing. That means understanding what the causes (not symptoms) of vulnerability are and who the key actors and stakeholders that should be listened to are. They should also look beyond the policy or project timeline and take into account the interconnectedness of development pathways and the dependency of various groups on infrastructure or institutional structures.

Nature-based solutions

The European Green Deal in general, and EU adaptation and biodiversity policies more specifically, call for greater efforts to roll out nature-based solutions (NBS) much faster and at larger scale than at present.

The UN defines NBS as “actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits”¹².

The IPCC sixth assessment report¹³ stresses that conserving, protecting, restoring, and managing a significant share of Earth’s ecosystems is needed to reduce their vulnerability and to maintain their climate resilience. It also underlines the great potential of NBS to effectively reduce climate risks and improve human wellbeing simultaneously, especially for vulnerable and marginalised groups. Ecosystems across the world are vital in protecting communities and nature from climate impacts, such as floods and desertification.

In general, NBS bring more, and more diverse, nature and natural features and processes into cities, landscapes, and seascapes. They benefit biodiversity, support the delivery of a range of ecosystem services, and can help meeting ecosystem restoration and protection targets.

NBS can be implemented independently or integrated in other adaptation measures, combined with more technological or infrastructure-based solutions.

They deliver the best results when their implementation takes into due consideration the complexity of ecosystems and the projected effects of climate change on them, but also the specific local context and the various interests and values linked to them. It is thus important to involve stakeholders and communities at all stage in order to ensure support and co-ownership. This can be made significantly easier by a conducive regulatory framework, technical standards, collaborative governance, knowledge transfer, capacity building, and sufficient funding.

¹² Multilaterally agreed NBS definition, adopted by the Fifth United Nations Environment Assembly of the United Nations Environment Programme on 2nd March 2022 ([UNEP/EA.5/Res.5](#)), link retrieved 13/4/23.

¹³ The Working Group II contribution [Climate Change 2022: Impacts, Adaptation and Vulnerability](#), link retrieved 13/4/23.

According to the [EEA \(2021\)](#), nature-based solutions that reduce exposure and sensitivity to climate hazards and enhance adaptive capacity for addressing such hazards involve various levels of intervention:

1. Conservation and restoration (including rewilding) of natural ecosystems in locations where they provide ecosystem services critical for adaptation and disaster risk management (e.g. protecting and restoring wetlands to sustain the protection of human settlements from extreme weather).
2. Sustainable management and climate-proofing of managed ecosystems to provide multiple ecosystem services (e.g. diversifying agricultural landscapes and forests).
3. Creating new, engineered ecosystems for particular adaptation needs (e.g. green roofs or hybrid solutions for coast management).

However, as stated by [Eggermont et al. \(2015\)](#), boundaries between these three types are not clear cut as hybrid solutions exist along this gradient both in space and time. For example, at landscape scale, mixing protected and managed areas could be needed to fulfill multifunctionality and sustainability goals; a constructed wetland can be developed as a new ecosystem but, when well established, may subsequently be preserved and surveyed as a natural ecosystem.

Climate stress testing

In response to the Fukushima nuclear power plant disaster in Japan, the European Council of 24th and 25th March 2011 declared that “the safety of all EU nuclear plants should be reviewed, on the basis of a comprehensive and transparent risk assessment – called the “stress tests”. These stress tests consisted of two elements: (i) an evaluation of the robustness of a nuclear power plant when facing a set of (hypothetical) extreme situations¹⁴ and (ii) a verification of the preventative and mitigative measures chosen including the available margins¹⁵. 10 years on, the methodology of these stress tests can now be extrapolated to a wider set of European climate stress tests to identify risks and weaknesses in an area related to the impacts of climate change. As with the nuclear stress tests’ whose aim was to focus on measures that could be taken to prevent the failure of a nuclear reactor following a natural disaster as well as mitigating measures, climate stress tests should also focus on measures that could be taken before climate-induced extreme weather events that would reduce the risk of impact. The following steps will guide towards a tailor-made climate stress test.

✔ *Step 1: Defining hazards in a context-specific climate stress test*

A climate stress test at its core identifies possible risks in a designated area due to climate-related hazards, including flooding, heat, drought, storms, etc. This is done by gathering and creating information on the effects of climate change (the stress), and on the vulnerability of systems and objects against these effects. Particular attention is paid to key climate risks - most importantly (key) infrastructure, but also water security, food security, public health, biodiversity and ecosystems, etc. It is considered good practice to begin stress testing critical infrastructure in a designated area that is imperative to other critical systems like food, water and health. The climate risks and hazards are highly spatially dispersed, differing not just on a national or sub-national scale, but also from village to village, street to street, or even house to house. Identifying the spatial scale of a climate stress test, and its accompanied hazards, should therefore be the first exercise.

✔ *Step 2: Exploring general vulnerabilities*

The second step involves exploring the vulnerabilities related to the previously determined climate hazards with publicly available knowledge, like national or local maps. This ‘quick scan’ allows gathering of basic information quickly, giving a first indication of climate impacts and vulnerabilities in a certain area. The results are suitable for raising awareness and providing information to relevant stakeholders who are not yet sufficiently engaged in climate adaptation.

¹⁴ Natural initiating events, including earthquake, tsunami and extreme weather, the loss of safety systems and severe accident management were the main topics for review.

¹⁵ See also [EU Stress tests specifications](#), link retrieved 13/4/23.

Step 2.a: In-depth vulnerability assessment

The information gathered in Step 2 is in many cases insufficiently specific to identify vulnerabilities on a local scale. In this situation, it would be useful to generate tailor-made information with additional data and model calculations on a specific area.

✔ **Step 3: From stress test to climate adaptation strategy**

When a stress test has been conducted, the next step is to translate this information into a climate adaptation strategy for that sector or area. Before discussing the possibilities of translating these results, it is important to note what a stress test does, and does not, generate:

- *You cannot fail or pass a stress test.* It is designed to identify potential vulnerabilities and risks in an area that can provide input for climate adaptation plans or strategies.
- *A standardised stress test does not offer 'blueprint' checklists.* Rather, it aims to support tailor-made climate adaptation strategies or plans.
- *The stress test does not mandate norms for adaptation* but provides input for discussions on which levels of risks are acceptable and which are not.
- *The stress test does not include the costs of certain adaptation measures,* this budget exercise should be conducted at a later stage when adaptation measures can be compared.
- *The stress test does not judge and does not impose measures* – this is done in cooperation with stakeholders, as seen in the following practical example.

Practical example: a Dutch practice on incorporating climate stress tests in climate adaptation plans through risk dialogues

In The Netherlands all municipalities, regional water boards, provinces, and the central government work together in the Delta programme, a climate adaptation programme. As part of the Delta plan spatial planning, with the goal to have The Netherlands climate-proof and water- resilient by 2050, all parties agreed to conduct a climate stress test in collaboration with various stakeholders. The stress test focused on drought, heat, waterlogging and urban / pluvial flooding. As a next step, they undertook to organising risk dialogues and incorporate the outcome of the stress tests and risk dialogues into the development of implementation agendas. By 2021, all working regions had executed a stress test. Additionally, nearly all Working regions had embarked on risk dialogues, and a growing number of municipalities and Working regions have set down a climate adaptation implementation agenda.

A risk dialogue is a recurring process consisting of multiple conversations about climate-related risks. Internal risk dialogues take place between civil servants at (sub-)national level whereas external risk dialogues are held between national governments and other parties, such as residents and businesses. The objective for a risk dialogue is twofold:

1. Raising awareness about the vulnerability of a certain area to climate change. Participants can discuss the results of the climate stress test during the risk dialogue, considering which risks they consider acceptable and which they do not.
2. The dialogues also foster discussions on how to reduce vulnerabilities with concrete actions.

The Dutch government shaped a road map to create risk dialogues that in turn feed information into climate adaptation strategies and plans.

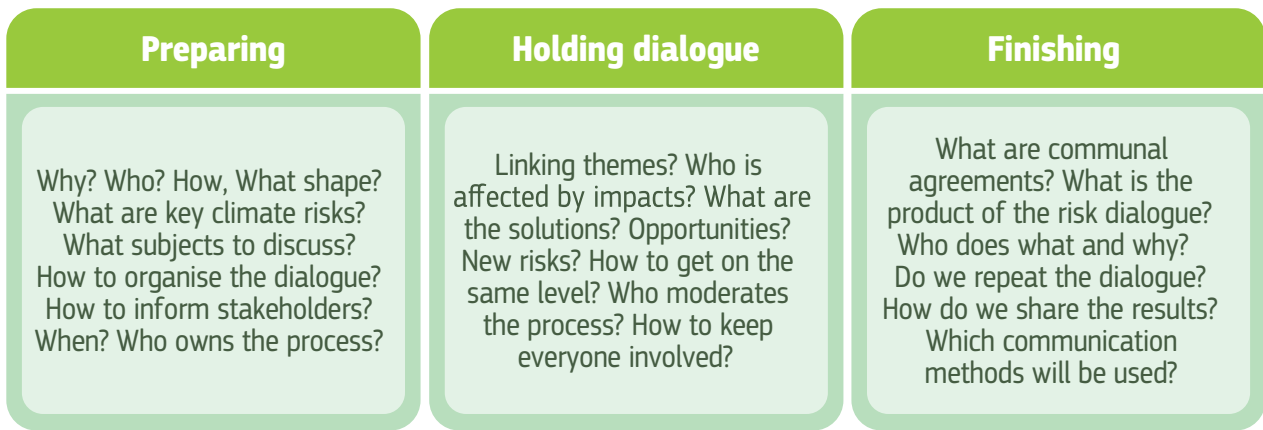
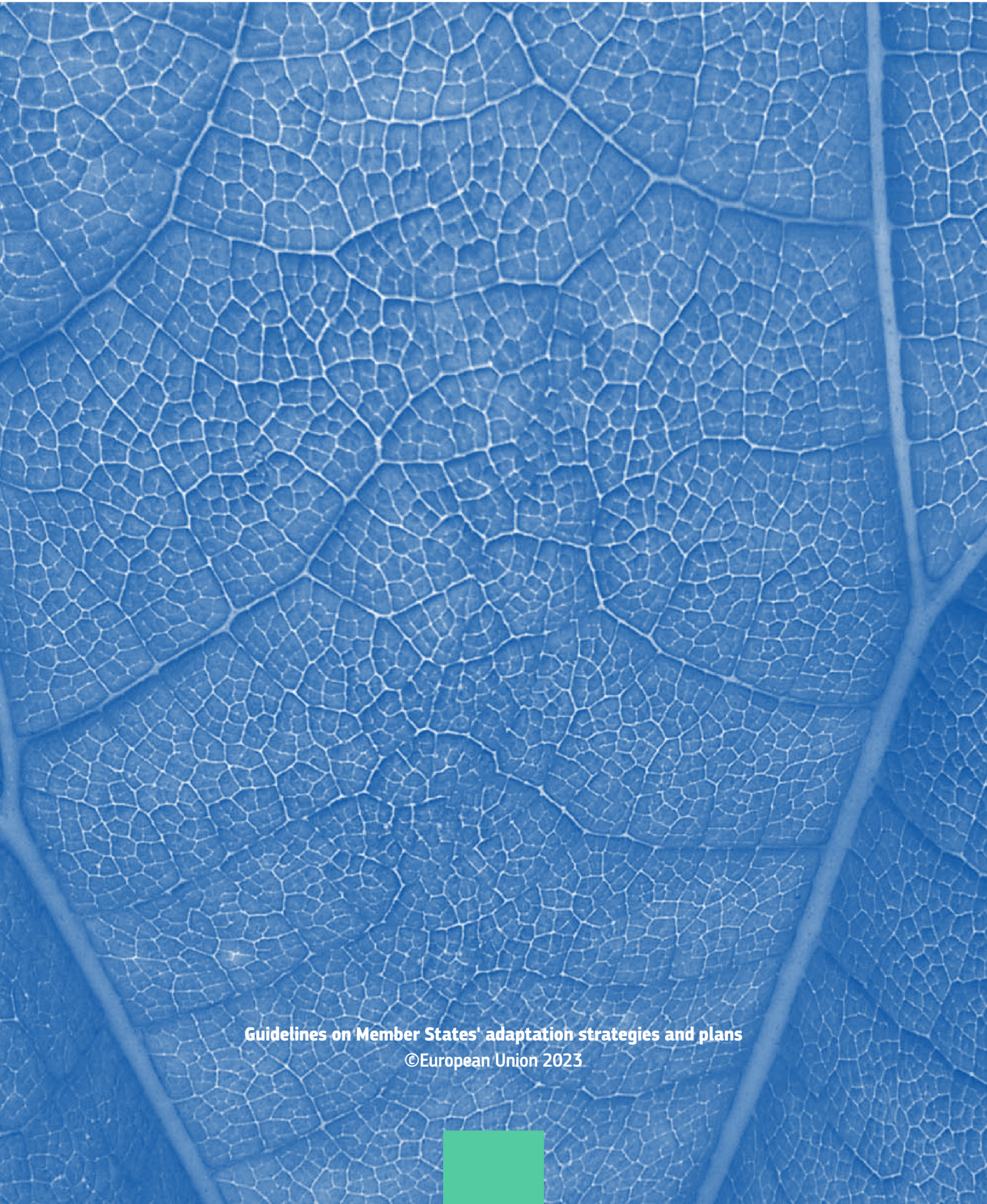


Table 1- Overview of the risk dialogue process.

There is no definite blueprint for a risk dialogue, since it depends on many factors, such as scale, time, and capacity. There have now been several risk dialogues based on stress tests in The Netherlands, which have been compiled in an overview and [map](#). The Dutch government also provides municipalities, regions and other administrative bodies with a list of organisations that can help in facilitating risk dialogues, with examples of risk dialogues that have already taken place.



Guidelines on Member States' adaptation strategies and plans
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