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DEVELOPING REGIONAL CLIMATE RESILIENCE STRATEGIES AND ACTION PLANS

Implementation Guidance to support regions through the Regional Resilience Journey in line with the EU Mission on Adaptation

V1.0

Citation: This document should be cited as: Pathways2Resilience (2024) Developing Regional Climate Resilience Strategies and Action Plans: Implementation Guidance to support regions to plan the Regional Resilience Journey in line with the EU Mission on Adaptation

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Help us improve this document:

This document represents the current best thinking available from across the literature and within the Pathways2Resilience consortium of how regions can develop climate resilience strategies and action plans. However, it is a rapidly evolving area, with new approaches and examples constantly being generated. In addition, piloting this work with 100 regions will result in significant amounts of new learning and understanding.

Therefore, the guidance will be updated over the lifetime of the Pathways2Resilience Initiative, based on our learning from working with our 100 regions.

If you have any feedback on how it could be further improved throughout the lifetime of the Pathways2Resilience programme, please provide feedback to hello@pathways2resilience.eu

Executive Summary

Introduction

In a rapidly warming Europe, where challenges such as food, water security, financial stability, and public health are increasingly threatened, the Pathways2Resilience project introduces the Regional Resilience Journey. This adaptable planning framework enables regions and communities to transition to climate resilience through transformational adaptation. The Regional Resilience Journey encourages moving beyond incremental change to foster systemic shifts that address the adaptation gap and promote long-term prosperity in the face of climate change.

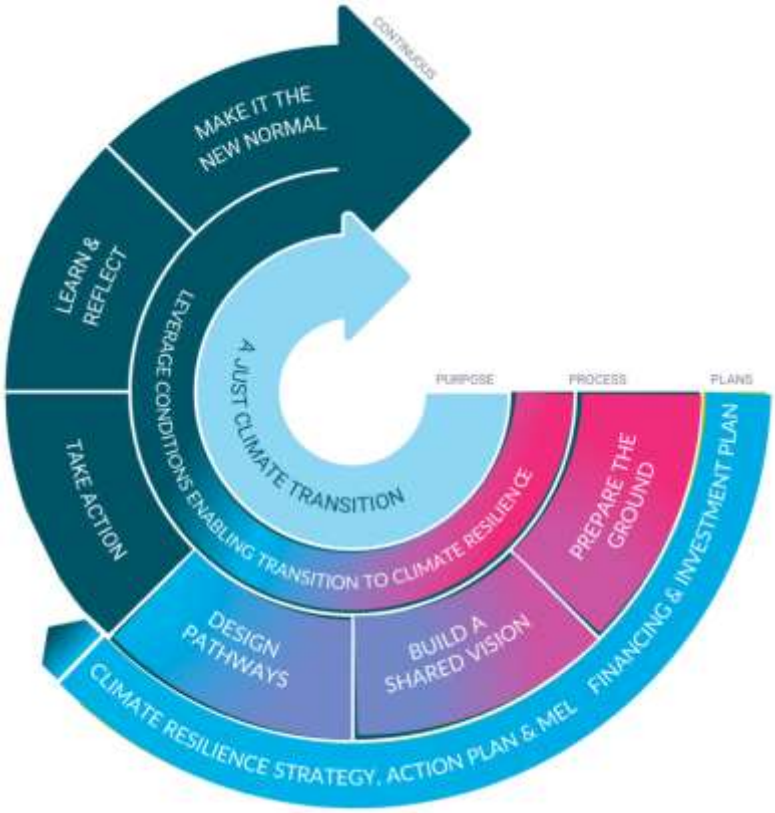

Figure I: The Regional Resilient Journey (Regional Resilience Journey) developed by Pathways2Resilience

This guidance is designed to support regions in developing transformational Climate Resilience Strategies and Action Plans, focusing on the first three phases of the Regional Resilience Journey process.

The **objectives of the guidance** are to:

- Provide an overview of the process required to develop a transformational Climate Resilience Strategy and Action Plan as part of the Regional Resilience Journey.
- Help you to scope, prepare and deliver the Climate Resilience Strategy and Action Plans.
- Build the transformational adaptation planning knowledge and capabilities on developing your region's Climate Resilience Strategy and Action Plan.
- Provide an entry point for further training, knowledge exchange, and collaboration on transformational adaptation planning.

The guidance provides a model process for a region, such as yours, to develop its Climate Resilience Strategy and Action Plan, in collaboration with a broad range of stakeholders relevant

to your local context. Doing so helps you to deepen your understanding of the challenges arising from climate change, imagine possible climate resilient futures, develop pathways to a commonly agreed vision of such a future, and translate these into actionable plans.

The Regional Resilience Journey

The framework adopts a systemic approach to help understand the interconnectedness and interdependencies of our world. It promotes the development of climate adaptation pathways to facilitate prudent decision-making in uncertain contexts, combining interventions across multiple levers of change. The Regional Resilience Journey emphasises transformative innovation, encouraging new ideas, methods, and solutions that drive significant and lasting societal change.

The Regional Resilience Journey is designed to support regions in transitioning to climate resilience in a just and equitable manner. It integrates principles, processes, and practices to ensure fair distribution of burdens and benefits, participatory decision-making, and respectful, meaningful engagement with diverse cultures and perspectives.

In addition to helping regions co-design their Climate Resilience Strategies and Action Plans through stakeholder participation, the Regional Resilience Journey fosters an integrated government approach breaking down departmental silos and collaboration across local, national, and EU levels of governance.

The framework also highlights the need for substantial investments to achieve climate resilience. It includes a dedicated Adaptation Investment Cycle to support the development of a Climate Resilience Investment Plan, with specific guidance provided in a separate but interlinked document.

Recognising that transformative adaptation is not a linear process, the Regional Resilience Journey is designed to accommodate multiple iterations. Regions are encouraged to revisit and refine their journey over time, adjusting assumptions, learning from new insights, and focusing on specific sectors.

How to develop you Climate Resilient Strategy and Action Plan

The framework provides task-by-task guidance, including methods, tools and checklists, to help regions at all maturity levels create or improve their Climate Resilience Strategies and Action Plans.

Phase 1 – The first phase of the Regional Resilience Journey ensures that your adaptation planning is framed within ongoing activities and the broader policy, social, environmental, economic, and fiscal context, providing an initial understanding of the scope, challenges, and opportunities in your region's journey toward climate resilience. It is about **preparing the ground** by:

- **Establishing a baseline**: Reviewing existing knowledge and gaps related to climate impacts, political commitments, regional policies, and ongoing activities, and creating an initial problem framework.
- **Understanding the system**: Identifying the relevant systems, their interconnections, drivers of change, and key stakeholders in the climate adaptation process.
- **Assessing risks and capabilities**: Gaining a clear understanding of current and future climate risks and evaluating your region's capacity to manage the transition to climate resilience.

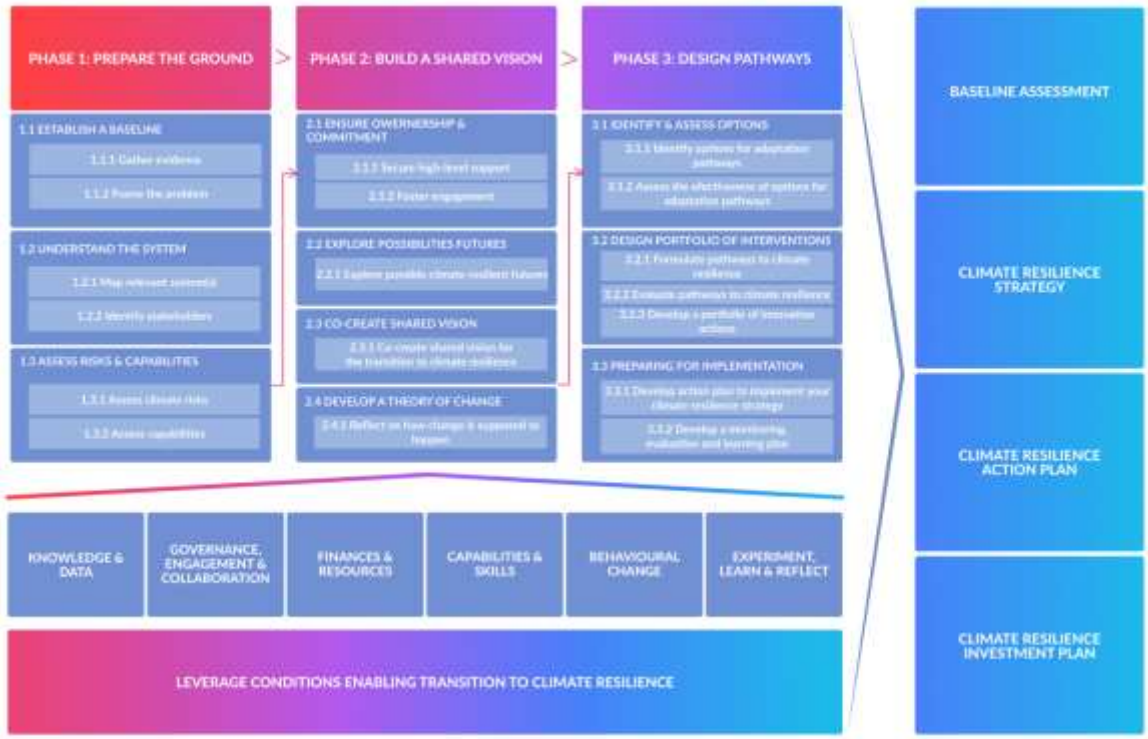

Figure II: The first three phases of the Regional Resilient Journey developing Climate Resilience Strategies and Action Plans

Phase 2 – The second phase of the Regional Resilience Journey aims to unite all stakeholders around a shared vision of a desirable, climate-resilient future, ensuring that the necessary transformations are both acceptable and achievable. **Building this shared vision** involves:

- **Ensuring ownership and commitment**: Developing strategies for active and meaningful engagement of key actors and outlining a decision-making process within your policy framework to secure adoption of the Climate Resilience Strategy, Action Plan, and Investment Plans.
- **Exploring possible climate resilient futures**: Considering various paths to climate resilience by qualitatively exploring how your region might adapt to different climate scenarios.
- **Co-creating a shared vision**: Developing a collective understanding of an ambitious yet possible future for your region, providing a clear sense of purpose and direction for the transition to climate resilience.
- **Developing a theory of change**: Detailing the vision by reflecting on how change should occur and identifying the commitments and systemic changes your region is willing to embrace to achieve that vision.

Phase 3 – The third phase of the Regional Resilience Journey focuses on turning your vision into actionable climate adaptation pathways. Designing these pathways involves:

- **Identifying and assessing options**: Exploring a wide range of potential adaptation options to reduce risks and achieve the vision, while evaluating their applicability, performance against risks, overall benefits, adverse effects, trade-offs, and synergies.
- **Designing a portfolio of interventions:** Formulating adaptation pathways to realise your region's shared vision by sequencing prioritised options over time, identifying key decision points, and selecting a diverse array of innovations—from technical solutions

to institutional, social, and behavioural changes—to create comprehensive climate resilience strategies.

- **Preparing for implementation:** Once the Climate Resilience Strategy is in place, a detailed Action Plan must be developed to guide implementation over the next three to five years, alongside a Monitoring, Evaluation, and Learning Plan to track progress, encourage learning, and allow for adjustment.

Enabling conditions

To accelerate the transition to climate resilience, it is crucial to establish a supportive environment at the regional level. Key Enabling Conditions (KECs) are vital factors that drive this transformation, including access to knowledge, strong governance, stakeholder engagement, financial resources, and necessary skills. These conditions help align ideas, coordinate actions, and ensure that efforts toward transformation are both effective and sustainable. Establishing and maintaining these enabling conditions from the outset of the Regional Resilience Journey is essential for ensuring a fair and successful climate transition.

Further guidance and support

In addition to this guide, which serves as the foundation for developing your Climate Resilience Strategies and Action Plans, a wide range of additional resources is available to support the process. Pathways2Resilience has consolidated these resources in the Climate Toolbox. The toolbox includes guidance, training materials, presentations, websites, and tools that offer more detailed examples of the topics covered in this guide. References to the initial resources available in the toolbox are provided throughout the guide.

1. Introduction

Europe is warming faster than any other continent, as recently confirmed again by the European Climate Risk Assessment from the EEA (2024), leading to more frequent extreme weather events. These events, along with other environmental and social risks, are creating major challenges across Europe. These challenges threaten food and water security, energy security, financial stability, and people's health, which in turn affects social cohesion and stability.

To address these growing issues, policies are being introduced. For example, the EU's strategy on adapting to climate change (EU 2021) aims to make adaptation smarter, faster, and more systematic to achieve climate resilience by 2050. Additionally, the EU Mission on Adaptation to Climate Change aims to help 150 European regions become climate resilient by 2030.

Embedded in the EU Mission on Adaptation, the Pathways2Resilience project introduces the Regional Resilience Journey, which is an adaptable planning cycle for regions and communities that wish to transition to climate resilience through a **transformational adaptation** approach. It helps regions to move beyond reactive and incremental adaptation of existing systems. Instead, it seeks to bring about systems change where this is needed to close the adaptation gap and deliver long-term prosperity in the face of climate change.

This journey to resilience is the journey of your region – **your journey**. Regions and communities are in the driving seat, working in partnership with public organisations, municipalities, businesses, and voluntary organisations. The Regional Resilience Journey supports you in undertaking this journey, adapted to your situation as needed.

You should follow the Regional Resilience Journey taking into account the local context and build on what you have already been achieved or is underway. The Regional Resilience Journey builds on already developed strategies (across cross-cutting agendas) revising and revisiting where relevant.

The Regional Resilience Journey approach provides your region with guidance, tools and methodologies to use the framework itself in the most strategic way possible, recognising that local actors are often the most knowledgeable on their own needs.

Aim, objectives and scope of this guidance

While keeping the entire transition to climate resilience in sight, this guide covers only the first three phases of the Regional Resilience Journey, up to the development of Climate Resilience Strategies and their underpinning Action Plans. The aim of this guidance is designed to support regions in developing transformational Climate Resilience Strategies and Action Plans.

It is particularly intended for actors in regions leading climate adaptation policies and strategies, such as senior officers, project managers, or heads of departments, as well as those contributing to their development.

The objectives of the guidance are to:

- Provide an overview of the process required to develop a transformational Climate Resilience Strategy and Action Plan as part of the Regional Resilience Journey.

- Help you to scope, prepare and deliver the Baseline Reports, and Climate Resilience Strategy and Action Plans.
- Build the transformational adaptation planning knowledge and capabilities on developing your region's Climate Resilience Strategy and Action Plan.
- Provide an entry point for further training, knowledge exchange, and collaboration on transformational adaptation planning.

The guidance provides a model process for a region, such as yours, to develop a Climate Resilience Strategy and Action Plan, in collaboration with a broad range of stakeholders in your local context. Doing so helps you to deepen your understanding of the challenges arising from climate change, imagine possible, climate resilient futures, develop pathways to a commonly agreed vision of such a future, and translate these into actionable plans.

The information in this guide is presented in sequential chapters, offering an introductory context, initial steps to prepare the groundwork, and detailed Phases and Tasks necessary to successfully develop a Regional Climate Resilience Investment Plan.

- Section 1 provides the introductory context, including the Regional Resilience Journey.
- Section 2 outlines the preparatory actions needed to establish and run the Strategy and Planning process.
- Section 3 sets out the detailed phases and tasks involved in developing a Strategy and Action Plan and represents the core of the guidance.
- The Appendix provide a series of useful additional information to support you in developing your Climate Resilience Strategy and Action Plan. This includes a plan checklist, further technical guidance for each task, and a glossary.

Throughout the guidance there are included several types of boxes to help you:

Insights – These are practical tips from practitioners who have already undertaken some of the activities in this guide. They don't guarantee success, but they are likely to help create better conditions for success.

Explainers – These explain the underpinning methods needed to help you in undertaking the Regional Resilience Journey tasks. They provide in-depth coverage of the more complex areas of the process which may be less familiar and are designed to deepen your awareness and understanding.

Food for thought – These highlight important aspects and/or issues that should be carefully considered as you develop your Climate Resilient Strategy and Action Plan to help it meet your region's local context, needs and constraints.

Case studies – These showcase regions undertaking Tasks of Regional Resilience Journey, providing examples that offer learned lessons and replicable solutions.

The Regional Resilience Journey

The Regional Resilience Journey framework provides task-by-task guidance, including methods, tools and checklists, to help regions at all maturity levels create or improve their Climate Resilience Strategies and Action Plans. It applies a systemic approach, just transition and just resilience principles and harnesses transformative innovation. Successful strategies for climate

adaptation and transitioning to climate resilience combine interventions across multiple levers of change in a coherent portfolio of actions, outlining how each intervention contributes to progress towards the desired outcomes.

Key Approaches used in the Regional Resilience Journey

Systems thinking: This approach is designed to help us grasp the interconnectedness and interdependencies of our world. It builds from the idea that none of our human interactions exist in isolation and therefore the changes applied to one part of a given system can have ripple effects in other parts of that system and those connected.

Transformative Innovation: Innovation is defined as the process of conceiving new ideas, methods, practices, or solutions that have the potential to generate a positive impact and value. For innovation to be transformative, it needs to go a step further in generating new patterns that create significant and lasting change. Systems thinking is essential for transformative innovation.

Systems change: It is an intentional process that aims at addressing the root causes of complex social and ecological issues that are often embedded in multiple interactions of cause and effect. It seeks to alter the components and structures that cause systems to behave in a certain way, with a view to establish new patterns of behaviour.

Portfolio: A portfolio approach shifts attention from the merits of individual projects to the potential for integration: facilitating synergies across and between projects to effect systemic change. The intent is to transform a place by creating an ecosystem of interventions and/or solutions.

Levers of change: These can be understood as areas of work or entry points for interventions that have the potential to unlock wide-ranging and positive change in a given place, industry or both. In the context of climate adaptation, some examples of powerful levers of change are policy, finance, technology, and citizen engagement, among others, especially if the interventions are designed following an innovation approach.

Whole-of-government approach: The approach refers to the joint activities performed by diverse ministries, public administrations and public agencies in order to provide a common solution to particular problems or issues and involve some form of cross-boundary work.

Multi-level governance: Multi-level governance refers to coordinated actions across different levels of governance from the Member States and local and regional authorities to the European Union, based on partnership and aimed at developing and implementing common policies.

Transformational climate adaptation: This approach seeks to move beyond reactive and incremental adaptation of existing systems. Instead, it seeks fostering systemic shifts that address the adaptation gap and promote long-term prosperity in the face of climate change. It delivers place-based transformation by implementing an interrelated portfolio of interventions across multiple levers of change, to drive significant and lasting societal change.

Risk-informed decision making: This approach is about making risk management related decisions in uncertain, unpredictable environments such as those that a future climate provides. It is about properly considering risks by building and weighing-up possible scenarios, consider risk drivers, and trade-offs.

The framework considers various regional circumstances and fosters integrated work on different enabling conditions to maximise institutional, social, and financial powers. Acknowledging the inter-connectiveness of different fields of work, the transformative perspective aims to look beyond climate adaptation and to identify synergies with related sectors (e.g., water management a, while also strengthening collaboration and multilevel and multistakeholder engagement.

This guidance is designed to support regions in developing transformational Climate Resilience Strategies and Action Plans, focusing on the first three phases of the Regional Resilience Journey process as outlined in Figure 3 and described in detail in section 3.

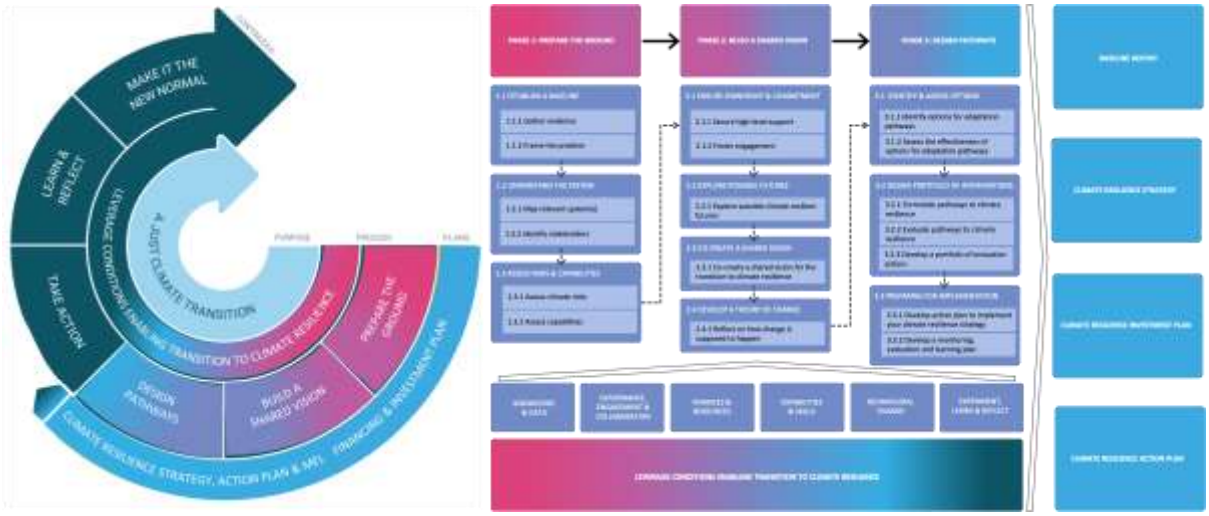

Figure 1: The phases and tasks of the Regional Resilience Journey covered by this guidance

A systemic approach to accelerating the transition to climate resilience

The Regional Resilience Journey framework promotes transformational adaptation by adopting a systemic approach that addresses climate resilience in its full complexity, rather than viewing it as a set of isolated issues. This approach encourages regions and communities to consider all relevant components and relationships, framing interventions holistically to shape a desirable future.

By taking a systemic perspective, regions can identify leverage points and incorporate diverse stakeholder perspectives, balancing short-term disaster risk reduction with long-term prevention and adaptation while avoiding maladaptation. The Regional Resilience Journey supports a whole-of-government and multi-level governance approach, breaking down departmental siloes and fostering meaningful stakeholder engagement at every stage of the process. This requires a foundation of transdisciplinary knowledge and data to ensure informed decision-making and collaborative action.

The Regional Resilience Journey fosters an integrated government and multi-level governance approach to support regions in work beyond departmental siloes, supports meaningful engagement of stakeholders across all relevant stages of the journey, and requires an underpinning transdisciplinary knowledge and data.

An iterative and multi-layered process

No transformative adaptation to climate resilience is linear. Therefore, allowing for experimentation, learning, and continuous iteration is crucial. The Regional Resilience Journey is designed to accommodate multiple iterations—while the phases follow a sequential logic, many of the tasks within each phase will run in parallel or in repeated cycles. Over time, regions are encouraged to undertake parts of the journey, and the journey itself, multiple times, revisiting assumptions and learning from new insights. Gaps in knowledge, data, or finance will emerge as different elements are explored, or stakeholders engaged. Strategically, it will be valuable to undergo iterations with diverse focuses, such as applying different approaches or zooming in on specific sectors.

Just Climate Resilience

The Regional Resilience Journey is designed to support regions in transitioning to climate resilience in a just and equitable manner. It integrates principles, processes, and practices to ensure distributive justice (fair allocation of burden and benefits), procedural justice (participatory decision-making processes), and recognition (respect and robust engagement with diverse cultures and perspectives), as defined by the IPCC 2022.

The IPCC stresses that just transitions need targeted and proactive measures to ensure that any negative social, environmental or economic impacts of economy-wide transitions are minimised, while benefits are maximised for those disproportionally affected.

The Regional Resilience Journey supports regions in co-designing their adaptation strategies with a participatory approach, recognising the role that vulnerable populations play in a just transition. It will help regions in enabling a governance structure that fosters a meaningful participation of relevant stakeholders (including vulnerable communities), e.g., through leveraging innovation engagements, mapping exercises, co-creation, etc.

Financing transformative adaptation

The Regional Resilience Journey approach emphasises the importance of mobilising the significant investments needed to achieve the transition to climate resilience. This increasingly demands regions to move from being applicants and recipients of public funds to being stewards of adaptation capital - leading a financial planning process to scale and target adaptation finance which makes achieving those regional transformations possible.

Therefore, and in parallel to the main Regional Resilience Journey, we have developed an Adaptation Investment Cycle to support the development of a Climate Resilience Investment Plan, which translates the ambitions into bankable projects.

The process for developing a Climate Resilience Investment Plan has been designed to encourage the financing of a region's strategy and pathways in their entirety, whilst recognising that regions will be starting from different levels of maturity and capability. The Adaptation Investment Cycle is aligned with the main steps of the Regional Resilience Journey, meaning that certain inputs are relevant to both. They also intersect at key stages, particularly in the development and assessment of adaptation options, pathways, and action plans, where financial viability and economic performance play a crucial role in determining whether to proceed with various actions. To help clarify these connections, we have included links throughout the guide to relevant inputs and outputs that support the development of a Climate Resilience Investment Plan. A full overview of the links between the two processes can be

found in Appendix B. A similar guide is provided in the finance section, illustrating how the Regional Resilience Journey aligns with the steps in the Adaptation Investment Cycle.

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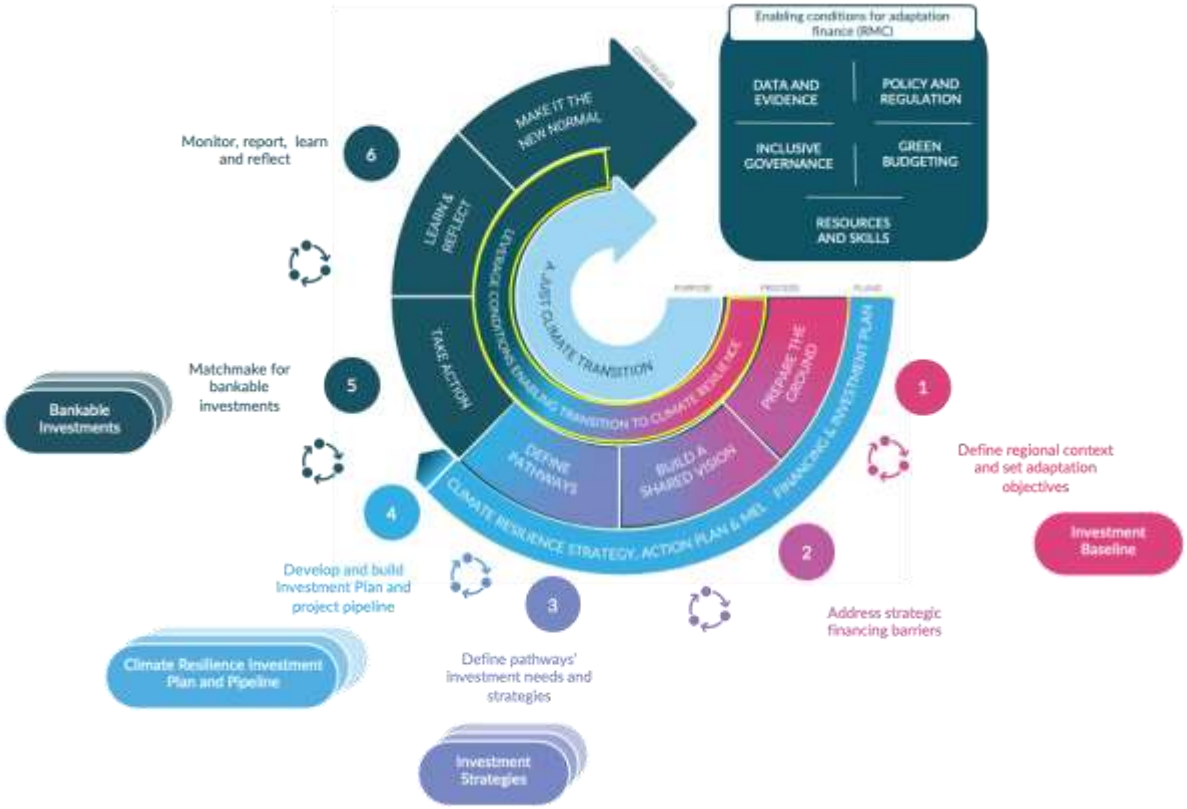

Figure 2: The Adaptation Investment Cycle phases supporting the Regional Resilience Journey

A note on Time Horizons

One of the challenges of working towards climate resilience is the long-term nature of the planning needed. Adaptation pathways are solutions to be implemented over longer periods of time (spanning time horizons of 50-100 years or more) in a process that starts today, but which not only depends on actions taken by us in the present but also on those taken by future generations. This thinking contrasts with the more typical time horizons that are usually associated with addressing policy problems, which, in many cases, demand immediate results and outcomes and apply shorter-term tools and methods. Taking a long-term perspective often also leads to economic and financing challenges due to the deep uncertainty involved in the future projections, as well as the potential disconnect between when investment happens to when its benefits are reaped.

To address this issue, we take inspiration from the way in which past generation(s) thought about their legacy. This has been called *cathedral thinking* and refers to "the undertaking of long-term projects or goals that are initiated for the benefit of future generations and are destined to be completed long after the original visionaries and builders are gone. This label represents the creation of something that inherently requires more time than those who design it could

ever hope to experience themselves: that is, a way of planning that benefits not the designers but those who will come after them."[1]

How can you incorporate this way of thinking into your Climate Resilience Strategy? The most important point is to have a strong sense of purpose and a clear vision. Many of the elements of the Regional Resilience Journey have different time frames.

Your adaptation pathways can be very long-term (e.g., up to 100 years). The vision and the theory of change underpinning your pathway should aim to close the gap between long-, mid- and shorter-term results; in that respect, your vision should be attainable against a time horizon that allows for significant transformations to take place (for instance, in 50 years' time). In practical policy terms, your Climate Resilience Strategy might have a mid-term ambition of 10-20 years, with your Climate Resilience Action Plan focusing on short-term implementation over the next 3-5 years.

What is important is to keep a strong sense of purpose and an eye on your long-term goals. The second important aspect is to understand that many of the actions that can be implemented in the short- and medium-terms are preparatory and will build the conditions for results in the long-term. The key question to answer is "what should we be doing in the next few years to ensure we are adapting well for the long term".

Your region will define the specific time frames for each these components, depending on the adaptation challenges that you want to address. We invite you to maintain a long-term perspective throughout implementation of the Regional Resilience Journey.

2. Preparing to deliver your Strategy and Action Plan

Define outputs

Before embarking on your Regional Resilience Journey, take time to reflect on the outputs you aim to produce as part of your Climate Resilience Strategy. We suggest the following:

- A **Climate Resilience** Baseline Assessment drawing on key elements of the 'Prepare the ground' phase, including in particular:
    - An assessment of current and predicted future climate risks and vulnerabilities, including a prioritisation of the key and most urgent ones.
    - A description of the different sectors and community systems impacted by the transition to climate resilience, including interdependencies and cascading effects.
    - An assessment of adaptive capacities, competences and resources relevant for achieving a just transition to climate resilience, including a list of needs that should be addressed as a matter of priority.
    - A map of stakeholders, vulnerable groups and inequities, including a stakeholder assessment matrix mapping the interest and influence of each target group, and their impact in regional resilience.

[1] https://www.maize.io/cultural-factory/designing-for-tomorrow/

- A **Climate Resilience Strategy** drawing on key elements of the 'build a shared vision' phase as the 'design pathways' phase, including:
    - A shared vision of the climate resilient future that the region wants to achieve, providing a compelling, engaged, co-created narrative that allows you to mobilise the stakeholders in your region required to implement and sustain your plan.
    - An overview of identified regional transformation potentials and possible climate resilient futures, including the key enabling conditions that regions and communities would need to address and strengthen).
    - A set of preferred climate adaptation pathways, outlining strategic sequences of preferred adaptation options to be implemented against a long-term time horizon as risk-based conditions continue to change.
    - A co-developed stakeholder engagement strategy and participatory designpeer process, including the description of engagement mechanisms and structures.
- A **Climate Resilience Action Plan** covering key elements of the 'design pathways' phase, including:
    - A description of the near-term that the region will conduct to implement its adaptation strategy, including priority of these actions, roles, responsibilities, and resources.
    - A monitoring, evaluation and learning framework for implementing the action plan, adaptation pathways, and investment plan.
    - An innovation portfolio, outlining a set of innovation activities that support the adaptation pathways.
- A **Climate Resilience Investment Plan** which translates the shared vision into a pipeline of bankable projects, ensuring the resources are available to deliver the climate resilience strategy and action plan (see guidance on the Adaptation Investment Cycle on this). Its key components include:
    - A summary of the investment context in your region, including an assessment of current and future costs, and the relevant investment processes and criteria.
    - A catalogue of existing sources and instruments in your region to finance adaptation and future options you are planning to explore.
    - A series of investment strategies for the adaptation pathways developed in your climate resilience strategy.
    - A pipeline of bankable projects associated with the action plan, along with actions to improve the enabling conditions for financing.

The elements of these suggested outputs are further described in section 3.

Who to involve

When preparing your work on the Climate Resilience Strategy, it is important to consider who to involve. Forming a diverse, cross-sectoral team is crucial for navigating the Regional Resilience Journey and designing effective strategies, action plans, and investment plans. Engaging representatives from various departments and sectors ensures that all relevant perspectives and expertise are included, fostering a comprehensive approach to climate resilience. An ideal composition of a local team directly involved in delivering the planning process is presented in Figure 3.

Figure 3: Ideal composition of a local team directly involved in delivering the planning process.

Here's a brief description of the roles that constitute an ideal team and are strongly recommended for direct involvement in your efforts to develop a climate resilience strategy. While these roles are described individually, it is understood that two or more may be performed by the same person, depending on the participant's specific profile, availability, and other factors:

- **A programme manager:** Responsible for overseeing the implementation and progress of the Regional Resilience Journey, as well as the coordination of different regional functions and actors that will need to get involved.
- **Climate adaptation officer:** Operates at regional level with a clear mandate to lead the development of a climate adaptation strategy. This role involves a deep understanding of adaptation planning and is responsible for guiding a region-wide approach to mitigate the impacts of climate change.
- **Technical officer/consultant:** Operates at the regional level and works closely together with the climate adaptation officer. This role is responsible for conducting the technical risk and options assessment activities that inform the development of the climate resilience strategy, including data collection, computational modelling of current and future risks, and the modelling of potential options and pathways. They are also responsible for the development and specification of the adaptation monitoring plan to track ongoing adaptation needs.

- **Adaptation finance officer:** Operates at regional level and leads day-to-day operations regarding the design and implementation of the financing of the regional climate resilience strategy. This role would focus on the development of the climate resilience investment plan.
- **Community engagement coordinator:** Responsible for facilitating dialogue between local stakeholders and the regional authorities and ensuring that local communities are actively involved. Note that this role could be filled in by a local non-governmental organisation (NGO) and/or academic experts with the ability to facilitate co-creation processes.
- **Political role:** Operates at the regional level, providing strategic advice and support to elected political leaders on climate resilience and adaptation policies. The political role ensures that political leaders are well-informed about climate risks and the necessary adaptation strategies.
- **Innovation expert:** Focuses on the integration and promotion of innovative solutions within the climate resilience strategy at the regional level. The innovation expert should have a good understanding of how the region uses innovation in their socio-economic activities and other areas, and ideally understands the different mechanisms to support innovation at the regional, national and EU level.

Develop a project plan

It is advisable to develop and agree on a project plan for the development of your Climate Resilience Strategy and Action Plan, ensuring it aligns with the development of your Climate Resilience Investment Plan. A sample timetable is shown below in Figure 4.

Figure 4: Model project plan for developing a Climate Resilience Strategy and Action Plan.

Key enabling conditions

To speed up the transformation towards climate resilience, it's essential to create a supportive environment at the regional level. Key Enabling Conditions (KECs) are factors that help drive this change, including 1) access to knowledge, 2) good governance and stakeholder involvement, 3) financial resources, 4) capabilities and skills, 5) behavioural change, and 6) abilities to learn and reflect. They help align ideas, coordinate initiatives, and ensure that efforts towards transformation are effective and sustainable. Building and maintaining these enabling conditions from the beginning of the Regional Resilience Journey is critical for achieving a fair and successful climate transition.

Six key enabling conditions have been identified as crucial drivers for building regional resilience within the Pathways2Resilience framework. These conditions not only align with existing research but also act as accelerators, helping regions at various stages of development move towards climate resilience. They represent strategic elements that enhance the ability of regions and communities to navigate the complexities of climate adaptation and promote sustainable development. As such, these enabling conditions should be viewed as a cross-cutting element, to be considered throughout the entire journey.

The EU Adaptation Mission supports your journey

The EU Adaptation Mission is currently the key European programme to accelerate climate resilience in European regions and communities by 2030. The work you develop in the framework of Pathways2Resilience contributes to the Mission's objective and has great value for possible replication in other regions.

The Mission consists of several thematic projects that address various aspects of resilience and generate knowledge that can be highly beneficial for your journey. Below are links to projects that can help you better leverage key enabling conditions to accelerate your transformation towards climate resilience.

Table 1: Examples of ongoing EU Mission Adaptation projects related to Key Enabling Conditions

KEC	Link to projects		
Finance and resources	CLIMATEFIT	PIISA	Soteria
Knowledge and data	VALORADA	ClimEMPOWER	OCEANIDS
Governance, engagement and collaboration	CLIMAS	AGORA	
Behavioural change	NEUROCLIMA	PRO-climate	

3. Developing your Strategy and Action Plan

This section of the guide outlines the three phases and related tasks to develop your region's Climate Resilience Strategy and Action Plan.

Structure

For each phase an introduction is outlining:

1. Main objectives of the phase
2. Main outputs of the phase
3. Key enabling conditions that would need to be leveraged for the phase
4. Relevant links to the Adaptation Investment Cycle during the phase

Guidance on each task is provided at two levels. First, within the main body of this document, guidance is provided per task with outline on:

1. What is this task about?
2. Why is it important?
3. How can you complete it?
4. What are the key inputs for the task?
5. What are the expected outputs?
6. Who to involve?
7. A short checklist of actions to check your progress as you move along the Regional Resilience Journey

Secondly, a dedicated Appendix provides more detailed and technical descriptions for some tasks, along with suggestions for additional resources and links to relevant methods and materials available in the Pathways2Resilience Climate Toolbox.

The Pathways2Resilience Climate Toolbox

The toolbox is designed to further support and guide you during your Regional Resilience Journey and beyond. This web-based toolbox offers a well-organised collection of open-access tools and resources, structured in a user-friendly manner to align with the key tasks you will undertake in your journey.

The toolbox contains the tools and materials referred to in the guidance for developing climate resilience strategies, action plans and investment plans, as well as additional relevant resources. These will help you understand what you need to do at each stage of the Regional Resilience Journey and how to meet those objectives.

The toolbox allows you to find tools and resources using different filters, such as your resilience maturity knowledge and other needs: for example, specific climate hazards, type of tool, and language.

The toolbox is intended for a diverse group of users, including individuals, groups, or organisations involved in adapting, transforming, and enhancing regional resilience. It is particularly relevant to those involved in urban or regional planning, budget allocation for innovative solutions, and environmental departments dealing with climate hazards, as well as development and innovation departments.

How to use the guide

The first level of guidance is meant to provide a good overview for all involved in the development of your Climate Resilient Strategy and Action Plans regarding each of the tasks and how they are interconnect. The more detailed descriptions of how to complete some tasks presented in the Appendix are more targeted towards the various subject experts who will be delivering the task.

While each task in the Regional Resilience Journey is presented sequentially, many are interrelated and may require cycles of iteration and revision as other tasks are completed. This is especially true for tasks within a phase, which will often need to be delivered in parallel. Additionally, there are overlaps and reiteration of some tasks across phases, with some tasks revised in later stages according to new insights derived from other tasks in the meantime, as shown in the model project plan above.

We encourage you to design your own Regional Resilience Journey based on your region's starting point, priorities, and resources. While the goal is to complete all the tasks, you should sequence these in such a way that best fits your specific context, while noting the implicit dependencies present between the various tasks.

Most importantly, define your levels of ambition as you navigate your Regional Resilience Journey. While we strongly encourage you to address all tasks—since they all contribute essential parts to a whole that is greater than the sum of its individual pieces—it is ultimately up to you to decide how deeply to engage with each one. This will depend on your region's capabilities and resources, previous work, and the timing and priorities of your policy and political context.

This highlights another level of iteration—repeat the phases of the Regional Resilience Journey at a later stage when you wish to revisit and update your Climate Resilience Strategy, each time deepening the process and raising your level of ambition.

Phase 1 – Prepare the ground

Figure 5: Phase 1 of the Regional Resilience Journey.

This **first phase** of the Regional Resilience Journey is to ensure that you situate your adaptation planning and already ongoing activities within the wider policy, social, environmental, economic and fiscal context for an initial framing of the scope, challenges and opportunities of your regions' journey to climate resilience.

More concretely, this phase is about **preparing the ground** by:

- **Establishing a baseline**: reviewing available knowledge and gaps of climate impacts and existing political commitments, regional policy, plans and strategies currently in place and ongoing activities to address them; and preparing an initial framing of the problem.
- **Understanding the system**: recognising the relevant parts of the affected systems, their interrelationships and the drivers of change; and understanding who are the actors and stakeholders relevant in the climate adaptation context.
- **Assessing risks and capabilities**: Based on the aforementioned points, gaining a clear understanding of the current and future climate risks for your region that would need to be addressed to become climate resilient; and assessing the capabilities of your region needed to manage this transition.

By preparing the ground, you will gather essential information on your climate challenges, vulnerabilities, and risks, gain an initial understanding of the conditions that enable or hinder resilience, and identify key ecosystem actors to engage with for refining the diagnosis and evidence base. You will also have gained an overview of ongoing activities that build on, mobilise the necessary resources and knowledge, and enable a co-creative environment for the development of the Climate Resilience Strategies.

The **output** of this phase could be envisaged as a **baseline report**. This baseline report could cover key elements of the 'preparing the ground' phase, including in particular:

- An assessment of current and predicted future climate risks and vulnerabilities, including a prioritisation of the key and most urgent ones.
- A description of the different sectors, including key community systems involved and impacted by the transition to climate resilience, including their relationships, key interdependencies and cascading effects; economic, social and ecological drivers and

consequences; as well as policies impacting and impacted by climate risks and regional resilience maturity.

- An assessment of adaptive capacities, competences and resources relevant for achieving a just transition to climate resilience, including a list of needs that should be addressed as a matter of priority, for example with regard to key enabling conditions.
- A map of stakeholders, vulnerable groups and inequities, including a stakeholder assessment matrix mapping the interest and influence of each target group, and their impact in regional resilience; a stakeholder profile to identify their mandate, field of action and strategic interrelations; an influence map to scope out the impact of the project in the regional communities.

Fostering enabling conditions to prepare the ground: As you embark on the regional resilience journey, leveraging key enabling conditions becomes an essential immediate action to establish a smart, fast and systemic process from the outset. In Appendix D1, you will find concrete key enabling actions for this phase. Here is a summary of why these conditions are particularly important at this early stage:

- Having a strong base of reliable and accessible data from the outset ensures that your decisions are informed by the most accurate and comprehensive information available. Establishing solid data management practices now will allow you to better understand the specific climate risks your region faces and to plan effectively.
- Establishing clear governance structures and fostering collaboration across different levels of government and with key stakeholders sets the stage for coordinated and cohesive action, ensuring that everyone involved is aligned and working towards the same goals. Throughout several tasks in Phase 1, it is expected that you consult with a core group of representatives to validate your findings. Due to the iterative nature of these tasks, this core group will likely evolve and expand at different stages. All tasks in this phase will benefit from refinement and validation through broader stakeholder participation.
- At this foundational stage, it's important to assess and enhance the skills and capacities within your region. Building these capabilities early ensures your region is prepared to tackle upcoming challenges and helps prevent potential skill gaps that could slow progress.
- Promoting adaptive behaviours from the beginning is key to ensuring that your community is engaged and actively participates in resilience-building efforts. Early awareness-raising and involvement makes it easier to implement and sustain adaptive practices as your journey progresses.
- Creating a culture of experimentation and learning at the start of your journey allows you to explore different approaches and refine your strategies as you move forward.
- Securing financial resources and understanding funding mechanisms early on is critical. It allows you to plan and allocate budgets effectively, ensuring that your resilience initiatives are well-supported and sustainable. By addressing financial needs at this stage, you set a strong foundation for the continued success of your journey.

By focusing on these enabling conditions during the "Preparing the Ground" phase, you are building the essential infrastructure that will support all your future efforts. This preparation is crucial for ensuring that your region is not only ready to face the challenges of climate change but is also equipped to lead a successful and sustainable resilience journey.

Links to the Adaptation Investment Cycle while preparing the ground: During this phase, the important interlinkages to be considered between the Adaptation Investment Cycle and the Regional Resilience Journey are described in Table .

Table 2: Linkages between the Regional Resilience Journey and the Adaptation Investment Cycle during Phase 1, including relevant inputs and outputs.

Regional Resilience Journey Phases and Tasks	Relevant Adaptation Investment Cycle inputs	Outputs relevant to Adaptation Investment Cycle
Phase 1: Prepare the ground		
Task 1.1 Establish a baseline	Summary of the existing policy objectives, headline budget (Adaptation Investment Cycle Task 1.1), as well as evidence of current and future costs (Adaptation Investment Cycle Task 1.2) are both relevant. Work to develop a rationale and objectives (Adaptation Investment Cycle Task 1.3) can also help with problem framing.	The economic and financial aspects of data collected will help in collecting economic and financial data (Adaptation Investment Cycle Task 1.2). Wider baseline data can feed into the spending objectives and rationale (Adaptation Investment Cycle Task 1.3).
Task 1.2 Understand the system	Preparatory work to develop an Investment Plan, including governance and stakeholder engagement approach can help with identifying and engaging stakeholders.	Conceptual maps can be used to inform the rationale and spending objectives (Adaptation Investment Cycle Task 1.3). Work to identify stakeholders can feed into the preparatory work to get ready to develop an investment plan, as well as the development of investment strategies for pathways (Adaptation Investment Cycle Task 3.3)
Task 1.3 Assess risks and vulnerabilities	Studies and evidence identified or developed in Adaptation Investment Cycle task 1.2 may provide useful inputs for the risk and vulnerability assessment.	The risk and vulnerability assessment will be helpful to support economic and financial evidence of risks.

1.1. Establish a baseline

Task 1.1.1 Gather evidence

What is this task about?

This task is about gathering the necessary evidence with which to take stock of where your region stands in terms of its climate risks, vulnerabilities, climate risk management. This includes evaluating climate impact studies, adaptation and disaster risk reduction measures, policy objectives and priorities, strategies and action plans, as well as current funding, budgets, resources, and institutional, legal, and regulatory frameworks. Additionally, it requires

identifying key challenges and opportunities, including those likely to be worsened by climate change, to effectively respond to evolving climate conditions.

In this task, you build your evidence base – including all the relevant associated social, cultural, economic, environmental, and institutional aspects to support the identification and prioritisation of adaptation and resilience needs and strategies in later tasks. This involves:

- Developing a data collection plan
- Collecting historical data and information
- Identifying relevant legal, fiscal, institutional and operational frameworks, including policy objectives and priorities, strategies, plans and regulations
- Analysing evidence and deriving insights from the data collected

Why is it important?

Gathering evidence provides an initial understanding of your region's vulnerabilities and climate resilience maturity, which are essential for effective climate adaptation planning. It helps in recognising and articulating the direct and indirect impacts of climate risks on various sectors in your region. Most importantly, it establishes a solid factual evidence base to inform subsequent tasks of the Regional Resilience Journey. It also helps to identify any data and knowledge gaps that could be addressed through further research and innovation.

Insight

Be aware of the iterative nature of data collection and its continuous feedback with the parallel tasks of 1.1.2 Frame the Problem, 1.2.1. Map Relevant Systems, and 1.2.2 Identify Stakeholders. Input from these three tasks requires adjustments in data collection, revision of the data collected, and additional information as more insight into the challenge is gained.

How can you complete it?

- **Develop a detailed plan for data collection:** determine specific information and data needs for the Regional Resilience Journey and define data sources, data collection methods, available resources and timeline, as well as assign roles and responsibilities for gathering data and organising and maintaining the information database.
- **Collect historical data and information:** gather available data and information on the current state of your region's system, including past climate-related extreme weather events, their impacts, and ongoing challenges. This should also cover previously implemented or planned adaptation and disaster risk reduction measures, as well as socio-economic and environmental data on the prevailing context and regional dynamics, such as demographic changes, economic development, and land use changes. Engage stakeholders in the data collection process to build a base of comprehensive evidence informed by their observations, knowledge, and experiences.
- **Identify relevant legal, fiscal, institutional, and operational frameworks:** review local, regional, sectoral, and national policies, strategies, and plans addressing or that have addressed climate risks and vulnerabilities, as well as other relevant policy objectives and priorities. Identify legislation related to climate adaptation and disaster risk management. Analyse available fiscal mechanisms and the roles, mandates, and capabilities of key institutions involved along your Regional Resilience Journey.
- **Analyse evidence and derive insights:** integrate and synthesise the collected data, identifying any gaps in information or knowledge that require further data collection,

research, or innovation. Highlight potential sources and mechanisms for gathering or generating this data. Extract key initial findings related to your region's adaptation and resilience needs.

Further detailed technical guidance on completing this task, along with useful tools and methods can be found in Appendix D2.

Food for thought

Three fundamental aspects to consider in this task are: i) the availability and reliability of data sources, ii) the time frame scope over which the baseline is constructed including both historical data and current conditions, and iii) the geographical scope to which the baseline applies (spatial boundaries), which is also linked to the framing of the problem (Task 1.1.2).

External stakeholders can be involved for various purposes, such as ensuring access to data from different organisations by securing their consent and aligning data standards and collection methods. Additionally, certain stakeholders can enrich the evidence base with their unique observations, knowledge, and experiences. Implementing open data practices can encourage citizen participation, including data generation. It is good practice to consult stakeholders on the types of data that would be useful to them, identify existing citizen initiatives, and explore potential synergies with your resilience journey.

What are key inputs for the task?

- Self-assessment (Task 1.3.2)
- Problem framing (from Task 1.1.2)
- Understanding of your system and the components (from Task 1.2.1.) about which to gather evidence
- Economic and financial baseline (from Task 1.2 'Gather economic and financial evidence' of the Investment Plan).

What are the expected outputs?

- A summary of the evidence on climate-related environmental and socio-economic trends and challenges, climate impacts from previous events, ongoing climate risk studies, and existing legal, fiscal, institutional and operational frameworks for adaptation in your region.
- An organised database or repository containing all collected data, ideally accessible to the stakeholders involved in your Regional Resilience Journey.
- Identified knowledge and data gaps to be addressed by actions to build your region's KEC Knowledge and Data.

Checklist:		
Before moving on, have you:		
	Developed a summary report outlining the region's evidence regarding past and current changes in climate conditions, other relevant environmental and socio-economic trends and challenges, as well as the current legal, fiscal, and operational landscapes within which you are developing your Climate Resilience Strategy?	☐
	Established a repository for your data and assigned responsibilities for its ongoing management and update?	☐

	Identified any knowledge and data gaps to be addressed through future research and/or innovation?	☐
	Engaged stakeholders to provide and collect data and information based on their observations, knowledge, and experiences regarding past extreme weather events and ongoing climate-related challenges?	☐

Task 1.1.2 Frame the problem

What is this task about?

This task is about reflecting on the baseline evidence and your understanding of your system to frame the set of climate-related problems against which you will formulate your Climate Resilient Strategy. This task involves defining and specifying an initial common, agreed set of problem statements and decision-making frameworks (i.e. assessment and evaluation criteria) against which to formulate the climate adaptation pathways and innovation portfolio. This task specifies these problems further, and includes:

- Reviewing the gathered evidence and the insights derived from it (Task 1.1.1) as well as your system understanding (Task 1.2.1)
- Formulating an initial set of prioritised problem or challenge statements
- Formulating a set of initial planning objectives to both directly address climate risks and build broad-based system resilience
- Identifying an initial set of appropriate performance metrics for each of the planning objectives against which to assess and evaluate the performance of the Climate Resilience Strategy
- Specifying the key boundary conditions for the Climate Resilience Strategy.

The task should be undertaken in close collaboration with stakeholders to ensure that the problem framing for the Climate Resilience Strategy reflects their collective interests, values, perspectives, and priorities. It should also be completed in parallel and in exchanges with the activities to gather evidence (Task 1.1.1) and establish the shared understanding of the relevant systems, actors and resources (Tasks 1.2.1 and 1.2.2).

Insight

You will collaboratively develop and refine your problem framing in parallel with other tasks in Phase 1 (Prepare the ground), ensuring alignment with your baseline evidence (Task 1.1.1), system understanding (Task 1.2.1), and risk assessment (Task 1.3.1). This problem framing will serve as a foundation that is further developed in Phase 2 (Build a shared vision), where it will evolve based on the shared vision (Task 2.3.1), theory of change (Task 2.4.1), and portfolio of available adaptation options (Task 3.1.1). It will also continuously integrate the expectations and priorities of stakeholders engaged across these tasks, with future revisions taking place as part of the ongoing process in subsequent phases.

Why is it important?

Properly framing and specifying your problem helps clarify what your region aims to achieve with its Climate Resilience Strategy and sets the agenda for the rest of the Regional Resilience Journey. This process moves regional discussions beyond vague ambitions (e.g., 'build regional climate resilience,' 'address heat stress,' or 'ensure water security') by establishing concrete goals

and measurable performance criteria. Agreeing on these goals and criteria with stakeholders is crucial for building legitimacy for the Climate Resilience Strategy and for mobilising and engaging relevant actors in later Regional Resilience Journey tasks. Additionally, the formulation of adaptation pathways (Task 3.2.1) depends on risk-based problem framings that address how a system and its climate risks may evolve over time, as well as the uncertainties related to the magnitude and timing of these changes.

How can you complete it?

The actions described in this task are intended to be co-developed by a core group of representatives from the region, including different sectors and expertise. This group should perform the following actions during a series of (preferably in-person) workshops.

- **Review the gathered evidence (Task 1.1.1) and system understanding (Task 1.2.1)**: Reflect on both the gathered evidence base, as well as your understanding of the underlying causes, direct and indirect effects of the problems in your region to derive current adaptation and resilience needs for your region and how these are expected to develop in the future.
- **Formulate a prioritised initial set of problem or challenge statements:** Summarise your adaptation and resilience needs into clear, concrete problem or challenge statements to be addressed by the Climate Resilience Strategy, and identify the key community systems most affected. If multiple climate-related challenges exist, prioritise them based on their expected impacts on the relevant key community systems.
- **Formulate an initial set of planning objectives:** Based on the problem statements, specify an initial set of planning objectives to address the identified climate risks and build resilience in the prioritised key community systems. Objectives that directly address climate risks serve as *primary adaptation objectives*. It is against these objectives that the performance of the existing system, any adaptation options and the adaptation pathways are *assessed*. Any additional objectives, such as job creation, improving public health, social well-being, and economic development, serve as *secondary resilience objectives*. These are used to *evaluate* the relative performance of the alternative climate adaptation pathways and the innovation portfolio in building broad-based system resilience.
- **Identify an initial set of appropriate performance metrics**: For each planning objective, specify appropriate (preferably quantitative) metrics with which to assess the relative performance of the adaptation options, pathways and innovation actions. Also specify any key acceptable performance limits or thresholds to be considered in the analysis.
- **Specify key boundary conditions for the Climate Resilience Strategy:** Specify the set of boundary conditions to constrain the ensuing risk and option assessments and other planning processes during the Regional Resilience Journey, including:
    - Strategic planning time horizon for the Climate Resilience Strategy
    - Prioritised uncertain drivers of risk and resilience to be confronted and managed by the Climate Resilience Strategy
    - Geographical extent of the system
    - Other system boundaries and constraints, e.g., institutional, socioeconomic, environmental, financial.

Further detailed technical guidance on completing this task, along with useful tools and methods can be found in Appendix D3.

What are key inputs for the task?

- Self-assessment of capabilities (Task 1.3.2)
- Evidence gathered on baseline conditions in your region (Task 1.1.1)
- Understanding of your system (Task 1.2.1), particularly in relation to prioritised system boundary conditions, uncertain drivers of risk and resilience, and the system vulnerabilities, opportunities, effects and impacts to be addressed, etc.
- Identified stakeholders from Task 1.2.2 to be incorporated into the problem framing.
- Later iterations of the problem framing also need to consider findings from other tasks, including: the risk assessment (Task 1.3.1), capability assessment (Task 1.3.2), shared vision (Task 2.3.1), theory of change (Task 2.4.1), options identification and assessment (Tasks 3.1.1 & 3.1.2), as well as in response to any stakeholder engagement activities in other tasks that serve to modify the overarching planning objectives.

What are the expected outputs?

- The key output from this task is the explicit, agreed set of initial problem statements, planning objectives (i.e. identified primary adaptation objectives and secondary resilience objectives) and associated performance metrics against which to formulate your Climate Resilience Strategy.

Checklist:		
Before moving on, have you:		
	Identified and prioritised a set of climate-related problems to address and identified the relevant key community systems to include in your analysis?	☐
	Specified the set of concrete planning objectives to address your prioritised climate-related problems?	☐
	Categorised your set of planning objectives into primary adaptation objectives (for risk assessment and pathways formulation), and secondary resilience objectives (for building broad-based system resilience)?	☐
	Expressed your planning objectives as a set of measurable performance metrics, specifying associated acceptable performance thresholds where appropriate?	☐
	Specified the set of planning boundary conditions to guide and constrain later strategy building activities?	☐
	Validated your problem statements and decision-making frameworks with stakeholders?	☐

1.1. Understand the system

Task 1.2.1 Map relevant systems

What is this task about?

This task focuses on using systems thinking to create a shared understanding of the components and functions in your regional system that affect its climate resilience and are relevant to the problems identified in Task 1.1.2. The aim is to view the regional system as a whole, rather than as separate systems like the key community systems.

The task involves gathering and organising information on system components, functions, and characteristics into a comprehensive systems map. This map highlights key interactions and dependencies within and between relevant key community systems. By considering climate impact chains, you can prioritise climate hazards, their uncertain drivers, and potential risks to the key community systems. Understanding these among other system components and their relationships helps identify interactions, dependencies, feedback loops, opportunities, and barriers that affect your region's climate resilience. It also helps pinpoint system processes that can be improved by strengthening relevant key enabling conditions. The task includes the following activities:

- Identifying system boundaries
- Mapping the relevant systems
- Considering cascading effects
- Considering the role of the identified stakeholders in system functioning

Insight

Be aware of the continuous dialogue and feedback this task has with the parallel tasks of 1.1.1 Gather evidence, 1.1.2 Frame the problem, and 1.2.2 Identify stakeholders. As with all those tasks, the process of building your system understanding will remain a continuous process throughout the Regional Resilience Journey. The system maps you develop in this task will be subject to continuous updating and revision as new information comes to light or new insights are derived during later tasks.

Why is it important?

Systems mapping serves to establish a common, agreed understanding of the integrated systems to be managed by the Climate Resilience Strategy. The issues you are likely to face in adapting to climate change are not straightforward; uncovering the opportunities and barriers to unlock transformative change is crucial to building resilience. Taking an integrated, whole-of-system approach helps to reveal key interdependencies between your regions' climate challenges and other social, ecological and economic functions, highlighting important trade-offs and synergies. It facilitates identification of solutions capable of addressing multiple challenges and objectives simultaneously. It maps the identified stakeholders (from Task 1.2.2) to the various system functions to help identify points of intervention for policy innovation (which will feed into task 3.2.3 on innovation actions). It also assists with distinguishing which system elements and behaviours are ripe for transformation and may benefit from strengthened key enabling conditions. Finally, it helps identify the (uncertain) drivers of changing risk, which inform the specification of risk-based scenarios against which to assess the performance of your adaptation pathways.

How can you complete it?

The actions described in this task are intended to be co-developed by a core group of representatives from the region, including different sectors and expertise. This group should perform the following actions during a (preferably in-person) workshop (series).

- **Identify system boundaries**: Identify and prioritise which climate hazards, key community systems and sub-systems to include in the analysis, including all relevant system components, functions, and characteristics. Consider the integrated nature of your system and the bio-physical (e.g., geographical, environmental, infrastructural),

socio-economic (e.g., demography, sectors, societal behaviours, technology) and institutional (e.g. policies, governance) aspects impacting on climate resilience.

- **Map relevant systems**: Map the identified system components, functions, and characteristics both spatially and conceptually. Consider the causal relationships present between elements (i.e. what leads to what?) to identify and highlight key system behaviours, interactions, feedback loops, barriers and enablers. Use your analysis to help identify:
  - principal uncertain drivers of risk and their associated impacts
  - how various components affect or are affected by each of the key enabling conditions
  - promising (initial) points of intervention in the system to reduce risk, unlock transformative change, innovate, and otherwise build resilience.
- **Consider cascading effects**: Do not limit your analysis to only direct effects of system elements onto other elements, but also the cascading indirect effects on elements situated further away. In particular, consider how climate hazards propagate through the system, amplifying or triggering additional processes. Also think about the potential impacts of compound or consecutive hazard events.
- **Consider the role of the identified stakeholders in system functioning**: Building on the work undertaken in Task 1.2.2, analyse the key points of stakeholder contribution and influence on the functioning of the system.

Further detailed technical guidance on completing this task, along with useful tools and methods can be found in Appendix D4.

What are key inputs for the task?

- Evidence gathered on baseline conditions in your region (Task 1.1.1)
- Problem framing (Task 1.1.2)
- Identified stakeholders to incorporate into the system map as well as to collaborate in system mapping activities (Task 1.2.2)
- Self-assessment of capabilities (Task 1.3.2)

What are the expected outputs?

The key outputs from this task are the **series of spatial and conceptual system maps** that describe the complex problem context being addressed. These can be used to help communicate the common understanding of the problem to other stakeholders.

Food for thought

Given the objective to establish a common, shared understanding of system behaviour, collaboration with stakeholders on the development of the systems map can be highly beneficial to avoid later disagreement and stakeholder conflict. At the very least, its core underlying assumptions will need to be validated with your stakeholders as you encounter them through the Regional Resilience Journey (particularly in Task 2.4.1, understanding how change happens).

Generating these maps also helps improve system understanding, which allows the problem framing (Task 1.1.2) and stakeholder analyses (Task 1.2.2) to be further elaborated and specified. Such an improved understanding also identifies whether additional baseline evidence

needs to be gathered (Task 1.1.1) and facilitates development of the risk-based scenarios for the climate risk assessment (Task 1.3.1). The system maps also serve as important inputs to Phase 2 of the Regional Resilience Journey and can be used to help elaborate possible futures (Task 2.2.1), define a shared vision (Task 2.3.1), and identify potential drivers of your region's transformation (Task 2.4.1). Finally, these maps serve to help identify points of opportunity to intervene in the system in terms of both adaptation and innovation (Tasks 3.1.1 & 3.2.3), while also illustrating the synergies and adaptation trade-offs between the key community systems under consideration.

Checklist:		
Before moving on, have you:		
	Developed a series of integrated system maps that describe your regional system's boundaries, components and elements, as well as their key causal relationships?	☐
	Identified your principal (uncertain) drivers of risk and their associated direct and indirect impacts?	☐
	Identified any opportunities and vulnerabilities in your integrated system that impact your region's climate resilience?	☐
	Considered how the various functions in your system can be affected by the key enabling conditions?	☐
	Identified promising points of intervention in the system to reduce risk, unlock transformative change, innovate or otherwise build resilience?	☐
	Validated your system understanding with a core group of representatives from the region, including different sectors and expertise?	☐

Task 1.2.2 Identify stakeholders

What is this task about?

This task is about identifying and analysing the relevant stakeholders to be involved in the resilience building process to develop the Climate Resilience Strategy. This task recognises the importance of mapping stakeholder power relations and their potential to influence both the planning process and system resilience more generally. Special attention is given to vulnerable groups and existing or emerging inequities, recognising that climate impacts are not only unevenly distributed across different geographies but also over time and by income. It also acknowledges that certain adaptation or maladaptation options may exacerbate these inequalities. The intention is for this task to be inclusive and participative: the mapping should be performed by staff from different departments in the region and improved over time.

The goal of this task is to ensure that no stakeholder group is overlooked and that the most relevant organisations and individuals are accurately identified and assessed. Identifying the critical nodes or potential ambassadors for your journey often requires reaching people embedded in the systems you need to work with.

Why is it important?

Understanding the challenge at hand from multiple perspectives and learning from past actions has real potential to accelerate and improve the impact of climate adaptation efforts. Mapping actors and their networks relevant to the climate resilience transition in the region is key to

effectively mobilising them in the necessary co-creation steps along the region's journey to resilience.

This task is critical to ensuring a just climate transition. Indeed, stakeholder mapping will help identifying who is most affected, who has influence in different sectors and thus provides crucial information to help decide who should have a say in the resilience-building process. From vulnerable community groups to potential financiers, experts and decision makers, this task serves to define a shared understanding of roles and opportunities for driving transformation towards climate resilience.

In practice, this task is essential for the development of the Stakeholder Engagement Strategy (Task 2.1.2), as it prioritises the stakeholders that should be involved in the different steps and determines the modes of engagement to start securing their participation.

How can you complete it?

The actions described in this task are intended to be co-developed by a core group of representatives from the region, including different sectors and expertise. This group should perform the following actions during a (preferably in-person) workshop.

- **Identify all potential stakeholders & groups** (stakeholder map): Using the systems map (Task 1.2.1) as a starting point, identify potential stakeholders relating to each of the prioritised system components and functions. Elaborate this list with any additional specific sectors or groups you think should be involved in your transformation towards climate resilience.
- **Assess and prioritise stakeholders** through a stakeholder assessment matrix to map their relative levels of interest and influence in the transition to climate resilience. This analysis should recognise that the variables affecting stakeholders' relative interest and influence are diverse. It will also suggest the most appropriate mode of engagement you should aim to deliver to each stakeholder.
- **Develop a detailed understanding of your stakeholders** by filling in a stakeholder profile. This profile should include analyses of the prevailing power relationships and dependencies present between stakeholders, as well as their key roles and responsibilities.

Further detailed technical guidance on completing this task, along with useful tools and methods can be found in Appendix D5.

Insight

Be aware that your stakeholder analysis will likely need to be updated throughout the Regional Resilience Journey as new information comes to light, planning priorities change, and stakeholder interest changes.

What are key inputs for the task?

- Information about key stakeholders in the region (partly from Task 1.1.1)
- Problem framing (Task 1.1.2)
- Mapped understanding of your system (from Task 1.2.1), particularly in relation to the included KCS, sectors, and related functions that are included in the analysis.

What are the expected outputs?

- A stakeholder map (key output)
- A stakeholder assessment matrix
- A set of stakeholder profiles

Checklist:		
Before moving on, have you:		
	Mapped all relevant stakeholders?	☐
	Developed stakeholder profiles, including appropriate mode of engagement?	☐
	Assessed and prioritised stakeholders to involve?	☐

1.1. Assess risks and capabilities

Task 1.3.1 Assess climate risks

What is this task about?

This task is about gaining a clear understanding of the current and future climate risks that are most relevant for your region. For those hazards identified in your initial baseline analysis of adaptation and resilience needs (Task 1.1.1), a more rigorous Climate Risk Assessment (CRA) is conducted according to your *primary adaptation objectives* specified during Task 1.1.2. Assessing climate risks essentially consists of three main steps:

1. **Risk identification**: to ascertain the most relevant current and future climate hazards, impacts and risks to be the subject of further analysis.
2. **Risk analysis**: to analyse the interrelated determinants (hazard, exposure, vulnerability) of the identified risks and impacts on relevant key community systems (identified in Task 1.2.1). The aim is to improve understanding of: (i) the complex nature of risks and their associated interdependencies and cascading impacts, (ii) how these risks may evolve in time, and (iii) potential opportunities to most effectively intervene to mitigate risks.
3. **Risk evaluation**: to prioritise climate risks based on their urgency, severity, and local capacity to adapt or respond.

A number of associated activities are required to progress through these steps, including:

- Determining a fit-for-purpose risk assessment methodology
- Additional data collection and/or generation
- Specifying climate risk scenarios

Insight

When performing this task, it is already useful to start thinking about the types of adaptation strategies and options you may wish to later assess, as this may influence the design of your Climate Risk Assessment methodology. Ideally, you will assess their performance using the same methodologies and tools as for the CRA, however this may be difficult (especially) for non-structural measures.

Why is it important?

You need a comprehensive assessment of current and potential future climate risks, system vulnerabilities, and opportunities to build a shared vision and develop pathways towards your

region's climate resilient future. The Climate Risk Assessment (CRA) provides essential risk information upon which to formulate your region's Climate Resilience Strategy. It provides you with rich information on the magnitude, frequency, and likelihood of any climate risks and impacts presently being experienced in your region, as well as plausible projections on how these may develop due to climate change. The CRA is crucial for identifying people, areas, sectors, and communities most vulnerable to current and future climate change impacts. It guides adaptation strategies and climate risk management practices toward the most pressing risks—those with the greatest potential for severe and likely adverse outcomes. The CRA explains how any single climate hazard impacts the relevant key community systems in your region differently, and how these systems may be subjected to multiple climate hazards that interact, compound, or cascade. Understanding how climate risks vary over time and space, and how they propagate, can help you and your stakeholders strengthen your system understanding (Task 1.2.1); identify your most affected stakeholders (Task 1.2.2); and identify and choose effective adaptation measures (Task 3.1). The CRA can also reveal opportunities where adaptation efforts will deliver multiple benefits, leveraging points to build effective climate resilience while also considering wider impacts.

Explainer: Adaptation limits or thresholds

Adaptation limits (or thresholds, or tipping points; Kwadijk et al., 2010) mark the point at which existing systems or adaptation measures can no longer meet their *primary adaptation objectives* and are considered to have 'failed.' For example, a flood protection dike may fail once water levels exceed its height, requiring further adaptation (e.g., raising the dike). These limits guide planners in maintaining system performance until new limits are reached.

When considering adaptation limits, distinction is drawn between hard and soft limits:

- *Hard limits* are physical constraints, like the maximum discharge capacity of a dam.

- *Soft limits* are value-based and subjective, such as the acceptable number of flood evacuations or tolerable flood damage. Soft limits are dynamic and can change over time as societal views evolve, requiring planners to stay responsive to shifting perceptions as this can serve to shift how adaptation challenges are viewed and affect the (future) success of any climate resilient strategies.

Adaptation limits shift the focus from planning for and reacting to specific risks to *anticipating* the conditions under which adaptation measures will fail. Such an approach reflects the uncertainty surrounding future conditions, and that these will likely differ to those foreseen in any specific scenario. The approach therefore renders risk analyses *scenario independent*.

Adaptation limits also serve as the basis for formulating adaptation pathways to address risks as conditions change (Task 3.2.1; Haasnoot et al., 2013). The approach helps planners adapt strategies as future scenarios (e.g. sea level rise or urbanisation) unfold. It allows for *flexible*, *proactive* planning by adjusting the timing of adaptation efforts without needing to redo risk assessments or formulate completely new strategies, thereby ensuring resilience across a range of plausible futures.

Kwadijk, J. C. J., Haasnoot, M., Mulder, J. P. M., Hoogvliet, M., Jeuken, A., van der Krogt, R., et al. (2010). Using adaptation tipping points to prepare for climate change and sea level rise: A case study in the Netherlands. Wiley Interdisciplinary Review Climate Change, 1(5), 729–740. https://doi.org/10.1002/wcc.64.

Haasnoot, M, Kwakkel, JH, Walker, WE, ter Maat, J (2013). Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world, *Global Environmental Change*, 23 (2), 485-498. https://doi.org/10.1016/j.gloenvcha.2012.12.006

How can you complete it?

To assess your climate risks, you need to step through three risk assessment phases, supported by three associated activities. Complete each of the three phases as follows:

- **Risk identification**: With reference to your problem framing (Task 1.1.2), supplement the information contained within the initial baseline analysis (Task 1.1.1) with additional existing knowledge (e.g., hazard event databases, previous risk and vulnerability studies, expert and stakeholder input, etc.). Identify the most relevant hazards, impacts and risks to assess in the CRA. Consider both current and potential future risks when identifying those to be assessed.
- **Risk analysis:** Analyse current and future climate risks according to the specified CRA methodology (see below). Assess risks and their evolution in time using climate hazard, exposure and vulnerability data. Apply scenarios to determine the range of potential impacts that may be experienced depending on the conditions that emerge. Be sure to consider any integrated system interactions and interdependencies across the affected key community systems, and especially how risks and impacts can propagate through the systems. Where possible, and with reference to your scenario analyses, identify the conditions (and timing) when acceptable risk thresholds or adaptation limits are reached within any key community systems, such that (further) adaptation is required. Begin also to identify any opportunities to most effectively mitigate risks by addressing hazards, exposure or vulnerability.
- **Risk evaluation:** Evaluate the analysed risks according to their impacts and likelihood, as well as aspects such as their frequency and urgency (timing), your region's local adaptive capacity (tolerance), and preferences (risk perception).

Associated activities can be completed as follows:

- **Formulate risk assessment methodology:** Establish how you will undertake your climate risk assessment. CRAs can be undertaken according to one of three general assessment approaches: *quantitative*, *semi-quantitative*, or *qualitative*. The selection of the approach largely depends on:
  - the level of detail required for the assessment
  - the availability of data and applicability of tools to inform the assessment
  - the resources available to conduct the assessment.
- **(Supplementary) data collection/generation:** Collect and/or generate additional data according to the specified risk assessment methodology. Revise this methodology and/or problem framing if the necessary information cannot be collected/generated.
- **Scenario formulation:** From the system mapping (Task 1.2.1), prioritise the set of (uncertain) climate and socioeconomic drivers of risk. Use projections for these drivers to specify plausible sets of future conditions against which to assess climate risks and formulate your Climate Resilience Strategy.

External stakeholders, identified through the stakeholder mapping in Task 1.2.2, likely hold valuable knowledge for risk assessment activities such as data collection, scenario formulation, and impact validation. Determine their involvement based on their potential contributions.

Data partners should be engaged early on (as part of Task 1.1.1), while stakeholders with unique insights or specific expertise should be consulted at key moments, such as during the refinement and validation of the risk evaluation phase.

Further detailed technical guidance on completing this task, along with useful tools and methods can be found in Appendix 6.

What are key inputs for the task?

- Initial evidence base of potential climate hazards (Task 1.1.1)
- Problem framing set of planning objectives and indicators (metrics) of system performance (from Task 1.1.2)
- Understanding of integrated system functions, including interactions and interdependencies (from Task 1.2.1)

Note that during your risk assessment activities, any or all of the above inputs may need further refinement through additional iterations.

Food for thought

You will likely need to adapt your Climate Risk Assessment methodology to the capabilities of presently available resources, tools, methods, data in your region, and to the level of analytical depth required for decision-making. Use this opportunity to also identify any gaps and areas in which to develop or enhance knowledge and data practices in the future.

What are the expected outputs?

The key output from this task is the Climate Risk Assessment (CRA), which will provide you with an overview of current and future climate risks for your region to which you may need to adapt. These should be expressed in terms of the specified *primary adaptation objectives* and associated metrics defined during the problem framing (Task 1.1.2). You should also gain an appreciation for any system performance thresholds or adaptation limits according to these criteria that may be encountered in the future. The CRA may take the form of a formal independent report, which will directly inform the respective chapter of the Climate Resilience Strategy.

Checklist:		
Before moving on, have you:		
	Developed a risk assessment methodology tailored to the decision and aligned with the anticipated outcomes?	☐
	Collected, organised and analysed your climate risk information?	☐
	Formulated a set of future plausible climate risk scenarios?	☐
	Assessed and prioritised your current and future regional climate risks across KCS?	☐
	Consulted relevant stakeholders in the risk assessment activities (data collection, scenario formulation, impact validation, etc.)?	☐

Task 1.3.2 Assess capabilities

What is this task about?

This task is about initially assessing (and monitoring) the capabilities necessary to implement the Climate Resilience Strategy and transition your region towards climate resilience. To support this, Pathways2Resilience offers the Resilience Maturity Curve – a comprehensive tool for monitoring, evaluation and learning that helps you to assess your readiness for transformative adaptation through the Regional Resilience Journey.

The Resilience Maturity Curve evaluates your region's four core resilience capacities to anticipate, adapt, absorb and transform. It recognises that regions and communities have varying resilience 'maturity', and that enhancing overall regional resilience depends on developing these capabilities. These capabilities can be strengthened through interventions that address both short-term and long-term regional resilience needs.

Pathways2Resilience's Resilience Maturity Curve self-assessment questionnaire assists you in assessing your region's resilience capacities. The questionnaire is aligned to the Regional Resilience Journey, including its key enabling conditions and adaptation investment cycle. This task involves completing the self-assessment questionnaire before using the insights gained from this assessment to identify gaps and develop a roadmap to improve your resilience maturity throughout the remainder of the Regional Resilience Journey.

Why is it important?

The Regional Resilience Journey empowers you to lead your region's transition to climate resilience. As such, it places particular emphasis on your region's anticipatory, adaptive, absorptive, and transformative capacities and related resources. Measuring your regional capabilities against these four capacities allows you to gain a comprehensive understanding of your region's current resilience maturity while also providing you with a measurable set of indicators against which to assess your region's ongoing progress to develop it.

Assessing these capabilities in sufficient detail is an important part to leveraging the key enabling conditions for your Regional Resilience Journey in the most effective and efficient way possible. It also serves to improve (stakeholder) awareness and understanding of the requirements of the different steps of the framework and thereby fosters a more informed and proactive community. The translation of your insights into a roadmap to improve your resilience maturity informs the (later) formulation of your shared vision, climate adaptation pathways and innovation portfolios, particularly in terms of the prioritisation of investments and other interventions. Establishing a shared understanding of current capabilities within your region can better ensure that any resources are strategically allocated.

Insight

Your journey to climate resilience will not be linear. You can retake the Resilience Maturity Curve self-assessment at any time, using it as a tool to continuously assess and monitor your progress.

How can you complete it?

You undertake this task by completing the *self-assessment questionnaire* and then using this knowledge to identify key resilience gaps to address and monitor over the remainder of the

Regional Resilience Journey. Specifically, this means you should step through the following activities:

- **Measure baseline resilience capacity**: Gain a comprehensive understanding of your current resilience levels in relation to the Regional Resilience Journey, by establishing your regional baseline.
- **Identify resilience gaps**: Pinpoint gaps in your resilience capacities in relation to the different tasks of the Regional Resilience Journey, to inform preparation of a roadmap for the targeted enhancement of your resilience maturity.
- **Identify key enabling conditions to leverage:** Determine the extent to which the key enabling conditions are currently being leveraged in the process of public policy innovation and change, to similarly inform preparation of your capabilities development roadmap.
- **Develop a roadmap to enhance resilience maturity**: Use information from the preceding activities to develop a roadmap to enhance your regional resilience capabilities. This should include any necessary skills and knowledge development, institutional development, as well as other activities relating to strengthening the enabling environment. It should also include the specification of relevant performance criteria by which to measure your progress in enhancing your resilience capabilities.
- **Share your assessment outcomes and roadmap with stakeholders:** Initiate meaningful dialogue to develop a shared understanding of your resilience maturity and roadmap among diverse stakeholders, to pave the way for collaborative efforts throughout the remainder of the Regional Resilience Journey.

To complete this task effectively, we strongly encourage you to engage a diverse group of stakeholders from your region, including local government representatives, community leaders, industry partners, and climate resilience experts.

What are key inputs for this task?

- Self-assessment questionnaire as part of the Resilience Maturity Curve framework.
- Stakeholder analysis (from Task 1.2.2)

What are the expected outputs from this task?

The principal output from this task is a roadmap against which to develop your region's resilience maturity. This is based on your region's adaptive capacity score from the Resilience Maturity Curve questionnaire, and which identifies your region's capacity gaps to undertake the Regional Resilience Journey. The score highlights areas where additional efforts are needed, especially in order to best leverage the key enabling conditions and develop your Climate Resilience Strategy and Climate Resilience Investment Plan. This roadmap provides focus to your efforts to strengthen resilience, guide strategic planning, and prioritise investments most effectively.

Checklist:		
Before moving on, have you:		
	Assessed capabilities, competencies and skills needed in the region to develop transformative adaptation pathways?	☐
	Identified resilience gaps?	☐
	Identified key enabling conditions to leverage?	☐
	Developed a roadmap to enhance resilience maturity?	☐

Explainer: Resilience Maturity Curve

The **Resilience Maturity Curve** is a comprehensive tool for monitoring, evaluation and learning to help assess regional transformative adaptation readiness.

The Resilience Maturity Curve evaluates a region's resilience against four core resilience capacities:

- **Anticipatory capacity:** The ability of systems, institutions and humans to anticipate, prepare and plan for future climate risks.
- **Absorptive capacity:** The ability of systems, institutions and humans to stabilise and resist the impact of climate change. This includes responding in ways that enable effective and feasible adaptation solutions.
- **Adaptive capacity:** The ability of systems, institutions and humans to adjust to potential damage, take advantage of opportunities, or respond to consequences.
- **Transformative capacity:** The ability of systems, institutions and humans to change the fundamental attributes of a system in response to climate and its effects.

Enhancing overall regional resilience depends on developing these capabilities. These capabilities can be strengthened through interventions that address both short-term and long-term regional resilience needs. Using the Resilience Maturity Curve to assess regional resilience results in a combined adaptative capacity score and climate risk score which can be used to improve regional understanding of its resilience levels in relation to the risks it faces (see image below).

Figure 6: Risk and capacity quadrant.

Phase 2 – Build a shared vision

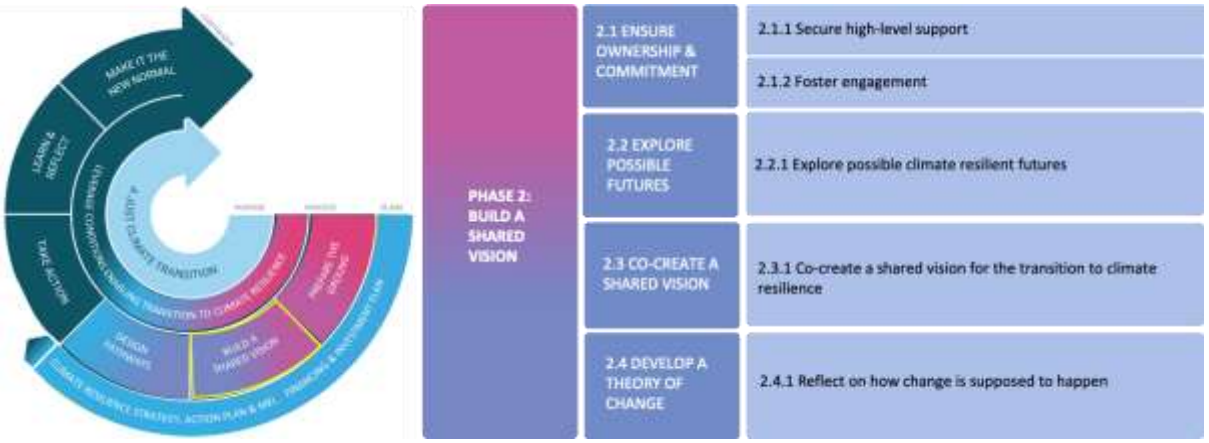

Figure 7: Phase 2 of the Regional Resilience Journey.

A critical step of your region's journey to climate resilience is co-developing a shared vision of your region's future climate resilient state together with stakeholders. This vision will guide your later activities to formulate your long-term Climate Resilient Strategy and Action Plan, and serves as the beacon towards which your region is heading.

This **second phase** is about **building a shared vision** by:

- **Ensuring ownership and commitment**: Developing strategies for meaningful and active engagement of relevant actors in the various tasks and outlining a decision-making process within your respective policy processes and political contexts leading to adoption of the Climate Resilience Strategy, Action Plan, and Investment Plans.
- **Exploring possible climate resilient futures**: Climate resilience can possibly be achieved by a range of different paths. Reflecting about possible different climate resilient futures is about exploring different and potentially transformational ways in which your region could choose to live under the evolving climatic conditions.
- **Co-creating a shared vision**: Building on the preparatory work completed in Phase 1, elaborating a common understanding of an ambitious, transformative, yet possible future for your region, which lays the ground for a cohesive narrative and clear sense of purpose and direction for the transition to climate resilience.
- **Developing a theory of change**: Giving more detail to your vision by reflecting on how change is supposed to happen, and to better understand and agree on the commitments and systemic changes that your region is willing to take to achieve that vision.

Meaningful and active engagement of relevant actors in the process of building a shared vision is critical to creating ownership of and commitment to both the process and vision. Exploring possible futures generates positive narratives and leads to a shared understanding of what a just climate transition should entail for the region, while identifying regionally specific potentials and levers of change. The co-created vision serves both as a mobilizing tool and a reference to keep regional stakeholders accountable.

The **outputs** of this phase will provide **key elements of your Climate Resilience Strategy**, including:

- A shared vision of the climate resilient future that the region wants to achieve, providing a compelling, engaged, co-created narrative that should allow you to mobilise stakeholders in your region required to implement and sustain your plan.
- A co-developed stakeholder engagement strategy and participatory design process, including the description of engagement mechanisms and structures. These can be planned or already established and should be linked to the key enabling conditions.
- An overview of identified regional transformation potentials and possible climate resilient futures, including the key enabling conditions that regions and communities would need to address and strengthen (building on the baseline assessment).

Fostering enabling conditions to build a shared vision: As you start building a collective vision, key enabling conditions guide you in uniting stakeholders, ensuring that diverse voices are heard, and setting a clear, shared direction for your region's future.

- In this phase, sustaining platforms for knowledge co-creation is crucial. By creating communities of practice and fostering inclusive knowledge exchange, you ensure that the shared vision is informed by a broad spectrum of perspectives, including indigenous and local knowledge. This approach allows for the exploration of innovative solutions and alternative futures.
- By securing political support and ensuring meaningful stakeholder engagement, you lay the groundwork for a shared vision that is both ambitious and achievable. Transparent communication and well-defined roles help maintain trust and collaboration throughout the process.
- Building the necessary internal capabilities is key to facilitating participatory processes. By enhancing skills in climate adaptation and stakeholder engagement, your team is better equipped to mediate discussions, foster collaboration, and incorporate lessons from other regions.
- Communication strategies that emphasise practical, relatable actions are essential for driving collective behavioural change. By tailoring information to specific stakeholder contexts and observing social dynamics, you can identify opportunities to promote system transformation and ensure that the vision is embraced by the community.
- Engaging in experimentation and collaborative learning promotes ownership and commitment among stakeholders. By setting learning as a core objective and implementing feedback mechanisms, you create a dynamic process where the shared vision evolves and adapts based on continuous input and reflection.
- Strategic alignment of financial resources with your long-term resilience goals is critical. Involving financial stakeholders early and exploring new opportunities for investment ensures that the shared vision is financially viable.

These enabling conditions (detailed further in Appendix D7)are the pillars that support the creation of a shared vision, ensuring that it is inclusive, actionable, and resilient.

Links to the Adaptation Investment Cycle: During this phase, the important interlinkages to be considered between the Adaptation Investment Cycle and the Regional Resilience Journey are described in Table .

Table 3: Linkages between the Regional Resilience Journey and the Adaptation Investment Cycle during Phase 2, including relevant inputs and outputs.

Regional Resilience Journey Phases and Tasks	Relevant Adaptation Investment Cycle inputs	Outputs relevant to Adaptation Investment Cycle
Phase 2: Build a shared vision		
Task 2.1 Ensure ownership and commitment	Preparatory work to develop an Investment Plan, including governance and stakeholder engagement approach can help with identifying and engaging stakeholders.	Commitment of relevant stakeholders.
Task 2.2 - Explore possible futures	Evidence identified in Adaptation Investment Cycle task 1.3 on current and future risks should help shape futures development.	The more detailed possible futures can also be useful to help inform the selection and expansion of future finance sources and instruments in Adaptation Investment Cycle Task 2.2 and 2.3.
Task 2.3 Co-create a shared vision for the transition to climate resilience	The additional sources of finance and/or instruments the region identifies in Adaptation Investment Cycle Task 2.2, as well as the changes to enabling conditions that are needed to achieve them can feed into the vision process.	The vision and objectives defined in this process are relevant for the objective setting in task 1.3 of the Adaptation Investment Cycle. They will also be useful to help inform the selection and expansion of future finance sources and instruments in Adaptation Investment Cycle Task 2.2 and 2.3.
Task 2.4: Develop a theory of change	Regions may wish to use the additional sources of finance and/or instruments the region identifies in Adaptation Investment Cycle Task 2.2, as well as the changes to enabling conditions that are needed to achieve them to develop a dedicated strand for finance in both the theory of change, and in the priorities for innovation portfolios.	The ToC will be useful to help inform the selection and expansion of future finance sources and instruments in Adaptation Investment Cycle Task 2.2 and 2.3. It will also be useful for framing the longlisting of options in Adaptation Investment Cycle Task 3.1 by setting out the broad framing for the pathways.

2.1 Ensure ownership and commitment

Task 2.1.1 Secure high-level support

What is this task about?

This task is about ensuring there is high-level support for the development and implementation of your Regional Resilience Journey. This task establishes how you will receive the necessary

endorsement and commitment from political leaders for your Climate Resilience Strategy and Investment Plan. It also outlines the way you will mainstream the Regional Resilience Journey into other policy areas: coordinating it with other (governmental) initiatives, integrating it into policy cycles, allocating sufficient resources to it and prioritising and harmonising its adaptation and resilience goals (social, ecological and economical) across public departments and agencies.

This task seeks opportunities for a whole-of-government approach. This involves engaging with colleagues in different departments and agencies in your local government. It also means moving beyond your region (e.g., to national or EU levels) to identify any obstacles to and opportunities for your Regional Resilience Journey, elaborating on the foundational analysis established in the baseline report of the relevant legal, institutional, and operational frameworks. It identifies common objectives and strengthens political buy-in and support from the other levels of government to coordinate actions, for example around policy alignment, investments, data collection and regulatory barriers.

Why is it important?

Local and regional political support is crucial for the implementation of your Climate Resilience Strategy. Your climate adaptation challenges will likely affect most sectors in your region and demand a coordinated long-term vision and ownership. Without high-level political endorsement and commitment, it will not be possible to achieve this. Multi-level collaboration will support the development of policies that promote and advance innovative actions to build resilience, as well as the refinement of policies and processes through innovation and experimentation. Moreover, it is essential to align policies, programmes and objectives, as well as to address policy and regulatory barriers, access funding, support capacity-building, and access data and knowledge.

How can you complete it?

Insight

This task resembles elements of the key enabling condition on governance and engagement. As such it embodies two different aspects, first the **development of a high-level engagement strategy and a roll-out plan** for decisions to be made, and after that the **implementation of these** across time.

The following activities correspond to the development of your high-level engagement strategy and should ideally be started after Phase 1:

- **Understand your current policy mix:** by mapping out the relevance of various EU, national, regional and local policies, strategies and programmes to your region's Climate Resilience Strategy. This includes policies that currently address climate adaptation issues, but also policies that might need to be reformulated due to the climate risks identified in Phase 1. Use these risks and the vision that you develop in Task 2.3.1 to raise awareness of the relevance and urgency of this change in policy logic.
- **Identify points of entry to policy cycles:** Make note of the relevant points in each policy cycle to present the outputs of the Regional Resilience Journey; and in what formats. Identify the outputs from the Regional Resilience Journey that need to feed into the design of relevant sectoral policies, and at what levels (e.g., strategic or programmatic level).
- **Map the bureaucratic processes that need to be considered in the development and endorsement of your Climate Resilience Strategy and Investment Plan.** Identify those

decision makers that would need to endorse your Climate Resilience Strategy at different points in time and clarify the sequential process to secure support across different institutions. Identify administrative processes at regional, national and EU level that would be required for your Climate Resilience Strategy to be recognised as a policy strategy by your local government. This analysis will help you to establish vital connections between your region's resilience efforts and existing policy structures.

- **Develop an initial 'policy roadmap' to mainstream your Climate Resilience Strategy**: Identify how to roll out your strategy implementation process given different levels of interest, resistance to change, and alignment between the policies influenced by the Climate Resilience Strategy.

To support the above process, we recommend consulting principles behind participatory methodologies to structure multi-stakeholder policymaking processes.

The following activities of disseminating and broadly mainstreaming your regional vision should take place perpetually along your journey:

- **Engage, communicate and collaborate with colleagues at the identified departments and/or agencies.** Foster these as ambassadors or internal champions for your Regional Resilience Journey. Use their multi-sector, multi-level knowledge to develop compelling arguments and materials about the urgency of accelerating the transition towards climate resilience tailored to political representatives at all levels of government (local, regional, national). Organise information sessions, workshops or webinars to inform the identified actors about regional climate challenges, and to engage them in decision-making, regional development processes and regional adaptation efforts.
- **Arrange meetings with political representatives** at local, regional and national levels to present your region's resilience context (using the baseline report) and discuss links with national and EU climate commitments. Highlight the bottlenecks hindering the acceleration of your region's climate resilience efforts and seek support and commitments from national ministries to address these challenges. Establish dialogues about the benefits of shared ownership of the journey as a policy strategy and objective.
- **Create or use existing forums for high-level, multi-level and multi-stakeholder collaboration.** Collaborate with other cities and regions aiming to accelerate their transition to climate resilience, along with national ministries and other relevant stakeholders, such as Research and Technology Organisations, national agencies, and universities. This will enable you to support your regional stakeholders to build high-level partnerships, exchange ideas and knowledge, and cultivate collaborations.

Gather explicit forms of support and commitment. Supporters can become signatories to the Regional Resilience Journey process or to specific outcomes, as well as provide letters of intent, be part of a list of official supporters hosted on your website, among other possibilities. Where possible, be explicit about the kind of support to be provided.

What are key inputs for the task?

- An understanding of existing EU, national, regional and local climate adaptation laws, strategies and policies
- The baseline report (output of phase 1), including planning objectives (Task 1.1.2), stakeholder mapping (Task 1.2.2) and climate risk assessment (Task 1.3.1)
- Set of alternative futures (Task 2.2.1) to persuade stakeholders of their vulnerability and/or potential contribution (as they become available)

- Co-created vision (Task 2.3.1) to demonstrate broad support for resilience objectives (as it becomes available)

What are the expected outputs?

- A roll-out plan/map of bureaucratic processes to be considered in the development and endorsement of your Climate Resilience Strategy and Investment Plan.
- A strategy for ensuring political buy-in from the different levels of government and departments within the public authority (especially at the regional level).
- Established formal and informal collaborations with institutions, initiatives, programmes and strategies beyond your region.
- Integration of the Climate Resilience Strategy (e.g.: planning objectives, vision, documents) into policy processes at different levels.
- Increased awareness among key stakeholders of the regional resilience context
- A set of demonstrably committed stakeholders to engage in and support the journey.

Checklist:		
Before moving on, have you:		
	Developed a roll-out plan/map of the bureaucratic processes to be considered in the development and endorsement of your Climate Resilience Strategy and Investment Plan	☐
	Developed a strategy for ensuring political buy-in and support from the different levels of government and departments within the public authority (especially at the regional level)	☐
	Contacted local, regional and national political representatives to inform them about regional climate risks, climate impacts and the governance framework to request political support?	☐
	Organised information sessions, workshops or other awareness-raising activities to inform key regional (and other) stakeholders of the regional climate context?	☐
	Informed high-level stakeholders and actor groups on how to participate in decision-making processes and regional adaptation activities?	☐

Task 2.1.2 Foster engagement

What is this task about?

This task is about developing and implementing a comprehensive stakeholder engagement strategy, defining the participation mechanisms available across the length of your journey. This gives clarity on the level of involvement for each stakeholder group in each of the planned activities in the Regional Resilience Journey. It defines which stakeholders you should engage in co-creation activities, which should be consulted, which should validate certain choices, and which should be informed. It also outlines the channels, methods and timing for engaging with the various stakeholders, and defines their potential roles in efforts to build regional resilience. The engagement strategy should serve to direct your communications with stakeholders to satisfy their relative levels of influence and interest. The task also encourages you to review your internal governance structures to incorporate the desired level of stakeholder participation.

Insight

As with Task 2.1.1, this task resembles elements of the key enabling condition on governance and engagement. As such it embodies two different aspects, first the **development of an engagement strategy and a roll-out plan** for decisions to be made, and after that the **implementation of these** across time.

Why is it important?

Meaningful and active involvement of relevant actors in the process of developing the Climate Resilience Strategy is critical to building ownership and commitment. Developing a detailed and comprehensive stakeholder engagement strategy defines the involvement of all relevant stakeholders within the activities of the Regional Resilience Journey and subsequent Climate Resilience Strategy implementation. It helps to manage stakeholder expectations, by facilitating their understanding of their potential roles, the timing of their involvement, and as well as their influence over the process.

Establishing safe spaces for stakeholders to convene and exchange ideas cultivates trust, fosters new partnerships, and creates opportunities for collaboration. Integrating stakeholders into the decision-making process brings diverse perspectives, expertise, and interests to the table. This leads to more informed, inclusive, and effective decisions that better serve the entire community.

How can you complete it?

- **Co-develop a comprehensive stakeholder engagement strategy** together with key actors, utilising the findings from the stakeholder mapping and analysis exercises in Task 1.2.2. This document should be co-developed with the key stakeholder groups to play major roles in the Regional Resilience Journey. Find inspiration in the many resources available in the Pathways2Resilience toolkit, such as this manual for stakeholder engagement. This strategy should include:
  - **Who:** to be involved (individuals, organisations and stakeholder groups), their potential roles and collaboration objectives.
  - **How:**
    - For each output (e.g.: planning objectives, vision, action plan), define the role of stakeholders and the participation process to be used (including preliminary agendas and required time commitment);
    - Include which channels and tools will be used (e.g.: on-site workshop sessions, online surveys, participation platform, official website/email);
    - Clarify logistical arrangements and support available (e.g.: day-care, compensation to participants for attendance or travel).
  - **When:** clarify the timeline when stakeholders will be approached, and when specific contributions will be most valuable.
  - **Define:** principles for effective and equitable participation, including conflict resolution practices and institutional accountability.
  - **Communications:** develop a broad awareness raising strategy towards ensuring the public (particularly those stakeholder groups that are critical to be informed but don't have a defined active role) is aware of the Regional Resilience Journey and attracting a significant amount of participation to each of the participatory processes.

- **Start to implement this stakeholder engagement strategy through:**
  - **Establishing 'safe spaces' for discussion, collaboration, and knowledge exchange** among formal government institutions, the private sector, academia and research, and civil society. These spaces, whether physical or online, should be founded on principles of trust, equality, and inclusiveness. Typically, a neutral facilitator is needed to effectively manage interactions between participating stakeholders. Take inspiration on how to develop in person co-creation exchanges, by reading the AGORA Guidance on design and implementation of the in-person agora.
  - **Establishing participatory mechanisms** such as community hubs, climate action hubs, citizen assemblies, advisory committees, urban labs, or community workshops as dedicated spaces for community engagement and coordination for any projects impacting climate change adaptation (see resources in the toolkit for more details into each of these). These processes help ensure that local resilience development and policy-making are more inclusive, transparent, and responsive to the needs and preferences of the community.
  - **Raising awareness about the regional resilience context** with relevant stakeholders. Create communication materials and organise information sessions and workshops to enhance stakeholders' understanding of regional climate challenges and potential adaptations. Ensure Regional Resilience Journey outputs, particularly insights and strategic decisions, are shared widely.
  - **Involving regional stakeholders in regional decision-making, development processes and adaptation efforts**. Identify ambassadors among these stakeholders with whom to collaborate, thereby helping to engage more actors in your region's resilience journey. Establishing structures of continuous participation for these stakeholders.

What are key inputs for the task?

- Stakeholder mapping and analysis (from 1.2.2 and 2.1.1)

What are the expected outputs?

- A comprehensive stakeholder engagement strategy
- Physical and/or online platforms for stakeholders to meet, exchange and collaborate on adaptation efforts.
- Participatory governance processes in place to meaningfully involve local stakeholders in the decision-making processes related to regional resilience.

Checklist:		
Before moving on, have you:		
	Co-created a stakeholder engagement strategy with key stakeholders?	☐
	Established platforms for local and regional stakeholders to meet, exchange ideas and build partnerships?	☐
	Implemented frameworks to ensure local and regional stakeholders can effectively participate in regional decision-making processes?	☐

2.2 Explore possible futures

Task 2.2.1 Explore possible climate resilient futures

What is this task about?

This task is about exploring a range of alternative desirable futures for your region considering the future climate risks it may face. Exploring alternative futures is the first step in helping your region develop its shared vision and move beyond a narrow understanding of climate adaptation towards one that treats climate resilience as a central organising principle. It is intended to stimulate stakeholder thinking about alternative desirable versions of what the future could look like, informing ideas to then be used to ground development of the shared vision.

The futures developed in this task differ from the risk-based scenarios in Task 1.3.1 in that these do not inform quantitative, risk-based projections, but are rather more qualitative, narrative descriptions of future states that encompass multiple dimensions. The risk-based scenarios inform you about the (uncertain) range of future risks your region may face and their impacts. The futures developed in this task explore the alternative ways your region could choose to live under the range of potential risk-based scenario conditions.

For this task, a future is understood to consist of a storyline or narrative description of alternative sets of social, ecological, and technical dimensions that govern the overall organisation and functioning of your region. Desirable futures are those that embody key **principles** and address the key challenges that your region would like to address. Your region's climate resilience will be one challenge, while the other challenges and principles to be addressed will be specific to your region's context and history.

Insight

For the implementation of this task, it is advised to procure assistance from an experienced futures facilitator. Using these methods effectively and in a participatory setting requires good facilitation.

Why is it important?

Exploring desirable futures is pivotal in taking the decisions to collectively shape your region's transition to climate resilience while recognising the inherent climate and socioeconomic uncertainties you face. By envisioning diverse futures, including those involving smooth or abrupt transitions, you gain invaluable insights into what a just climate transition means for different people, as well as the complex interplay of factors that shape climate resilience. It also opens stakeholders up to the possibility of creating new futures and exploring their roles in that process.

These futures can expand the possibilities for your region's climate transformational adaptation vision. It provides you with a structured way to imagine possibilities for your region beyond business as usual, rooted in past, present, and emergent trends.

How can you complete it?

- **Agree on the challenges that your futures need to address so that these would be considered desirable**. Building on the initial set of problem/challenge statements framed during Task 1.1.2, agree on the set of challenges to be addressed in your

alternative futures. Start with your drivers of climate risk, before including the other challenges that your region is seeking to address, such as inequality, regional development, wellbeing, etc. These should be aligned with your planning objectives. It is important to focus on the most important challenges for your region, and not try to cover everything.

- **Understand what is already changing and how these changes affect your region's future**. The methodology most used for this purpose is called 'horizon scanning', which systematically detects early signals of potentially important developments. It is a method to identify emergent changes occurring in both your region and elsewhere that exert influence on the future. In particular, consider how the potential development of your climate risks will influence your broader system in the short-, medium and long-terms.
- **Select a small set of these changes and use them to explore how the future might look.** Select those changes that are most relevant for your region (i.e. 'drivers' of change), e.g., because they have the highest impact, and/or because you see them as emergent opportunities. It is important to include at least one climate driver in this exercise. To map how these futures might look, there are several methodologies, detailed in Appendix D8. Choose a methodology based on your available time and resources.
- **Identify key levers of change for each desirable future**. For the alternative desirable futures developed, identify the main "levers" or "drivers" of change that would allow your region to achieve that future. These will feed into Task 2.4.1.
- **Develop narratives and/or visuals representing the selected futures**: Select a few alternative futures to translate into a short narrative and/or visual to use in the remainder of the participatory process (between 2-5). This narrative describes how you will live in each future, encompassing its social, ecological, technical, political, and other dimensions. It also identifies what are the main features of this future and what makes it unique.

Futures development benefits from engaging a diverse set of stakeholders with different perspectives. To keep this process manageable, it is better to work with a small group of between 8-30 people (depending on the availability of facilitators, with at least 1 facilitator per 8 people). We suggest conducting this process with a selected set of representative stakeholders. This should include vulnerable groups, youth, private sector and key industries in your region, public sector representatives, and other interest groups on relevant matters that affect your region. It is important to include representation of everyone who is thinking and working towards the future of your region, especially those who are often not given a voice.

Further detailed technical guidance on completing this task, along with useful tools and methods, can be found in Appendix D8.

What are key inputs for the task?

- Initial problem framing developed in Task 1.1.2, to provide you with your initial set of future challenges.
- System map developed in Task 1.2.1, to provide you with clear boundaries of the system, and help you identify key drivers.
- Stakeholder map of Task 1.2.2, to help you identify who can drive or influence these futures, who will be affected, and who should be involved in your conversations.

- The risk-based scenarios developed for the Climate Risk Assessment (Task 1.3.1), and the results from the assessment of these.

What are the expected outputs?

- A small set of qualitative narratives of desirable alternative futures that can be shared and discussed with stakeholders.

Checklist:		
Before moving on, have you:		
	Identified drivers and seeds of change with a wide set of stakeholders?	☐
	Outlined at least 2 and max 5 alternative futures and developed narratives for them?	☐
	Identified key levers of change for each desirable future?	☐

2.3 Co-create a shared vision for the transition to climate resilience

Task 2.3.1 Co-create a shared vision for the transition to climate resilience

What is this task about?

This task is about the co-creation of a shared vision, supported by a wide and meaningful participatory process. A vision is a shared understanding of where the region wants to be in the future and what are the desired changes that need to take place. A good vision is ambitious and transformative – while remaining possible – and specifies a clear time frame for its realisation. It provides alignment to all stakeholders on the scope and priorities of their climate resilience journey.

This task is the kickstart of your wider engagement activities (Tasks 2.1.1 and 2.1.2). The task involves facilitating the necessary discussions to contextualise and align stakeholders as well as refine and validate the outputs from other tasks. It also serves as a key decision-making moment to ensure stakeholder priorities are fully represented in the Phase 3 strategy building activities. It creates a culture of participation, through training and enabling stakeholders to meaningfully contribute to the process, thereby beneficially serving the region along the remainder of its journey. This task is relevant to many of the other tasks in the Regional Resilience Journey, and helps to ensure high levels of stakeholder validation, legitimacy and quality in the produced outputs and decisions.

Why is it important?

Fostering a shared vision within a diverse set of stakeholders is a vital step towards creating a cohesive narrative and a clear sense of purpose and direction. The vision serves as the underlying foundation for the key components of the Climate Resilience Strategy (adaptation pathways and innovation portfolio), as well as your Climate Resilience Investment Plan. Realising this vision is what your Climate Resilience Strategy should be working towards. The vision is a compelling, engaging, co-created narrative that allows you to mobilise the necessary stakeholders in your region to implement and sustain your plan.

A vision that is meaningfully co-created with stakeholders gauges the extent of their aspirations, contemplates the various avenues to realising these, and identifies potential challenges in advance. By collaboratively crafting a new narrative, grounded in collective

insights and intentions, a profound understanding and sense of ownership is cultivated. Establishing the shared perspective also expands what is perceived as achievable, and underscores the essential actions required to realise these outcomes within local systems.

How can you complete it?

This task can be completed in three sub steps: contextualise, develop the vision, and communicate. Each of the steps should be completed using the most appropriate forms of engagement methodologies (as outlined in your stakeholder engagement strategy). Ideally, the process is performed across multiple sessions (supported by an online platform) but, depending on the capacities, resources and time available, can be completed in a single full day session:

- **Contextualise:**
  - **Set the stage:** provide clarity to your stakeholders on the process, goals and expected outcomes of the process, and how their input is going to shape the vision and further steps of the Regional Resilience Journey. Some considerations:
    - Hold in-person events, such as informational sessions and/or press conferences;
    - Create a webpage for the initiative that is proportional to your capacity to maintain and update with content;
    - Have a clear point of contact (e.g.: email address or phone number).
  - **Contextualise stakeholders:** align stakeholders' understanding on critical work done so far (e.g.: baseline report, climate risk assessment), making sure all are operating from a similar level of knowledge regarding the biophysical, socio-economic and institutional context of the region. This can be a combination of explanatory materials and in-person workshop/discussion.
  - **Refinement and validation of outputs:** several tasks (e.g.: problem framing (Task 1.1.2), systems/stakeholder mapping (Task 1.2)) require broader stakeholder validation and should be revisited prior to moving onto the visioning. Provide an efficient process for stakeholders to meaningfully revise these outputs as needed, which can take the form of live discussions/workshops supplemented by asynchronous communication (e.g.: emails/surveys). As a minimum, agree on a revised initial problem framing of planning objectives (including both *primary adaptation* and *secondary resilience* objectives and associated performance metrics) before moving onto the visioning activity.
- **Co-develop a shared vision:**
  - **Formulate guiding principles:** co-develop a set of principles to guide decision making and prioritisation. Principles are rules or guidelines that shape and inform decision making and planning. The principles that you define as a region are meant to complement the objectives of your strategy and should be sufficiently specific and clear to be evaluated, either at the level of process (was the process conducted following the principles) or outcomes (are the results aligned with the principles). Importantly, these principles should be sufficiently clear to help you select your adaptation options, pathways and innovation portfolios. According to the GUIDE framework for good principles, some helpful questions to have well-defined principles include:
    - Guiding: Is this principle providing our adaptation journey guidance?
    - Useful: Is it useful?
    - Inspiring: Is it inspiring?
    - Developmental: Does it support us in learning, growing and adapting?

- Evaluable: Is the principle clear enough that we can evaluate it?

Food for thought

Being able to evaluate a set of principles does not imply that these need to be attached to a quantitative target. It means that you need to have a clear plan to understand whether and how the principle has been followed, and if it has led to the results that you envisioned. For example, if we take Murphy's low-expectations principle of pessimism: "Whatever can go wrong, will go wrong", we can evaluate it by asking: "What are the reasons that things go wrong? What are the reasons by which something might have gone wrong but did not?" [2]

- **Debate possible futures:** explore and discuss the desirability of the various alternative futures (Task 2.2.1) with different stakeholders, based on their preferences, expectations, and ways of living. Explore how different stakeholders see themselves in each of these futures, and which one seems more desirable to each of them. Find a common ground or boundaries under which you can start crafting your vision.
- **Agree on a shared vision:** through a participatory decision-making process (suggested examples: consent decision-making and participatory approaches), agree on a vision (including at least a future narrative, guiding principles, planning objectives, performance metrics and timeframe) that receives a high degree of support and legitimacy among regional stakeholders.
  - Example questions to guide this discussion include:
    - What is the timeframe for this vision? Think of a timeframe that is relevant to your adaptation challenges.
    - What are the unique strengths, capabilities and opportunities in your region? Which vision will inspire these to grow and more to emerge?
    - What are key risks and vulnerabilities that you need to address? Consider the results from Task 1.3.1.
- **Develop a narrative that summarises the key elements of your vision.** This can be accompanied by visuals, sound or other elements.
  - Develop a title and short narrative for your vision: Keep the title short, and in your narrative, think of the social, ecological, economic and technological implications of your vision. This can help you build a short, compelling story of how your region would look like in the future time frame.

- **Communicate the agreed vision:** spread the co-developed vision through a comprehensive campaign including visuals and key messages (as per the approach defined in 2.1.1).
  - Gather high-level support for the vision through gathering signatories
  - Promote the vision in regional events and international conferences where relevant

Insight

It is important to keep your vision accountable and relevant throughout the process of the Regional Resilience Journey and the Climate Resilience Strategy implementation. The vision reflects your stakeholders' aspirations, hopes and needs; hence it should guide the following steps in the process. Concretely, this means to assess the relevant outputs of Phase 3, such as the adaptation pathways and innovation portfolio with respect to the vision and its principles.

[2] Example taken from the book " Principle Focused Evaluation: The Guide" by Michael Patton.

In your MEL plan, you can use your principles to evaluate your activities and outputs. Last, it is important to keep your vision relevant, and adjust it to new knowledge and circumstance, as you adjust your Climate Resilience Strategy.

What are key inputs for the task?

- Baseline report from Phase 1 (including climate risk assessment, systems mapping, problem framing, etc.)
- Set of alternative futures developed in Task 2.2.1
- Stakeholder engagement strategy developed in Task 2.1.2
- All outputs from tasks that require alignment, refinement, validation or decision-making

What are the expected outputs?

- A vision for your region, with a clear timeframe and narrative, which is shared and resonates with a broad majority of regional stakeholder.
- Guiding principles that can support prioritisation decisions in later tasks.

Checklist:		
Before moving on, have you:		
	Enabled stakeholders to participate meaningfully through creating shared understanding of the journey process and outputs?	☐
	Refined journey outputs (so far) through stakeholder inputs and validation?	☐
	Formulated guiding principles for prioritisation?	☐
	Agreed on a shared vision (deciding on a future narrative, timeframe, set of guiding principles and planning objectives) to guide the journey?	☐

2.4 Develop a theory of change

Task 2.4.1 Reflect on how change is supposed to happen

What is this task about?

This task details your vision and its high-level outcomes, to better understand and agree on the broad systemic changes your region needs to make to achieve its vision. This task improves your understanding about and makes explicit these changes, how different stakeholders may benefit from and/or respond to them, as well as the degree of change your stakeholders will be willing to engage in. It helps you to better understand the series of assumptions underlying your vision (i.e., the underlying, often implicit, beliefs that are used to understand how processes of change happen), which then help you to identify the key dependencies, needs and weaknesses in your vision moving forward.

As your vision is long-term and exposed to a wide variety of uncertainties, it is not the intention of this task to identify the specific activities or interventions to be taken to achieve the vision. Rather, the task is principally concerned with identifying the preferred *chains of outcomes* to transition your region towards climate resilience in the short-, medium- and long-terms.

Insight

"Changes" and "outcomes" are not activities or their results (their outputs) but the changes that these actions bring about. For example, if an activity is to develop a stakeholder forum on a topic, the result (output) may be the number and diversity of people that participate. The outcome (the change) may be the connections that this activity creates: how people took the conversations into their own context and workplaces, etc., which can then activate other changes.

Why is it important?

Your vision provides you with a high-level understanding of where your region wants to be in the future. It needs to be translated into a series of more concrete systemic changes and their associated requirements and outcomes for your various regional sectors and groups. This serves to clarify the scope, level of ambition and commitment that achieving the vision will entail for the regional stakeholders involved. These series of systemic changes and sectoral requirements are used in Phase 3 to guide the formulation of your adaptation pathways and innovation portfolio.

Explainer: What do we mean by 'change'?

A change describes a behaviour, involving regional actors doing something differently. One useful way of understanding change is as combination of motivation, capability and opportunity framework.

- Capability: the psychological or physical ability to enact a behaviour
- Motivation: reflective and automatic mechanisms that activate or inhibit a behaviour
- Opportunity: physical and social environment that enables the behaviour.

For example, if you want to improve the resilience of your region to heat stress, regional actors need to know and understand heat management strategies (e.g., through training on heat resistant retrofitting), be motivated to be prepared (e.g., through raised awareness of heat risk and feeling ownership of their role in the region's heat adaptation strategy), but also have access to the physical and environmental infrastructures that allow them to respond to heat stress (e.g., subsidies available for retrofitting and existing economic structures to provide needed materials and service).

In a complex setting like this, not every stakeholder group needs to change in the same way, but many may need to contribute to the solution. This is where considerations of power become important – which stakeholders have more capacity to respond to a given problem? Who will benefit, who will lose?

How can you complete it?

We strongly suggest developing this task in a participatory workshop setting, led by a facilitator familiar with Theory of Change methodologies. This participatory workshop can take 1 or 2 days, depending on resources and availability of participants.

To complete this task, we suggest a participatory workshop setting conducted in two broad stages: (i) defining the broad systemic changes and high-level outcomes needed to achieve the vision, as well as their underlying assumptions and (ii) aligning these changes and outcomes with the principles, planning objectives and performance metrics identified previously.

For part **(i) defining the broad systemic changes and high-level outcomes**, we suggest the following activities:

- **Revisit your vision developed in in 2.3.1 and the system map developed in 1.2.1**: This will provide the basic context for your discussions in terms of what are the changes you want to achieve, in which timeframe, as well as what are the systems in which you would need to intervene to achieve that vision.
- **Identify the "changes" that underpin your vision:** Start with the longer-term changes, followed by mid and shorter-term changes. Express these changes in terms of outcomes: how would your region, or a specific part of your region, look like once that change takes place?
- **Review, consolidate and analyse these changes and outcomes**, ensuring that you have covered all the sectors and relevant stakeholder groups that you identified in your systems and stakeholder map; considering not only positive changes, but also what needs to diminish to be discontinued; what conflicts could emerge and how could these be addressed.
- **Identify your underlying assumptions:** When you are describing outcomes, there are implicit assumptions about factors, internal and external, that are likely to affect the success of the initiative. These can be positive (enablers) or negative (risks). Identify these.

For part **(ii) aligning these changes and outcomes with the principles and planning objectives**, the following activities are suggested:

- **Cross-check your chain of outcomes with your guiding principles and updated planning objectives and performance metrics** (from Task 2.3.1) and revise them accordingly.
- **Share your aligned high-level outcomes, assumptions, principles and objectives with other stakeholders:** Translate the outputs from the above activity into a simplified diagram and a short narrative to share with other stakeholders. In the Appendix you can find examples that you can use as inspiration.

Further detailed technical guidance on completing this task, along with useful tools and methods, can be found in Appendix D9.

What are key inputs for the task?

- A general understanding of your baseline assessment and systems map, including why the current system is not fit for purpose and the innovations or changes that may be already happening or relevant to your region.
- Stakeholder mapping, to understand who could serve as change agent in your region and which groups would be affected by these changes.
- Shared vision (including updated problem framing) developed in Task 2.3.1.

What are the expected outputs?

The key outputs from this task are a clear set of changes necessary to translate your vision into more concrete outcomes for your region that will guide subsequent tasks of the Regional Resilience Journey. These are combined with the set of key underlying assumptions to be shared with stakeholders in order to generate a common understanding of the underlying rationale for selecting the various interventions and innovations to affect these changes during Phase 3.

Checklist:		
Before moving on, have you:		
	Developed a shared understanding of the key changes that need to happen for your vision to be accomplished, translated into a graphic and a narrative.	☐
	Identified a set of assumptions that underlie your vision?	☐
	Shared this graphic, narrative and set of assumptions with key stakeholders and incorporated or addressed their feedback?	☐

Phase 3 – Design Pathways

Figure 8: Phase 3 of the Regional Resilience Journey.

The third phase of the Regional Resilience Journey focuses on turning your vision into actionable climate adaptation pathways. Designing these pathways involves:

- **Identifying and assessing options**: Exploring a wide range of potential adaptation options to reduce risks and achieve the vision, while evaluating their applicability, performance against risks, overall benefits, adverse effects, trade-offs, and synergies.
- **Designing a portfolio of interventions:** Formulating adaptation pathways to realise your region's shared vision by sequencing prioritised options over time, identifying key decision points, and selecting a diverse array of innovations—from technical solutions to institutional, social, and behavioural changes—to create comprehensive climate resilience strategies.
- **Preparing for implementation:** Once the Climate Resilience Strategy is in place, a detailed Action Plan must be developed to guide implementation over the next three to five years, alongside a Monitoring, Evaluation, and Learning Plan to track progress, encourage learning, and allow for adjustment.

Climate Resilient Strategies to both adapt to climate change and transition towards resilience bring together interventions across multiple levers of change in a coherent portfolio of actions, outlining how each intervention contributes towards the desired vision. These strategies rely upon structured and evidence-based decision-making—supported by monitoring—that ensures efforts align with the overarching shared vision and that their activities, outputs and outcomes can be prioritised and sequenced over time.

Your Climate Resilience Strategy is rooted in your Theory of Change, which outlines how and why the desired transformations will occur, based on a set of agreed assumptions. From this foundation, specific adaptation options and innovative actions can be identified to meet both your region's adaptation and resilience objectives. Climate adaptation pathways are designed to include a sufficient range of options to achieve long-term transformational goals, complemented by an innovation portfolio to both enable these and enhance overall system resilience. Co-creation of your Climate Resilience Strategy brings together existing policies and new or accelerated interventions into a transformative action plan aligned with your shared vision.

Stakeholder involvement is critical to this process. It refines and validates the adaptation options and pathways, fosters ownership and support for the actions within the Climate Resilience Strategy, and ensures accountability to the co-created vision established in earlier phases.

A well-designed Climate Resilience Strategy delivers early wins that mitigate risks and contribute to long-term resilience and societal transformation. It must also balance these immediate successes with future uncertainties, incorporating innovative experiments to generate insights for future decisions. This process should be guided by an iterative, continuously improving Monitoring, Evaluation, and Learning framework to ensure ongoing adaptation and refinement.

The **outputs** of this phase contribute the final key elements to **build your Climate Resilience Strategy** and **Action Plan**, including:

- A description of the climate adaptation pathways, outlining a sequence of actions drawn from a range of adaptation options. This should include an assessment of the effectiveness of identified options and their needs in terms of enabling conditions.
- A description of the short-term and mid-term activities that the region will conduct to implement its adaptation strategy, including priority of these actions, roles, responsibilities, and resources.
- A monitoring, evaluation and learning framework for implementing the action plan, adaptation pathways, and investment plan. This should include a description of how different actions contribute to the desired outcomes and changes and identify how to monitor progress.
- A portfolio of innovation actions) in support of the adaptation pathways.

Fostering enabling conditions to define pathways: The **'Define pathways'** phase requires careful planning, informed decision-making, and inclusive collaboration. The conditions presented below are designed to support these needs comprehensively:

- Promoting interdisciplinary knowledge exchange is essential for understanding the effectiveness of various adaptation options. By leveraging historical data, learning from other regions, and employing supportive technologies, you can ensure that your region's chosen strategies are grounded in evidence and tailored to your context.
- Sustaining ongoing collaboration between climate information users, producers, and stakeholders is key to aligning adaptation priorities. By integrating formal policy mechanisms with innovative practices from private and grassroots sectors, you ensure that the pathways you define are inclusive, equitable, and reflective of diverse needs.
- Building the right capabilities and skills is crucial for the long-term success of your adaptation pathways. This involves ensuring that your region is prepared to implement and sustain the adaptation options that will drive your journey forward.
- Encouraging creative thinking and promoting public and social innovations that inspire behavioural shifts are key strategies at this stage. This approach helps to ensure that the pathways chosen are not only viable but also supported by the community.
- Engaging in continuous experimentation, learning, and reflection allows your region to test and refine adaptation options. By integrating these practices into long-term policies and establishing robust monitoring frameworks, you ensure that your pathways remain flexible and responsive to evolving challenges.

- Mobilising and diversifying funding sources is essential to support the implementation of your pathways. By aligning financial resources with your resilience goals, and fostering multi-sector financing collaborations, you create a sustainable financial foundation that enables your region to progress confidently along its chosen path.

In Appendix D10 you will find more concrete enabling actions supporting the implementation of the points above.

Links to the Adaptation Investment Cycle: During this phase, the important interlinkages to be considered between the Adaptation Investment Cycle and the Regional Resilience Journey are described in Table .

Table 4: Linkages between the Regional Resilience Journey and the Adaptation Investment Cycle during Phase 3, including relevant inputs and outputs.

Regional Resilience Journey Phases and Tasks	Relevant Adaptation Investment Cycle inputs	Outputs relevant to Adaptation Investment Cycle
Phase 3: Design pathways		
Task 3.1 Identify and assess options	This Task is undertake in parallel with Adaptation Investment Cycle Task 3.1. The economic evaluation can be used to feed into the broader evaluation.	The options identified in this Task are also those used in Adaptation Investment Cycle Task 3.1, to help assess benefits. They can be used as options in Task 3.2 to help inform the sequencing approach.
Task 3.2 Co-design a portfolio of interventions	The assessment of adaptation options and sequencing in Adaptation Investment Cycle Task 3.2 can be used as an input into the formulation and evaluation of pathways. The barriers to new financing options in Adaptation Investment Cycle Task 2.2 can be used to shape priorities for financial innovation in the innovation portfolio.	The formulation and evaluation of pathways can be used as inputs into the sequencing from adaptation and economic perspectives in Adaptation Investment Cycle Task 3.2.
Task 3.3: Preparing for implementation	The pipeline of bankable priorities, as well as the actions identified to improve the enabling conditions for adaptation finance (Adaptation Investment Cycle Task 4.3) should be included in the action plan. Task 4.1 of the Adaptation Investment Cycle will also ensure that each action has a strong economic case that meets the region's financing requirements, whilst Task 4.2 will ensure that each action has an agreed financing approach.	The action plan of actions can be used as checklist to help build the economic and financial cases in Adaptation Investment Cycle task 4.1, as well as to confirm financial models for each action are in place as in Adaptation Investment Cycle Task 4.2.

3.1 Identify and assess options for adaptation pathways

Task 3.1.1 Identify options for adaptation pathways

What is this task about?

This task consists of identifying a wide array of potential adaptation options that can be used to reduce risks and contribute to achieving the envisioned outcomes and delivering the identified outcomes from Task 2.4.1. It involves researching best practices from similar contexts or regions, as well as engaging with stakeholders to gather ideas, insights, and interests. It is important to consider a diverse range – or portfolio – of options, recognising that singular solutions are likely to be insufficient given the complexity and uncertainties involved in addressing climate challenges and building broad-based systemic resilience. The key is to identify a portfolio of multiple options that will provide you with sufficient flexibility to adapt to the evolving circumstances.

By exploring the available options (technological, informational, nature-based, community-based, financial, governance, behavioural, structural) at different levels (e.g., from individual to regional, national, European) and across various sectors, you will better understand the landscape of possible interventions for your region. This will help to identify those options that can best address the targeted climate risks assessed in the CRA (Task 1.3.1), and includes the following principal activities:

- Research potential interventions
- Stakeholder consultation
- Co-creation workshops
- Screening and broad categorisation

Food for thought

As part of this task, it is crucial to ensure that the collected adaptation options reflect a diverse and sufficient range of possibilities to address various future scenarios. Refine your search for adaptation options by thinking about non-conventional alternatives or areas that have not been explored so far. Also, adjust your stakeholder engagement strategies to capture additional perspectives that may lead to more innovative and transformative ideas.

Why is it important?

Identifying a variety of possible interventions for adapting and transforming towards climate resilience is critical for assembling the possible steppingstones for the climate adaptation pathways. There will be multiple ways to bring about the necessary changes to help you achieve your vision and the agreed changes that will have to happen to achieve it. Identifying options provides you with a comprehensive understanding of the various adaptation approaches, and actions available to your region. The comparative strengths and weaknesses of these options can then be assessed for inclusion in your adaptation pathways. Identifying options of the Climate Resilience Strategy. It also encourages exploration of more innovative and novel solutions that may be more effective than traditional grey solutions at building sustainable resilience to climate change.

Thorough exploration also seeks to capture localised knowledge and expertise and create stakeholder buy-in through meaningful engagement and consideration of their preferred options. The latter is particularly crucial for the success of your Climate Resilience Strategy.

Overall, this task helps you to build a broad portfolio of diverse adaptation options to address the multi-faceted effects of climate change comprehensively – from managing and mitigating climate impacts to tackling their underlying risk and vulnerability drivers.

How can you complete it?

- **Research potential interventions**: Study existing climate risk management plans and adaptation strategies from similar contexts or regions experiencing similar climate risks to your region. Look at the empirical evidence of successes and failures in existing catalogues of good adaptation practices, case studies under similar conditions, scientific research, and other reports and resources. Analyse these for their, as well as the replicability and scalability to your own context. Find initial inspiration in the Pathways2Resilience Catalogue of Innovative and Transformative Options.
- **Co-creation with stakeholders**: Based on your stakeholder engagement strategy (Task 2.1.2), involve relevant stakeholders, including local communities, industry experts, sectoral representatives, scientists and researchers, and policymakers, to gather a broad perspective on possible adaptation options. Both stakeholder groups impacted by climate risks as well as those impacted by the adaptation options should be included in this process. Facilitate co-creation workshops (e.g., brainstorming sessions) with them to generate a range of innovative and transformative solutions.
- **Adopt a systemic perspective:** Foster thinking of more interconnected, systemic, and multi-functional interventions aiming to address not only direct risks, but also indirect and cascading ones. Think of transformative approaches that recognise the complexity of climate change and challenge existing systems to achieve better resilience outcomes.
- **Categorisation and screening**: Develop an inventory of identified adaptation options (e.g., scale, type, sector, addressed hazards or impact, timeframe, etc.).

While some options may align with your region's social, technical, economic, environmental, and institutional capacities and conditions, we encourage you to consider also options that go beyond incremental changes and lead to profound, systemic transformation. Be sure the set of options is coherent with the outlined ambitions and Theory of Change for your region.

Insight

Narrow down the broad list of potential adaptation strategies to a more manageable and relevant set of options. To do so, you need to consider several factors: consistency with the framed problem (Task 1.1.2), local capacities and adaptation needs (Task 1.3.2), alignment with the priorities, dynamics, and conditions of your region (Task 1.2.1), as well as the shared vision and Theory of Change (Tasks 2.3.1 & 2.4.1), and stakeholders' input gathered during the co-creation activities in this task and the rest of the journey. This facilitates a detailed analysis and further prioritisation in subsequent tasks.

Further detailed technical guidance on completing this task can be found in Appendix D11. This step is completed in parallel with Task 3.1 of the Adaptation Investment Cycle guidance.

What are key inputs for the task?

- Updated problem framing (Task 1.1.2)
- Systems mapping (Task 1.2.1)
- Stakeholders mapping (Task 1.2.2)
- Climate Risk Assessment (Task 1.3.1)

- Capabilities assessment (Task 1.3.2)
- Shared vision for climate resilience (Task 2.3.1)
- Theory of Change (Task 2.4.1)

You may also wish to draw inspiration from other areas such Pathways2Resilience's Catalogue of Innovative and Transformative Options and its additional resources, work underway by other regions in the Pathways2Resilience Innovation Practice Groups, as well as examples from the MIP4Adapt Platform, ClimateADAPT, and similar adaptation repositories.

What are the expected outputs?

The key output from this task is a preliminary list of adaptation options consisting of various types of measures across multiple sectors and at different scales, classified according to key relevant considerations.

Checklist:		
Before moving on, have you:		
	Developed a comprehensive and diverse list of adaptation options to address the targeted climate risk(s) and resilience needs?	☐
	Engaged multiple stakeholders, including actors from various sectors and community members affected by both climate risks and adaptation process, to identify and select adaptation options for your region?	☐
	Aligned the adaptation options with the results of the climate risk assessment and co-created shared vision?	☐

Explainer: Nomenclature of adaptation action

In the context of climate risk management and adaptation, several key terms are frequently used to describe the actions employed to address climate risks. These include:

- **Adaptation option:** referring to the array of strategies and measures available and deemed appropriate to meet the needs of addressing climate risks (IPCC, 2014).
- **Adaptation measure:** referring to the full range of actions and techniques available to reduce the damage and disruption caused by extreme climate events (AIDR, 1998).
- **Adaptation strategy:** referring to a structured organisation of prioritised and necessary measures that are logically connected to achieve specific outcomes related to climate risk management (Walz et al., 2021).
- **Intervention:** referring to human-induced change processes (adapted from Fekete et al., 2022) consisting of multiple actions and supporting or enabling activities implemented on the ground that focus on helping people adapt to identified climate risks (adapted from GIZ et al., 2020).
    - **Approach:** referring to the method or means used to implement one or more actions (i.e., measures, interventions, strategies), guided by specific goals such as enhancing resilience (Walz et al., 2021).

- **Response:** referring to the actions taken before, during, and immediately after a disaster strikes to minimise its effects and ensure that those affected receive prompt relief and support (IDRM, 2019).

More recent terms that have also become associated with adaptation action include:

- **Adaptation solutions:** referring to technologies, products, or services that can help manage or transfer physical climate risks and their impacts (adapted from Trabacchi et al., 2019)
- **Adaptations:** referring to initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects (https://pedrr.org/glossary/).

The similarities between these terms are self-evident. In practice, they are often applied interchangeably, or their use can depend on the specific discipline or context being discussed. This is in addition to other often used terms, such as *adaptation practices*, *technologies*, and *policies*; *risk reduction*, *mitigation*, *prevention* or *treatment*; or *prevention*, *preparedness*, and *control activities*.

All these terms essentially describe actions to take to build resilience to climate change. Regardless of the terminology used, we recommend focussing on every option that contributes to your overall goals, namely, to enhance resilience to the impacts of climate change.

Task 3.1.2 Assess the effectiveness of options for adaptation pathways

What is this task about?

This task is about appraising and analysing the applicability of each identified option and its potential performance against the identified risks (from Task 1.3.1), including overall benefits, adverse effects, trade-offs and potential synergies. This consists of screening each identified adaptation option to determine its capacity and effectiveness in achieving the multiple planning objectives, as well as its capacity to drive positive system change. It also involves analysing and understanding the key enabling conditions necessary for their successful implementation; essential to achieving the desired transformation. Guided by the Theory of Change (Task 2.4.1), this analysis provides an overview of potential building blocks of the best possible set of interventions, including insights into what works, why it works, and what resources and support structures are required for success.

Food for thought

While the primary focus should be on adaptation options that are currently available and appropriate, it is also important to remain open to those transformational options that are not feasible at present. These options should be kept under consideration and actively explored for future implementation, provided the necessary enabling conditions are developed. This ensures that immediate needs are met while also paving the way for transformational strategies in the long term, as knowledge, technology, and climate change progress.

Assessing adaptation options encompasses the following main activities. These activities should be completed in parallel with Task 3.1 of the Adaptation Investment Cycle.

- Establish option evaluation criteria
- Conduct feasibility assessment (technical, economic, financial and social)
- Futures testing and robustness analysis
- Stakeholder review and validation
- Prioritise optionsPrioritize interventions and measures.
- Communicate and disseminate decisions.

Why is it important?

Assessing adaptation options allows you to craft a win-win strategy, considering not only overall benefits and synergies but also adverse effects and trade-offs. By identifying options that are effective in addressing climate risks (i.e., risk mitigation) as well as contributing positively to other societal goals through wider co-benefits (e.g. job creation, public health, social well-being, economic development, etc.), you can achieve your *primary adaptation objectives* while also achieving your other objectives relating to your wider regional economic, social and environmental policy goals. This empowers you to prioritise positive impact while unlocking the potential for readily available and transformative options – a critical aspect of the Climate Resilience Strategy.

The prioritised adaptation options form the building blocks for your Climate Resilience Strategy. They are crucial for developing your adaptation pathways (Tasks 3.2.1 & 3.2.2) and innovation portfolios (Task 3.2.3).

How can you complete it?

To appraise your adaptation options, complete the following activities.

- **Establish option evaluation criteria**: identify key criteria (more information provided in Appendix D12) for the characterisation, appraisal, and prioritisation of the adaptation options. This includes the performance metrics to assess the *impacts* of your adaptation pathways against your planning objectives and progress towards your vision (Task 1.1.2, revised in Phase 2). But it also includes additional criteria relating to, e.g., *adaptivity*, *implementation feasibility*, and *transitional qualities*. It is important to ensure the criteria reflect community values, priorities, and needs, and are suitable for your region's conditions, objectives, and capabilities.
- **Conduct feasibility studies**: undertake the studies necessary to evaluate the technical, economic, financial, social, environmental, and institutional feasibility for the options. This includes analysing the key enabling conditions for each adaptation option and comparing these to the local conditions, capabilities, and resources. To adopt a more transformative lens, we encourage you to consider the Multiple Resilience Dividends framework. This framework helps you to recognise adaptation measures capable of achieving multiple benefits and planning objectives in terms of risk reduction and other sectoral or social goals regardless of a disaster event while guiding your selection towards *low-regret options*— adaptation efforts that do not lock in unsustainable practices or create new vulnerabilities.
- **Analyse opportunities:** Analyse the key enabling conditions under which conditions adaptation options may become more feasible, practical, impactful, or attractive in the future. This involves thorough examination of the technical, economic, financial, social, environmental, and institutional factors that could influence the feasibility/

implementation of these options, considering changes over time such as climate conditions, emerging technologies, societal values, and policy landscapes. This analysis can be especially valuable for adaptation options that seem to be more transformative and innovative but are currently considered less feasible given existing constraints (e.g., due to technological immaturity, financial barriers, or social resistance) or uncertainties, but can still play a crucial role in long-term planning. Take note of any factors influencing their realisation and potential timing as these will feed into the formulation of your pathways, innovation portfolio and Action Plan in later tasks.

- **Stakeholder review and validation**: according to the stakeholder engagement strategy (Task 2.1.2), involve wider stakeholder groups affected directly and indirectly by both climate risk(s) and adaptation options to present the assessment results. Gather their feedback and revise the assessment based on their input. This can support the decision-making process, ensuring that decisions are aligned with the needs and expectations of key stakeholders.
- **Prioritise options**: compare each option's potential capacity to achieve the set of planning objectives and deliver multiple resilience dividends (*impacts*, i.e., net benefits from adaptation options), as well as their relative *adaptivity* (e.g. robustness/flexibility), *implementation feasibility*, and *transitional qualities* (e.g. transformative power). Rank them according to these aspects against a weighted set of criteria. Prioritise adaptation options that best balance the weighted criteria, concentrating on currently available adaptation options with a higher capacity to drive more profound change.

Insight

Building on the climate-resilient futures developed in Task 2.2.1, analyse how various factors—technical, economic, financial, social, institutional, and environmental—enhance or hinder the feasibility of certain options over time. This analysis may consider changes in current conditions such as the following: upgrades to existing adaptation measures, sudden availability of capital for specific options like Nature-based Solutions (NbS), changes in regulatory and policy frameworks, the emergence of new markets (e.g., ecosystem services) or incentives, advancements in nascent technologies (e.g., artificial intelligence, big data, the Internet of Things), and shifts in public risk perception and tolerance due to the increasing frequency and intensity of climate-related events.

- **Stakeholder review and validation**: according to the stakeholder engagement strategy (Task 2.1.2), involve wider stakeholder groups affected directly and indirectly by both climate risks and adaptation options to present the assessment results. Gather their feedback and revise the assessment based on their input. This can support the decision-making process, ensuring that decisions are aligned with the needs and expectations of key stakeholders.
- **Prioritise options**: compare each option's potential capacity to achieve your set of planning objectives (Task 1.1.2) and deliver multiple resilience dividends (*impacts*, i.e., net benefits from adaptation options), as well as their relative *adaptivity* (e.g. robustness/flexibility), *implementation feasibility*, and *transitional qualities* (e.g. transformative power). Rank them according to these aspects against a weighted set of criteria. Prioritise adaptation options that best balance the weighted criteria, concentrating on currently available adaptation options with a higher capacity to drive more profound change.

For the Investment Plan development, Adaptation Investment Cycle Task 3.1 places particular emphasis on identifying the varying benefits of different options and their relative sizes, to help with the economic and financial appraisal and sequencing of options. The assessment undertaken in Adaptation Investment Cycle Task 3.1 should be used as the input to the economic and financial viability criterion for this assessment. Further information on how to complete the economic appraisal is provided in Task 3.1 of the Adaptation Investment Cycle guidance.

Further detailed technical guidance on completing this task can be found in Appendix D12.

What are key inputs for the task?

- Updated problem framing (Task 1.1.2)
- Climate Risk Assessment (Task 1.3.1)
- Capabilities Assessment (Task 1.3.2)
- Shared vision for climate resilience (Task 2.3.1)
- List of identified options (Task 3.1.1)
- The assessment of economic benefits identified in Task 3.1 of the Adaptation Investment Cycle Guidance (completed in parallel)

What are the expected outputs?

- A set of suitable adaptation options to address your planning objectives and deliver the necessary outcomes to build towards your future vision. This consists of a summary including relevant aspects of the assessment process (options characterisation, selection criteria, social preferences, and prioritisation methods).
- A set of suitable adaptation options to address the prioritised current and future climate risk(s) in your region and to achieve the desired changes to climate resilience (vision). This consists of a summary including relevant aspects of the assessment process (options characterisation, selection criteria, social preferences, and prioritisation methods).

Checklist:		
Before moving on, have you:		
	Involved stakeholders in the prioritisation exercise to ensure buy/in?	☐
	Developed a comprehensive assessment of identified adaptation options?	☐
	Prioritised a set of adaptation options readily available and locally appropriate for the targeted climate risks?	☐
	Analysed opportunities for implementing transformative and innovative adaptation options under future conditions?	☐

Explainer: Multiple Resilience Dividends

The Multiple Resilience Dividends concept illustrates how resilience interventions can yield substantial, multifaceted benefits in our systems and societies. Here, Resilience Dividend refers to the net benefits of investing in resilience-building, where "net" means the differential impact of a resilience intervention compared to a pre-intervention situation and accounts for the full range of benefits, implementation costs, adverse effects, and trade-offs. This balanced analysis of resilience dividends, in which overall positive and negative effects of adaptation actions are

considered in the decision-making, can significantly improve adaptation planning. It also better-links adaptation options to integrated sets of planning objectives, such as those envisaged in the Regional Resilience Journey.

The MRD conceives adaptation measures as interventions that impact various sectors, such as food, land-use, water, health, energy, or ecosystems, on different domains (e.g., social, economic, cultural, environmental, institutional, political, and technological). Given the interconnected nature of systems, resilience dividends are delivered via direct, cascading, and spill over effects extending across the system and result in synergies with other societal objectives and needs (e.g., job creation, gender equality, biodiversity conservation). Under this perspective, climate adaptation itself yields a spectrum of effects beyond the scope of disaster risk reduction, and thus, can be considered as a cross-cutting developmental aspect. For example, ecosystem restoration as an adaptation measure can yield a wide range of environmental benefits, such as biodiversity conservation, habitat creation, carbon sequestration, prevention of soil erosion and land degradation, and socio-economic benefits, which may include secure livelihoods, social cohesion, recreation areas, increased water security, enhanced food security, and tourism. When combined, these benefits can surpass the avoided losses and damages and, most importantly, the costs incurred in the rehabilitation process.

Assessing adaptation options against MRD is important for building a broader value proposition for investing in adaptation. By embracing the MRD concept, it is possible to achieve multiple goals (or planning objectives) while addressing and managing risks effectively and sufficiently. This thinking offers an alternative to the traditional appraisal of adaptation options that includes often single-sector approaches that do not consider wider system interdependencies (i.e., synergies and trade-offs between different sectors). Hence, decision-makers in the region can transcend the traditional focus of disaster reduction and build a strong business case for investing in climate adaptation, presenting it as an opportunity to leverage broader development objectives; a catalyst for growth and shared prosperity.

3.2 Design a portfolio of interventions

Task 3.2.1 Formulate pathways to climate resilience

What is this task about?

This task involves the formulation of adaptation pathways to help realise your region's climate resilient shared vision (Task 2.3.1). In practice, this consists of sequencing the prioritised adaptation options (Task 3.1.2) over time, before using these sequences to identify the future key adaptation decision moments for your region. Options are sequenced and assessed for their cumulative performance against your *primary adaptation objectives* (i.e. to manage risks, defined in Task 1.2.1) as conditions continually evolve according to the assumed Theory of Change (Task 2.4.1). Sequencing is also important to ensure that options match with the available resources in the region. The resulting pathways should inject and illustrate the flexibility present in your adaptation planning. In practice, this means that short-term measures should ideally leave multiple options open to scale up adaptation action in the future as climate and socioeconomic conditions evolve. Engage your stakeholders in the pathways formulation processes as per your stakeholder engagement strategy (Task 2.1.1).

This involves:

- Selecting promising – and preferably 'low-regret' – adaptation options (e.g. climate smart decisions, adaptive measures) to implement in the short-term and identifying (and, where possible, quantifying) their adaptation limits (i.e., the conditions under which an option will no longer achieve the primary adaptation objectives).
- Selecting additional adaptation options to be implemented when the adaptation limits to the short-term options are reached or when new opportunities emerge (e.g. technological progress, policy change, or shifts in socioeconomic conditions).
- Continually iterating; identifying the next options to be implemented and their associated adaptation limits until you also consider options which will be effective under long-term and more extreme scenarios (developed during Task 1.3.1).

The task should be completed in parallel with Task 3.2 of the Adaptation Investment Cycle.

Why is it important?

The formulation of adaptation pathways supports flexible, robust and proactive long-term planning. Adaptation pathways acknowledge that the future is uncertain and allow for strategic adjustments to be made through time as conditions evolve and new information becomes available or as conditions evolve. They progress your region towards realising its vision – regardless of the climate or socioeconomic conditions that emerge – by scaling up adaptation action as needed. They are therefore capable of responding to the assumption present within your Theory of Change (Task 2.4.1).

Adaptation pathways enable more robust decision-making by assessing the ability of pathways to achieve set risk reduction goals across the plausible range of future conditions. This makes investing in adaptation more financially feasible by distributing these investments over time. It also minimises the chances of being 'locked-in' to an adaptation trajectory that is unsuited or otherwise maladaptive to the key drivers of risk. Formulating pathways encourages you to consider which adaptation options are more compatible with each other (and which are not), as well as which options are reversible, easy-to-adjust and/or scalable to the future climate or socio-economic conditions that may emerge.

Explainer: Adaptation pathways

What are they?

Adaptation pathways are sequences of adaptation measures to flexibly address climate risks through time.

Adaptation pathways are flexible, dynamic sequences of options designed to address uncertain climate risks over time. They ensure that planning objectives are met as conditions evolve, making them ideal for decision-making in deeply uncertain environments with potentially significant future climate impacts (Mendoza et al., 2018). Initially developed for water management (Haasnoot et al., 2013), adaptation pathways have since been applied across various sectors, including water resources, coastal and flood management, agriculture, forestry, climate mitigation, natural resource management, sustainable development, transport, and urban planning (Haasnoot et al., in review).

Multiple adaptation pathways can achieve long-term goals, each with distinct benefits and trade-offs. These pathways include short-, medium-, and long-term adaptation options, with the flexibility to switch courses as conditions change. Short-term measures—often low- or no-regret adaptation options—are implemented immediately, while medium- and long-term

options are reserved for future risks, deployed as needed based on how conditions unfold. If greater change occurs, more impactful measures may be required; if change is less severe, fewer measures may suffice.

How are they visualised?

Adaptation pathways can be visualised in an adaptation pathways map – a metro-map-inspired infographic that indicates the potential adaptation limits associated with each measure (sequence) as the conditions change. Alternative pathways can be evaluated using a variety of evaluation methods including scorecards, multi-criteria analysis, or cost-benefit analysis. The below figure shows an example pathways map with scorecard.

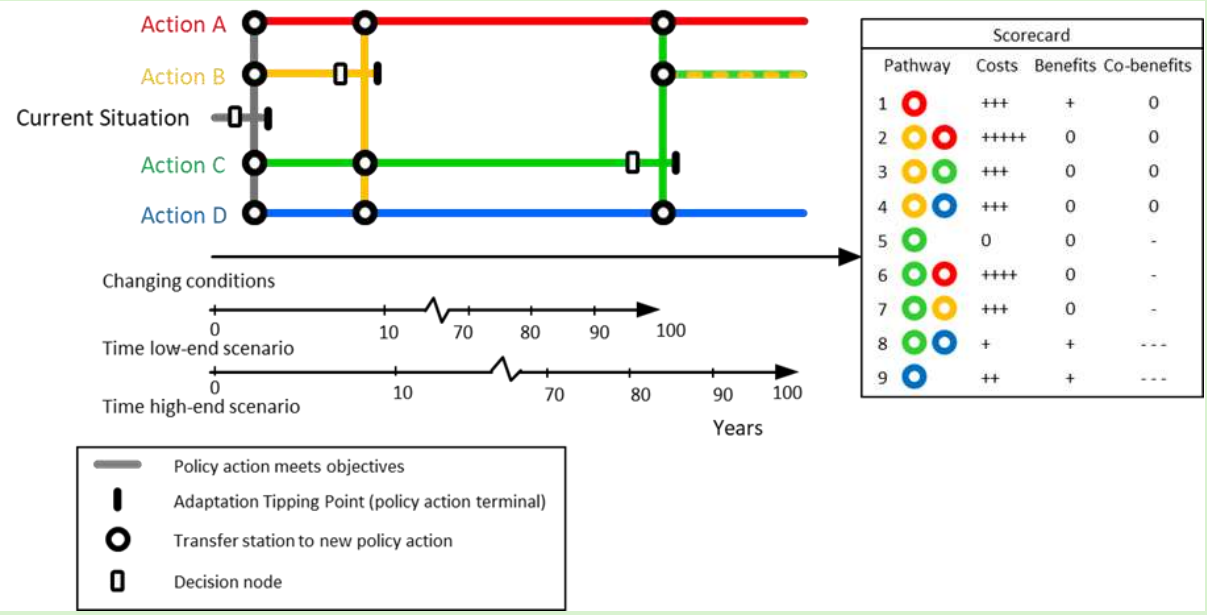

Figure 9: Typical metro-map to visualise adaptation pathways, including symbols to indicate transfer stations from one adaptation measure to another, adaptation limits (or tipping points) or effectiveness of each measure (sequence), and decision nodes to indicate the timing of the associated adaptation decision in recognition of the next measure's lead time (adapted from Haasnoot et al., 2013)

References

Mendoza, G, Jeuken, A, Matthews, J, Kucharski, J, Gilroy, K, Ray, P, Brown, C (2018). Climate Risk Informed Decision Analysis (CRIDA) - Collaborative water resources planning for an uncertain future.

Haasnoot, M, Kwakkel, JH, Walker, WE, ter Maat, J (2013). Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world, *Global Environmental Change*, 23 (2), 485-498. https://doi.org/10.1016/j.gloenvcha.2012.12.006

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Hallegatte, S (2009). Strategies to adapt to an uncertain climate change. *Global Environmental Change*, 19 (2), 240-247. https://doi.org/10.1016/j.gloenvcha.2008.12.003

How can you complete it?

You can choose to develop qualitative, semi-quantitative or quantitative adaptation pathways. The steps to be followed to develop pathways are similar in all three cases; and are outlined below. Draw your options from which to build your pathways from the list you prioritised in

Task 3.1.2 and with reference to both your shared vision (Task 2.3.1) and Theory of Change (Task 2.4.1).

- **Characterise your promising adaptation options** as either *short-*, *medium-* or *long-term* – based on the level of potential regret attached to the option; the timing of the risks (from Task 1.3.1); the effectiveness of the option in reducing risks; the implementation feasibility of the options (from Task 3.1.2); as well as when the costs and benefits will arise (from Adaptation Investment Cycle Task 3.2).
- **Identify potential adaptation limits** for the considered adaptation options. These are points at which further adaptation will be required. Estimate/calculate potential timings for these conditions being reached in the various risk-based scenarios (developed in Task 1.3.1).
- **Explore logical combinations of short-, medium- and long-term options**, thereby building alternative pathways to address risks into the future.
- **Visualise your pathways alternatives** in the form of a table, metro-map, or similar. Use this visualisation to identify those moments in time when key adaptation decisions will need to be taken. That is, when a decision *must* be made relating to the overarching strategic direction that may lock out other options.

An example characterisation of options (including identification of adaptation limits) is shown overleaf in Table , while example pathways visualisations are provided in Appendix D13.

For the Investment Plan development, Adaptation Investment Cycle Task 3.2 emphasises the economic and financing considerations for prioritising and sequencing options according to their relative benefits, costs and timing for these effects being experienced. The assessment undertaken in Adaptation Investment Cycle Task 3.2 should be completed in parallel with the characterisation activity in this task. Further information on the economic and financing aspects of sequencing options is provided in Task 3.2 of the Adaptation Investment Cycle guidance.

Further detailed technical guidance on completing this task, along with useful tools and methods, can be found in Appendix D13.

Food for thought

Whether you develop qualitative, semi-quantitative or quantitative pathways depends primarily on two factors: (1) availability of data and models to calculate the indicators associated with your primary adaptation objectives for each option (i.e., the extent to which quantification is possible), and (2) the degree of quantification required to take the investment decision to commence implementation of your pathways. Quantitative assessments may help to build confidence in the pathways, but this is not always possible to perform given time, data, capacity and budget constraints.

Consider to what extent will quantifying the effects of your options and pathways change the outcomes of your analysis?

What are key inputs for the task?

- Updated problem framing (Task 1.1.2)
- Climate Risk Assessment (Task 1.3.1)
- Shared vision for climate resilience (Task 2.3.1)
- Theory of Change (Task 2.4.1)

- Prioritised list of assessed options (Task 2.3.2)
- The assessment of economic and financing sequencing considerations identified in Task 3.2 of the Adaptation Investment Cycle Guidance (completed in parallel)

What are the expected outputs?

The key outputs from this task are a set of alternative adaptation pathways which could be implemented to reach and/or maintain your adaptation objective(s). We recommend you also visualize all pathways alternatives, to aid in stakeholder communication. The pathways should all perform similarly in terms of your adaptation objective(s) (i.e. they should sufficiently address your climate risks). But they may perform differently in relation to your secondary planning objectives and may even negatively impact some of these. Such trade-offs are explored and evaluated in Task 3.2.2.

Checklist:		
Before moving on, have you:		
	Identified key short-, medium- and long-term adaptation options?	☐
	Assessed the limits of each adaptation option, at least in qualitative terms (relative timing of adaptation limits for all options under increasing climate change)?	☐
	Developed multiple sequences of adaptation options that address adaptation needs in the short-, medium- and long-term, resulting in a set of alternative pathways to evaluate in the next task?	☐
	Visualized the pathways alternatives in a comprehensible way, for communication to stakeholders?	☐

Table 5: Example initial (qualitative) sequencing approach to adaptation pathways for flood risk management.

Options		Adaptation criteria					Economic criteria				Pathways Input		
Name	Option type	Potential regret	Adaptation effectiveness*	Timing of adaptation limit*	Indicative co-benefits**	Lead time***	Urgency of action	Indicative economic benefits	When costs arise	When benefits arise	When should the action happen?		
											Short	Med	Long
Early warning system extension	*No-regrets*	*Low*	*Exposure reduction (casualties): Med*	*Expected annual casualties > threshold: 2035*	*Addresses social vulnerabilities: Low*	*1 year*	*High*	*High*	*Now*	*Now*	X		
Resettlement with coastal and river planning	*Adaptive management*	*High*	*Exposure reduction (damages): High*	*Flooding EAD > threshold: 2100+*	*Climate smart spatial planning, addresses social vulnerabilities, restores coastal/river biodiversity, etc.: High*	*25+ years*	*Low*	*Medium*	*Future*	*Future*			X
Climate proof highways	*Climate Smart*	*Low*	*Exposure & Vulnerability reduction (damages): High*	*Flooding EAD > threshold: 2075*	*Maintains transport corridors and associated economic activities, aids in disaster response/recovery: Med*	*5 years*	*High*	*High*	*Now*	*Future*	X		
NBS in built environment	*No-regrets*	*Low*	*Hazard reduction (runoff, delays flood peaks): Med*	*Flooding EAD > threshold: 2045*	*Restores biodiversity, addresses heat stress, provides public recreation areas, etc.: High*	*10 years*	*Med*	*Med*	*Now*	*Now*		X	

* Risk reduction impacts and timings can be expressed either quantitatively or qualitatively depending on your selected assessment methodology. Separate impact assessments should be completed for each option against each of the primary adaptation objectives.
** Secondary impacts can be expressed either quantitatively or qualitatively depending on your selected assessment methodologies. Separate impact assessments may be completed for each option against each of the secondary resilience objectives.
*** Lead time refers to the length of time to address any implementation feasibility concerns and/or for the likely emergence of favourable opportunity conditions (based on analyses completed in Task 3.1.2)

Task 3.2.2 Evaluate pathways to climate resilience

What is this task about?

This task consists of evaluating the performance of the adaptation pathways you have formulated in Task 3.2.1 against the *secondary resilience objectives* (Task 1.1.2) and to ensure that they remain flexible, consistent, feasible, robust and effective in terms of their *adaptation performance* across the planning time horizon. The evaluation provides an explicit indication regarding how well your various alternative pathways will help to achieve your shared vision (Task 2.3.1) and in accordance with your Theory of Change (Task 2.4.1). The task reveals which pathway alternatives best achieve *both* the primary adaptation and secondary resilience objectives, as well as which ones can perform and adapt best your specific context considering the planning uncertainties. The resulting few prioritised (i.e. preferred) adaptation pathways become the core of your Climate Resilience Strategy. Be sure to engage your stakeholders in the evaluation processes as per your stakeholder engagement strategy (Task 2.1.1).

Evaluating your pathways consists of:

- Selecting an evaluation methodology (e.g., scorecards, multicriteria analysis, etc.) and associated evaluation criteria with which to prioritise your preferred set of adaptation pathways.
- Reaching an agreement on the relative importance of each criterion and its associated indicators (i.e., weighting).
- Ranking your adaptation pathway alternatives according to their integrated performance/impacts to select a few preferred pathways, to be included in your Climate Resilience Strategy.

Why is it important?

Carrying out an evaluation of your adaptation pathways allows you to filter the potentially large number of potential pathways (developed in Task 3.2.1) and prioritise a more manageable number of best performing ones for inclusion in your Climate Resilience Strategy. Performing the evaluation also ensures that the preferred pathways not only allow you to achieve your prioritised primary adaptation objectives, but also perform as desired in terms of your secondary resilience objectives and other relevant evaluation criteria. This allows you to prioritise those pathways best capable of adapting to the uncertain climate and socioeconomic conditions that may emerge, and thereby stimulate your region's transition towards its shared vision and climate resilience.

How can you complete it?

As per the previous task, you can evaluate your pathways using qualitative, semi-quantitative or quantitative methods. Whichever method is selected, this involves stepping through the following activities. The engagement of stakeholders in pathways evaluation activities is critical to ensure broad agreement for and ownership over the Climate Resilience Strategy.

- **Select the preferred pathways prioritisation methodology and associated evaluation criteria**: determine which evaluation methodology you will use to evaluate your alternative pathways. Common methodologies include Multi-Criteria Analysis, Social Return of Investment, Cost-Benefit analysis, Cost-effectiveness, Social return of investment (SROI), or a combination of these. The criteria to include in your

methodology should evaluate the performance of the pathways in terms of your *broader resilience objectives*, as well as additional criteria relating to their implementation and delivery (either drawn or amalgamated from the set of options evaluation criteria from Task 3.1.2. e.g. costs, adaptivity, implementation feasibility, transitional qualities).

- **Evaluate the performance of pathways alternatives:** against the specified set of evaluation criteria using your selected methodology. This should highlight the inherent synergies and trade-offs present in each of the pathways in terms of achieving the planning objectives and transitioning your region towards its vision.
- **Rank the overall performance of each pathway alternative**: by aggregating the results of the individual evaluation criteria for each pathway and ranking their comparative abilities to improve your region's resilience.
- **Select the best performing pathways and visualise them in a simplified pathways map**

Further detailed technical guidance on completing this task, along with useful tools and methods, can be found in Appendix D14.

What are key inputs for the task?

- Updated problem framing (Task 1.1.2)
- Shared vision for climate resilience (Task 2.3.1) and the
- Theory of Change (Task 2.4.1)
- List of adaptation pathways alternatives (Task 3.2.1)

What are the expected outputs?

The key outputs from this task are a limited set of preferred adaptation pathways (i.e., 3-4 pathways) to include in the Climate Resilience Strategy for implementation. Each of these pathways should achieve the identified primary adaptation objectives, as well as performing sufficiently well against the remaining secondary resilience objectives and criteria. The preferred pathways serve as inputs to Task 3.3 of the Adaptation Investment Cycle guidance to develop the necessary Investment Strategies to mobilise the associated finance.

Checklist:		
Before moving on, have you:		
	Evaluated your set of alternative pathways against their abilities to achieve the integrated set planning objectives and other associated evaluation criteria?	☐
	Identified 3-4 best performing pathways to be included in the Climate Resilience Strategy?	☐
	Visualised the best performing pathways for communication to stakeholders?	☐

Task 3.2.3 Develop a portfolio of innovation actions

What is this task about?

This task aims to identify a portfolio of innovation actions[3] to support and accelerate the impact of your adaptation pathways. Effectively addressing adaptation and climate resilience requires a holistic approach that considers a broad spectrum of innovations, ranging from technical solutions to changes in institutions, norms, values, and behaviours. The purpose of these innovations is to drive the implementation of the pathways and to develop them into comprehensive, whole-of-system climate resilience strategies.

Innovation actions are those social, public and technical innovations that can support and unlock the associated short, mid and long-term changes needed to implement the adaptation pathways, all the while maximising co-benefits for citizens and communities. These actions differ to adaptation options in that they *complement*, *facilitate* or *enable* these options, but do not *directly* address risks in the same way. Innovation actions are organised around your region's shared goals, resources, and activities identified when developing your shared vision (Task 2.3.1) and Theory of Change (Task 2.3.2). Taken collectively, they are called innovation portfolios or innovation portfolios – logical sets of innovation actions expected to work and be managed together. Innovation portfolios are supported by an innovation policy mix, skills and capability building, regulatory changes, etc. The design and implementation of an innovation portfolio is an iterative process, whereby the portfolio is implemented and assessed against a specified set of innovation objectives and metrics, revised and realigned to the context of new knowledge and understanding of your adaptation challenge.

Explainer: Innovation Portfolio

An innovation portfolio is a document and a strategy to identify, support and scale key innovations that can help a region to achieve a specific set of objectives. In the context of Pathways2Resilience, it refers to a strategic document that identifies a series of innovation actions that can be supported by your region to supplement the implementation of your adaptation pathways, and to enhance the co-benefits and outcomes emerging from these pathways. It also refers to the process of defining, activating and sustaining the implementation of these innovation actions in the short and longer term. Importantly, it seeks to mobilise the goals and activities of the private sector and citizens, identifying opportunities to innovate where outcomes might benefit many stakeholder groups.

Innovation portfolios as we use them in Pathways2Resilience, are inspired by the concept of Transformative Innovation (TI), which seeks to reorient innovation policy, away from solely economic growth and towards addressing societal challenges (Schot & Steinmueller, 2018). This approach is being implemented in the EU at various levels, under the label of "missions", "mission-oriented innovation policy" or "challenge-oriented innovation policy". This framework recognises that to address societal challenges, research and innovation should be combined with broader changes in the economy and society. Transformative Innovation policies are highly aligned with regional and place-based approaches to innovation, since they focus on the specific capacities, opportunities and challenges relevant to a specific community.

[3] *Any set of actions that takes existing and/or new knowledge and transforms it into products, frameworks or services that add value to one or more specific groups. Value, in this case, is understood in the broader sense, not only monetary value but also improvements in quality of life (human and non-human).*

The European Commission provides several strategic frameworks and programmes that support EU regions to use innovation as a driver of climate resilience. Most saliently, the European Green Deal with multiple targets and instruments to achieve a net zero economy by 2050, National Recovery and Resilience plans (NRRPs) with 37% of the budget focused on climate action; Cohesion Policy Funds including specific objective for investment promotion of climate adaptation and disaster risk prevention. More explicitly, EU Research and Innovation Policy has increasingly focused on climate mitigation and adaptation. Horizon Europe phase 2021-2027 contains a specific pillar on Climate, Energy and Mobility; and supports the new EU Mission "Adaptation to Climate Change" with exclusive focus on this topic (Harding et al., 2024). In addition, Smart Specialisation strategies (S3) can be reoriented to address sustainability and climate challenges. (Reid et al., 2023)

Innovation portfolio thinking responds to the need to consider more transformative approaches to adaptation. This means moving beyond a focus on reducing short term risks towards solutions that reorganise key systems to address social needs and services in new and more resilient ways. Transformative adaptation is a challenging, longer-term process that requires change at many levels, not just implementation of technical or regulatory solutions, but changes in, e.g., the productive base of a region, the phasing out of unsustainable practices and systems, changes in relationships and social norms, as well as understandings of identity and what citizens value. The climate risks that your region needs to address might introduce opportunities to rethink radically new ways of organizing your region and its territory. Taking an innovation perspective in the way you approach your climate adaptation strategy and plan recognises that some of the options to enable your adaptation pathways might not exist today; that they will require experimentation, testing and learning. It also acknowledges that the public sector can benefit from mobilizing the knowledge and resources of the private sector and citizens.

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Why is it important?

An innovation portfolio enhances the transformation potential of your region's climate adaptation pathways, by enabling a set of supportive innovation actions that seek to expand the potential co-benefits of the selected adaptation options. It complements your adaptation pathways by identifying specific technological, social, environmental, and economic innovations to catalyse transformation. It can also help to address any shortcomings your adaptation pathways may have in achieving your secondary resilience objectives.

Each individual and combination of innovation actions within the portfolio can bring concrete, short, mid- and long-term co-benefits to citizens and communities, and thereby sustain momentum for the implementation of the adaptation pathways. For instance, if a region selects to 'establish early warning systems', then it could identify innovation actions that create business opportunities around early warning systems, and/or businesses that benefit from the technological developments and upgraded skills required to implement these systems, in other areas.

How can you complete it?

This task benefits from the inputs and ideas of stakeholders both on the supply side (innovators, in the broad sense, including social and public innovation) as well as demand (potential users). While this task is not meant to be as participatory as those of Phase 2, it's good to identify a small, representative group of stakeholders to work with you through the process, including business representatives, investors, academia, NGOs and citizens organisations, and a good representation of different public sector agencies involved in the Regional Resilience Journey process.

The innovation portfolio is generated based on inputs from various steps along the Regional Resilience Journey.

- **Identify innovation actions to build up your portfolio.** Using your preferred adaptation pathways as a basis (Task 3.2.1), commence building up the innovation portfolio for your region. The innovation portfolio supplements the adaptation options selected. Innovation actions are identified through an open call, where your region's local government defines which options of your adaptation pathways to cover, and what information you are seeking to gather from other stakeholders. The innovations identified through the call are then selected through a collaborative, multistakeholder workshop, in which participants define the right composition of the portfolio based on the potential innovation synergies.
- **Assess the quality of your portfolio.** To assess whether the mix of innovation actions is the right one, you would need to define a small (i.e. 2-3) set of criteria that help you understand its performance. Note that these criteria are different from the assessment and evaluation criteria defined for your pathways. They refer instead to aspects of innovation per se, such as the criteria exemplified below:
    1. *Amplification Potential (Scaling):* assess whether the innovations in your portfolio are scalable and what that would entail.
    2. *Synergies:* the main goal of a portfolio approach is to generate results that are broader than those each innovation can achieve individually. In this respect, it is essential to understand whether and how the innovations in the portfolio can pool actor resources to create economies of scale (i.e. reduce the cost per unit associated with an outcome) or increase implementation feasibility.
    3. *Risk vs Return:* find a balance of risk vs return suited to your region. While transformational innovations are needed, these may only generate results in the long-term. Often 'quick wins' are needed to create momentum and maintain the legitimacy of your activities.
- Communicate your innovation portfolio to relevant stakeholders, indicating what is its goal and how is the portfolio going to be managed.

Further, more detailed technical guidance on how to complete this task, including useful tools and methods, can be found in Appendix D15.

What are key inputs for the task?

- Shared vision for climate resilience (Task 2.3.1)
- Theory of Change (Task 2.4.1)
- Set of preferred adaptation pathways (Task 3.2.2) and corresponding options (Tasks 3.1.1 & 3.1.2).

What are the expected outputs?

- An innovation portfolio that maps a set of innovations actions to support and enhance the implementation of your adaptation pathways, assessed against agreed criteria.

Checklist:		
Before moving on, have you:		
	Gathered and selected a set of innovation actions (innovation portfolio) that support at least some of the options of your adaptation pathways?	☐
	Communicated the selected innovation portfolio to key stakeholders?	☐
	Identified the policy and governance mix that will support the implementation of your innovation portfolio?	☐

3.3 Preparing for implementation

Task 3.3.1 Develop an Action Plan to Implement your Climate Resilience Strategy

What is this task about?

This task translates the near-term actions in the preferred pathways of your Climate Resilience Strategy (developed in Task 3.2) into a concrete set of actions. Your Climate Resilience Strategy has a longer timeframe and describes your goals, visions, and adaptation pathways as a strategic choice and policy strategy for your region. The action plan defines how to set about implementing the strategy in the short term. Each Climate Resilience Strategy will generate multiple action plans to support each phase of its implementation in the future. Subsequent action plans will serve to (among others) revise each strategy's progress and revitalise its stakeholder support.

An action plan details which activities will be conducted; which resources (financial, human, technological, etc) will be required to complete the activities and how these will be mobilised; who is responsible for the activities; and the short and mid-term goals associated with their delivery and in relation to your vision, Theory of Change and strategy. It also clearly indicates which activities are a priority and why, and how stakeholders are expected to participate in them, at which moments, by which mechanisms and for which purposes. It thereby provides a roadmap for implementation and mainstreaming of your Climate Resilience Strategy.

Why is it important?

Having a clear, realistic and robust action plan is essential to move from the strategic ambition to the actual implementation of the activities to achieve your climate adaptation goals. The action plan is the way to test that your ambitions can realistically be implemented within your regional context and will allow you to better identify the operational constraints (resources, institutional, capacities, or other) under which your different climate adaptation options need

to be implemented. Having concrete and robust plans for mobilising these resources is crucial to realising your envisaged actions.

How can you complete it?

- **Identify the short-term actions required to implement your preferred adaptation pathways into the future (i.e. actions to be completed in the coming 1-5 years).**
  - Consider the **adaptation options** included in your pathways. Identify the activities needing to be taken immediately across different levels and areas (policy, infrastructure, finance, etc.) to implement these into the future. For short-term adaptation measures, this could include undertaking their subsequent planning/design studies, procurement and construction, while for medium- and longer-term options, it could include contingency actions such as reserving land for potential future infrastructure needs. Include actions that can be directly undertaken by you as well as those where you would need the support of other public or private actors.
  - Consider which **enabling actions** are needed to support implementation of the adaptation pathways. Here, considerations could include:
    - Who is responsible for the delivery and maintenance of each adaptation option?
    - Do any adaptation options require changes to existing policies, regulations, or governance processes?
    - What stakeholder engagement processes will be required to generate the necessary support for each adaptation option?
    - Do any adaptation options rely on societal behaviour change that could be stimulated through subsidies or otherwise?
    - Do any of the preferred future options have additional knowledge and data needs?

    Consider how your guiding principles (Task 2.3.1) inform these enabling conditions (e.g., if one of your guiding principles is full data transparency, then an enabling action would be setting up an accessible data platform, as well as training stakeholders on data usage).
  - Re-iterate where needed, in particular to identify supporting actions based on the existing list (e.g.: if choosing to implement 10 actions relating to the food sector, a suitable supporting action could be to create an expert group to design and monitor these).
- **Prioritise your actions**:
  - Design a prioritisation system. Keep this simple and to a limited set of practical prioritisation criteria, such as costs, benefits (assessed in Task 4.1 of the Adaptation Investment Cycle), potential impact, and prerequisites/dependencies for each of the actions.
  - Gather information necessary to prioritise your actions. Consider how extensively each action should be assessed (e.g., in terms of its costs and benefits), balancing out the time and resources required. A full-on assessment might provide you with a more accurate prioritisation and anticipate future work; while a lighter approach might allow you to progress faster.
  - Rank each of the actions. Consider whether it is helpful to rank actions as a single portfolio or to create subdivisions per adaptation measure and/or enabling condition. Also consider a balanced mix of action types and adaptation options, as well as the distribution of responsibilities across implementation actors.

- **Integrate your actions into a suitable Policy Mix:** Drawing on the work conducted on 2.1.2, contextualise the Action Plan by identifying broader policy instruments and objectives relevant to the implementation of your adaptation pathways and innovation portfolio, the different agencies involved in managing these instruments, and how you are going to work together over time (particularly where multi-level governance is appropriate). Consider this policy analysis at the regional, national and EU levels.

Food for thought

Transformative climate adaptation requires coordinating actions across multiple policy areas, governance levels and social, ecological and economic systems. This requires a policy mix – a combination of policy strategies and instruments. Consider what you can do to overcome existing policy silos.

Often, policy mixes can only be effective if they include both supporting the creation of novel solutions as well as phasing out unsustainable practices.

Consider which existing policies are supporting and which ones are hindering the implementation of the action plan. Use this document as a starting point for political discussion, highlighting how each individual policy, when analysed through a system lens, contributes to a successful adaptation for all.

- **Publish the Action Plan:**
  - Determine the shortlist of actions to be presented publicly.
  - Gather all necessary information for each of the actions in the shortlist and determine the best way to present it in the document, including each action's:
    - Timing: categorise actions according to when they should be implemented (e.g.: in 1 year, in 2-3 years, in 5 years). Consider collecting the full information first for the actions due in 1 year.
    - Mainstreaming: consider how each action can or will be integrated into the policy cycle or existing initiatives, policies, strategies, or programmes; as well as identify which stakeholders need to be involved (e.g., via formal support or delivering concrete outputs) to ensure that the action is scaled up as desired.
    - Bankability lens: ensure each action has an economically strong case that meets the region's financing requirements (Adaptation Investment Cycle Task 4.1), and an agreed financing approach (Adaptation Investment Cycle Task 4.2). You should also include actions to improve the enabling conditions for adaptation finance generated in Adaptation Investment Cycle Task 4.3.
    - Key Performance Indicators: identify indicators associated to the performance of the action, linked with the Monitoring and Evaluation plan (as described in the following task). Note that your Key Performance Indicators are not your prioritisation criteria but refer to the performance of the action with respect to its intended outcome.
    - A simple template for this exercise is shown below.
  - Complement the Action Plan with the rationale behind the short list.
    - Draw from the work on the Investment Plan: The pipeline of bankable priorities, as well as the actions identified to improve the enabling conditions for adaptation finance (Adaptation Investment Cycle Task 4.3).
  - Receive political agreement for the Action Plan: as with all other official Climate Resilience publications, ensure there is clear political support from the relevant

levels (local, regional, national) and communicate it broadly through both public engagements (e.g., press releases) and dedicated meetings with the relevant offices.

Table 6: Example action plan for a region.

Action	Action Type	Adaptation Option or Enabling Condition	Due by	Responsible organisation	Mainstreaming	KPIs	Economic case	Funding or financing arrangements

The development of the Action Plan presents several moments where external experts can be involved and/or stakeholders consulted. Consider the adequate degree of participation for each of the different steps: generating potential actions, prioritizing them, and publication.

Depending on your internal capacity, available resources and time, you can decide to a) keep the development of the document as a mostly internal exercise, b) add expert assessment or a stakeholder consultation, c) organise a full-fledged participatory session series. We encourage you to involve stakeholders that are required for effective implementation and/or mainstreaming of the Action Plan at every stage of this process.

Further, more detailed technical guidance on how to complete this task, including useful tools and methods, can be found in **Climate Resilience Action Plan template.**

What are key inputs for the task?

- Your Climate Resilience Strategy, specifically:
  - Shared vision and Theory of Change
  - Set of preferred adaptation pathways and corresponding options
  - Innovation portfolio
  - Stakeholder engagement strategy
- Your Climate Resilience Investment Plan, specifically:
  - Economic case (Adaptation Investment Cycle Task 4.1)
  - Financing approach (Adaptation Investment Cycle Task 4.2).
  - Conditions for adaptation finance (Adaptation Investment Cycle Task 4.3)

What are the expected outputs?

The key outputs from this task are a Climate Resilience Action Plan that includes:

- A clear plan and timeframe of activities to be implemented in the short term (e.g.: 1-5 years) by your region.
- Details of each activity and its associated sub-activities, processes and synergies.
- Roles and responsibilities associated to the implementation, including public and private stakeholders where applicable.
- A clear prioritisation of the activities, and the rationale behind this.
- Resources required to complete these activities and concrete plans detailing how to mobilise these.
- Monitoring and Evaluation of your plan (see following task).

- Knowledge and information gaps, key uncertainties and decision points, and how to address them.
- Policy and governance mix for the implementation of your Climate Resilience Strategy.

Checklist:		
Before moving on, have you:		
	Generated a long list of potential actions?	☐
	Developed an action prioritisation system?	☐
	Produced a publishable Climate Resilience Action Plan?	☐

Task 3.3.2 Develop a Monitoring, Evaluation and Learning Plan

What is this task about?

This task is about formulating the monitoring, evaluation and learning (MEL) plan for your Climate Resilient Strategy and Action Plan. A MEL plan helps you to understand whether your strategy and action plan are being implemented as intended, whether their objectives and outcomes are being achieved, as well as the impacts these are having with respect to the overall vision that you have developed. It helps you to better understand the challenges and roadblocks you may encounter in their implementation, how these have been addressed, their potential intended and unintended (positive and negative) consequences, as well as any of their socioeconomic and/or equity-related outcomes. A well-formulated MEL plan both provides critical accountability to your key stakeholders and allows you to assess and adapt your Climate Resilient Strategy and Action Plan as required during implementation.

Your MEL plan should consider two levels:

- A "strategic" level that assesses your high-level planning objectives in relation to your longer-term vision, outcomes, and the principles that you have identified for your Climate Resilience Strategy. It should also include the Monitoring and Evaluation at the level of the Adaptation Pathways.
- An operational level connected to your Action Plan. This includes the Innovation Agenda, Climate Resilience Investment Plan, and early-stage implementation of the adaptation pathways.

These two strands of monitoring converge in the "learning" component, which refers to connecting different monitoring results to questions that can help identify what is working, how, and what is not working; as well as how resilient the various options and activities are in terms of adapting to changing circumstances and new (emergent) challenges. For effective learning, it is important to link your MEL activities to concrete decision points with stakeholders, as well as to design your plan in a manner in which it can flexibly reorganise and adapt to new circumstances.

Note that your MEL plan should be designed according to the capabilities and realities present in your region. While it is important to have a comprehensive MEL plan, it is critical to design an *implementable* plan that reflects your region's available resources, institutional setting, and stakeholder needs. The MEL plan should be aligned with each region's monitoring and reporting cycles.

Why is it important?

At the basic level, your MEL plan allows you to account for whether your climate resilient strategy and action plan are performing as intended, that resources are being used effectively and efficiently, and that goals are being achieved. Your stakeholders, potential donors or funders of your activities, as well as the policy process more all generally demand such accountability. At a more fundamental level, your MEL plan provides you with the evidence needed to adapt your plan and strategy to achieve better outcomes. Climate adaptation is deeply uncertain, and the effectiveness or otherwise of a solution will depend on many factors outside of your direct control. A strong MEL plan allows you to respond quickly to signals of change, re-routing your activities to new contexts and according to new knowledge. This is ultimately, a key component of resilience. Multi-stakeholder learning processes also serve to build regional adaptation capabilities and enhance resilience more broadly.

Some sources of finance (particularly those focused on impact) also require evidence on the use of proceeds as a condition for providing finance. Therefore, ensuring a strong MEL framework which accounts for these needs is also important.

How can you complete it?

- **Define your audience and purpose:** define who is this MEL plan for, who needs to participate in its development and implementation, and who should be informed of it outputs, and what would be the relevant reporting cycles. Based on the outputs from your stakeholder engagement strategy (Task 2.1.2), map those stakeholders to whom you are accountable. Also map those who will need to participate in the learning processes to inform the ongoing implementation of the strategy.
- **Clearly identify your "baseline".** This baseline describes the current state of your region along relevant dimensions. You can use the information gathered in Phase 1 and complement it with any additional information that is required to understand the current status of your region with respect to its vision and planning objectives, and in alignment with the CR strategy, action and investment plan.

Following the two-tier structure introduced before, your MEL plan should include:

- **At the strategic level:**
  - **Strategy MEL:** Specify the monitoring and evaluation requirements for the implementation of the Climate Resilience Strategy at the level of its guiding principles, and for the Action Plan, at the level of results and outcomes. Include a Theory of Change for strategic implementation, which can be drawn from Task 2.4.1. This helps to identify a set of quantitative strategic implementation indicators, for which you should define corresponding reporting methods (measurement tool, sample size, etc.) as well as the reporting cycle. Qualitative MEL methods may also be useful here, especially when building understanding for complex and uncertain processes. Indicate to whom, how, and for what purpose you intend to share these results with your relevant audiences.
  - **MEL for Adaptation Pathways:** Specify requirements to continually monitor and evaluate your region's adaptation challenges and the performance of your implemented adaptation measures in response to these. This monitoring is carried out at the level of your planning objectives and corresponding performance metrics (particularly for your *primary adaptation objectives*, from Task 1.1.2); however, these metrics typically will not constitute your complete suite of monitoring indicators.

The purpose of this monitoring is to identify suitable (i.e., strong and reliable) adaptation signals that indicate the direction and magnitude of future changes in your uncertain drivers of risk. More importantly, it should provide a timely signal for any approaching adaptation limits or emerging opportunities to trigger implementation of the next adaptation measures in your pathways. Both quantitative and qualitative monitoring methods may be appropriate to determine whether or not to advance further along your preferred pathways.

- **Learning and adaptive management:** Make sense of what the different monitoring data tells you about the state of implementation of your project and the extent to which your intended outcomes are being achieved. Adapt your implementation plan or actions accordingly given what you have learned from the process. The process should not only be informed by "hard" data, such as indicators, but also by contextual factors and experiences of those working on implementation. Such observations can unveil what has worked, for whom, and in which ways; what challenges have been faced and how have these been addressed; as well as new external information or changing circumstances that might impact the (future) feasibility of your plan. Attach these learning cycles to decision-making and adaptation processes and structures, such that your MEL plan helps you more effectively achieve your climate resilience goals. This might include, for example, regular updating and revising your strategy at a regular interval (e.g., every 5 years).

- **At the delivery level:**
  - **MEL for your Action Plan**: based on the activities identified in the previous tasks, identify those indicators that can keep track of key milestones in the implementation of your action plan. At this stage the monitoring will be considering short-term results and outputs. If due to funding or other considerations it is required to short impact of your plan, identify "proxy" indicators that can show that you are moving towards addressing your planning objectives.
  - **MEL for Innovation Portfolio:** Specify requirements for the monitoring and evaluation of the activation of your innovation portfolio with respect to the criteria that you have set up in Task 3.2.3; the suitability of the associated policy and governance mix; and a more qualitative assessment of the intended and unintended outcomes of this innovation portfolio, particularly with regards to your planning objectives. As noted in Task 3.2.3, the innovation portfolio relies on dynamic and adaptive management, for which continuous learning and sensemaking are required.
  - **MEL for Investment Plan:** Specify requirements for the specific financial and economic aspects of monitoring for your Investment Plan. This should focus on two key areas – which are monitoring mobilisation of funds for delivery of the strategy and action plan, and ensuring any monitoring of use of proceeds for any external financial sources.

    To monitor mobilisation of funds you should set targets for the overall amounts of finance mobilised, and consider what more detail is helpful – for example to break those targets down by pathway, or financial source or instrument. You may also wish to consider monitoring the amount or proportion of finance flowing towards specific objectives of your strategy or action plan, for example, whether finance is flowing towards supporting the citizens who are most vulnerable to climate change.

    Monitoring indicators for use of proceeds will be determined by individual sources or funders – for example when using green bonds, there is a requirement to demonstrate impact and this requirement may be satisfied by the broader MEL indicators of the Strategy and Action Plan, or may need supplementing. In contrast,

for actions funded by banks or financial institutions, there may be a requirement to show alignment with the EU Taxonomy on Sustainable Finance.

- **Communicate your MEL plan:** share your MEL plan with relevant stakeholders and provide space for feedback. It is important that the choices of indicators, tools and methods are relevant to your audience and stakeholders, and everyone involves understands the process of sensemaking, learning and adaptation of the Climate Resilience Strategy and the activities comprising it. Consider funder and policy requirements when applicable. Report on the progress of your strategy and action plan based on the needs of your region.

What are key inputs for the task?

- Your Climate Resilience Strategy, specifically:
  - Shared vision and Theory of Change
  - Set of preferred adaptation pathways and corresponding options
  - Innovation portfolio
  - Stakeholder map and engagement strategy
- Your Climate Resilience Investment Plan, specifically:
  - Economic case (Adaptation Investment Cycle Task 4.1)
  - Financing approach (Adaptation Investment Cycle Task 4.2).
  - Conditions for adaptation finance (Adaptation Investment Cycle Task 4.3)
- Your Climate Resilience Action Plan

What are the expected outputs?

The key output from this task is a Monitoring and Evaluation plan that clearly identifies:

- The audience for your MEL plan (who are you accountable to, who participates of the learning process)
- Metrics and indicators for each component (qualitative and quantitative)
- Methods for data collection and assessment of these indicators
- Frequency of reporting these indicators, to whom and for what purpose
- How are these results are going to be communicated, and to whom
- Clear descriptions of how your metrics, indicators, learning and adaptation (decision making) processes relate to each of the key components of your strategy as well as to the strategy as a whole.

Checklist:		
Before moving on, have you:		
	Develop a MEL plan for your Climate Resilience Strategy and specific components (pathways, innovation portfolio, investment plan?	☐
	Clearly defined cycles of learning and adaptation for your Climate Resilience Strategy and action plan?	☐
	Communicated this MEL plan to relevant stakeholders?	☐

4. Appendix

A. Climate Resilience Strategy and Action Plan checklist

This Appendix brings together the overall checklists included at the end of each phase and task within the process, to provide a handy checklist for regions to consider for the overall Strategy and Action Plan.

Task	Activity	Done?
Phase 1: Prepare the ground		
Task 1.1.1	**Gather evidence**	
	Developed a summary report outlining the region's evidence regarding past and current changes in climate conditions, other relevant environmental and socio-economic trends and challenges, as well as the current legal, fiscal, and operational landscapes within which you are developing your Climate Resilience Strategy?	☐
	Established a repository for your data and assigned responsibilities for its ongoing management and update?	☐
	Identified any knowledge and data gaps to be addressed through future research and/or innovation?	☐
	Engaged stakeholders to provide and collect data and information based on their observations, knowledge, and experiences regarding past extreme weather events and ongoing climate-related challenges?	☐
Task 1.1.2	**Frame the problem**	
	Identified and prioritised a set of climate-related problems to address and identified the relevant key community systems to include in your analysis?	☐
	Specified the set of concrete planning objectives to address your prioritised climate-related problems?	☐
	Categorised your set of planning objectives into primary adaptation objectives (for risk assessment and pathways formulation), and secondary resilience objectives (for building broad-based system resilience)?	☐
	Expressed your planning objectives as a set of measurable performance metrics, specifying associated acceptable performance thresholds where appropriate?	☐
	Specified the set of planning boundary conditions to guide and constrain later strategy building activities?	☐
	Validated your problem statements and decision-making frameworks with stakeholders?	☐
Task 1.2.1	**Map relevant systems**	
	Developed a series of integrated system maps that describe your regional system's boundaries, components and elements, as well as their key causal relationships?	☐
	Identified your principal (uncertain) drivers of risk and their associated direct and indirect impacts?	☐
	Identified any opportunities and vulnerabilities in your integrated system that impact your region's climate resilience?	☐
	Considered how the various functions in your system can be affected by the key enabling conditions?	☐
	Identified promising points of intervention in the system to reduce risk, unlock transformative change, innovate or otherwise build resilience?	☐
	Validated your system understanding with a core group of representatives from the region, including different sectors and expertise?	☐
Task 1.2.2	**Identify stakeholders**	

	Mapped all relevant stakeholders?	☐
	Developed stakeholder profiles, including appropriate mode of engagement?	☐
	Assessed and prioritised stakeholders to involve?	☐
Task 1.3.1	**Assess climate risks**	
	Developed a risk assessment methodology tailored to the decision and aligned with the anticipated outcomes?	☐
	Collected, organised and analysed your climate risk information?	☐
	Formulated a set of future plausible climate risk scenarios?	☐
	Assessed and prioritised your current and future regional climate risks across KCS?	☐
	Consulted relevant stakeholders in the risk assessment activities (data collection, scenario formulation, impact validation, etc.)?	☐
Task 1.3.2	**Assess capabilities**	
	Assessed capabilities, competencies and skills needed in the region to develop transformative adaptation pathways?	☐
	Identified resilience gaps?	☐
	Identified key enabling conditions to leverage?	☐
	Developed a roadmap to enhance resilience maturity?	☐
Phase 2: Build a shared vision		
Task 2.1.1	**Secure high-level support**	
	Developed a roll-out plan/map of the bureaucratic processes to be considered in the development and endorsement of your Climate Resilience Strategy and Investment Plan	☐
	Developed a strategy for ensuring political buy-in and support from the different levels of government and departments within the public authority (especially at the regional level)	☐
	Contacted local, regional and national political representatives to inform them about regional climate risks, climate impacts and the governance framework to request political support?	☐
	Organised information sessions, workshops or other awareness-raising activities to inform key regional (and other) stakeholders of the regional climate context?	☐
	Informed high-level stakeholders and actor groups on how to participate in decision-making processes and regional adaptation activities?	☐
Task 2.1.2	**Foster engagement**	
	Co-created a stakeholder engagement strategy with key stakeholders?	☐
	Established platforms for local and regional stakeholders to meet, exchange ideas and build partnerships?	☐
	Implemented frameworks to ensure local and regional stakeholders can effectively participate in regional decision-making processes?	☐
Task 2.2.1	**Explore possible climate resilient futures**	
	Identified drivers and seeds of change with a wide set of stakeholders?	☐
	Outlined at least 2 and max 5 alternative futures and developed narratives for them?	☐
	Identified key levers of change for each desirable future?	☐
Task 2.3.1	**Co-create a shared vision for the transition to climate resilience**	
	Enabled stakeholders to participate meaningfully through creating shared understanding of the journey process and outputs?	☐
	Refined journey outputs (so far) through stakeholder inputs and validation?	☐
	Formulated guiding principles for prioritisation?	☐
	Agreed on a shared vision (deciding on a future narrative, timeframe, set of guiding principles and planning objectives) to guide the journey?	☐
Task 2.4.1	**Reflect on how change is supposed to happen**	
	Developed a shared understanding of the key changes that need to happen for your vision to be accomplished, translated into a graphic and a narrative.	☐

	Identified a set of assumptions that underlie your vision?	☐
	Shared this graphic, narrative and set of assumptions with key stakeholders and incorporated or addressed their feedback?	☐
Phase 3: Design Pathways		
Task 3.1.1	**Identify options for adaptation pathways**	
	Developed a comprehensive and diverse list of adaptation options to address the targeted climate risk(s) and resilience needs?	☐
	Engaged multiple stakeholders, including actors from various sectors and community members affected by both climate risks and adaptation process, to identify and select adaptation options for your region?	☐
	Aligned the adaptation options with the results of the climate risk assessment and co-created shared vision?	☐
Task 3.1.2	**Assess the effectiveness of options for adaptation pathways**	
	Involved stakeholders in the prioritisation exercise to ensure buy/in?	☐
	Developed a comprehensive assessment of identified adaptation options?	☐
	Prioritised a set of adaptation options readily available and locally appropriate for the targeted climate risks?	
	Analysed opportunities for implementing transformative and innovative adaptation options under future conditions?	☐
Task 3.2.1	**Formulate pathways to climate resilience**	
	Identified key short-, medium- and long-term adaptation options?	☐
	Assessed the limits of each adaptation option, at least in qualitative terms (relative timing of adaptation limits for all options under increasing climate change)?	☐
	Developed multiple sequences of adaptation options that address adaptation needs in the short-, medium- and long-term, resulting in a set of alternative pathways to evaluate in the next task?	☐
	Visualized the pathways alternatives in a comprehensible way, for communication to stakeholders?	☐
Task 3.2.2	**Evaluate pathways to climate resilience**	
	Evaluated your set of alternative pathways against their abilities to achieve the integrated set planning objectives and other associated evaluation criteria?	☐
	Identified 3-4 best performing pathways to be included in the Climate Resilience Strategy?	☐
	Visualised the best performing pathways for communication to stakeholders?	☐
Task 3.2.3	**Develop a portfolio of innovation actions**	
	Gathered and selected a set of innovation actions (innovation portfolio) that support at least some of the options of your adaptation pathways?	☐
	Identified the policy and governance mix that will support the implementation of your innovation portfolio?	☐
	Communicated the selected innovation portfolio to key stakeholders?	☐
Task 3.3.1	**Develop an Action Plan to Implement your Climate Resilience Strategy**	
	Generated a long list of potential actions?	☐
	Developed an action prioritisation system?	☐
	Produced a publishable Climate Resilience Action Plan?	☐
Task 3.3.2	**Develop a Monitoring, Evaluation and Learning Plan**	
	Develop a MEL plan for your Climate Resilience Strategy and specific components (pathways, innovation portfolio, investment plan?	☐
	Clearly defined cycles of learning and adaptation for your Climate Resilience Strategy and action plan?	☐
	Communicated this MEL plan to relevant stakeholders?	☐

B. Integration of the Adaptation Investment Cycle into the Regional Resilience Journey

Regional Resilience Journey Phases and Tasks	Relevant Adaptation Investment Cycle inputs	Outputs relevant to Adaptation Investment Cycle
Phase 1: Prepare the ground		
Task 1.1 Establish a baseline	Summary of the existing policy objectives, headline budget (Adaptation Investment Cycle Task 1.1), as well as evidence of current and future costs (Adaptation Investment Cycle Task 1.2) are both relevant. Work to develop a rationale and objectives (Adaptation Investment Cycle Task 1.3) can also help with problem framing.	The economic and financial aspects of data collected will help in collecting economic and financial data (Adaptation Investment Cycle Task 1.2). Wider baseline data can feed into the spending objectives and rationale (Adaptation Investment Cycle Task 1.3).
Task 1.2 Understand the system	Preparatory work to develop an Investment Plan, including governance and stakeholder engagement approach can help with identifying and engaging stakeholders.	Conceptual maps can be used to inform the rationale and spending objectives (Adaptation Investment Cycle Task 1.3). Work to identify stakeholders can feed into the preparatory work to get ready to develop an investment plan, as well as the development of investment strategies for pathways (Adaptation Investment Cycle Task 3.3)
Task 1.3 Assess risks and vulnerabilities	Studies and evidence identified or developed in Adaptation Investment Cycle task 1.2 may provide useful inputs for the risk and vulnerability assessment.	The risk and vulnerability assessment will be helpful to support economic and financial evidence of risks.
Phase 2: Build a shared vision		
Task 2.1 Ensure ownership and commitment	Preparatory work to develop an Investment Plan, including governance and stakeholder engagement approach can help with identifying and engaging stakeholders.	Commitment of relevant stakeholders.
Task 2.2 - Explore possible futures	Evidence identified in Adaptation Investment Cycle task 1.3 on current and future risks should help shape futures development.	The more detailed possible futures can also be useful to help inform the selection and expansion of future finance sources and instruments in Adaptation Investment Cycle Task 2.2 and 2.3.
Task 2.3 Co-create a shared vision for the transition to climate resilience	The additional sources of finance and/or instruments the region identifies in Adaptation Investment Cycle Task 2.2, as well as the changes to enabling conditions that are needed to achieve them can feed into the vision process.	The vision and objectives defined in this process are relevant for the objective setting in task 1.3 of the Adaptation Investment Cycle. They will also be useful to help inform the selection and expansion of future finance

		sources and instruments in Adaptation Investment Cycle Task 2.2 and 2.3.
Task 2.4: Develop a theory of change	Regions may wish to use the additional sources of finance and/or instruments the region identifies in Adaptation Investment Cycle Task 2.2, as well as the changes to enabling conditions that are needed to achieve them to develop a dedicated strand for finance in both the theory of change, and in the priorities for innovation portfolios.	The ToC will be useful to help inform the selection and expansion of future finance sources and instruments in Adaptation Investment Cycle Task 2.2 and 2.3. It will also be useful for framing the longlisting of options in Adaptation Investment Cycle Task 3.1 by setting out the broad framing for the pathways.
Phase 3: Design pathways		
Task 3.1 Identify and assess options	This Task is undertake in parallel with Adaptation Investment Cycle Task 3.1. The economic evaluation can be used to feed into the broader evaluation.	The options identified in this Task are also those used in Adaptation Investment Cycle Task 3.1, to help assess benefits. They can be used as options in Task 3.2 to help inform the sequencing approach.
Task 3.2 Co-design a portfolio of interventions	The assessment of adaptation options and sequencing in Adaptation Investment Cycle Task 3.2 can be used as an input into the formulation and evaluation of pathways. The barriers to new financing options in Adaptation Investment Cycle Task 2.2 can be used to shape priorities for financial innovation in the innovation portfolio.	The formulation and evaluation of pathways can be used as inputs into the sequencing from adaptation and economic perspectives in Adaptation Investment Cycle Task 3.2.
Task 3.3: Preparing for implementation	The pipeline of bankable priorities, as well as the actions identified to improve the enabling conditions for adaptation finance (Adaptation Investment Cycle Task 4.3) should be included in the action plan. Task 4.1 of the Adaptation Investment Cycle will also ensure that each action has a strong economic case that meets the region's financing requirements, whilst Task 4.2 will ensure that each action has an agreed financing approach.	The action plan of actions can be used as checklist to help build the economic and financial cases in Adaptation Investment Cycle task 4.1, as well as to confirm financial models for each action are in place as in Adaptation Investment Cycle Task 4.2.

C. Glossary and Key Terms

The Pathways2Resilience glossary is meant to be a concise reference for frequently used words and concepts you will often hear during your participation in the programme.

The majority of definitions follows the Intergovernmental Panel on Climate Change (IPCC), European Environmental Agency (EEA), and European Union glossaries and usage, slightly adapted to the Pathways2Resilience programme and context.

Specific Pathways2Resilience terms (such as deliverables and concepts developed expressedly for the programme) have been highlighted in **pink**.

You will find additional explanations and technical glossaries related to specific topics such as finance, innovation, monitoring in the Pathways2Resilience guidances you have received as part of the **onboarding kit**.

Would you like to see a term added?

Please contact pathways2resilience@climate-kic.org.

A

Adaptation Investment Cycle (AIC)

An iterative, six-step process designed to be undertaken in parallel to the development of a regions' Climate Resilience Strategy through Pathways2Resilience's Regional Resilience Journey, or as a separate standalone process for regions which have already developed Adaptation Strategies

Adaptation limit

Also: threshhold, tipping point

Situations marking the point at which existing systems or adaptation measures can no longer meet their primary adaptation objectives and are considered to have 'failed.' For example, a flood protection dike may fail once water levels exceed its height, requiring further adaptation (e.g., raising the dike).

Adaptation options

Different strategies and actions that can help address climate adaptation. These actions can be structural, institutional, ecological, or behavioral.

Adaptation pathways

A series of choices about how to adapt, balancing short-term and long-term goals. These involve finding practical solutions that make sense in people's daily lives while avoiding negative outcomes (see *maladaptation*).

Adaptive capacity

The ability of systems, organizations, and living beings to adjust to potential damage, seize opportunities, or deal with consequences.

Adaptive capacity score

A measure of a region or community's ability to adapt to climate change impacts. It evaluates factors like resources, infrastructure, knowledge, and social structures that influence how well an area can respond to climate challenges.

B

Bankable (project)

A project that meets the terms required by the source to provide the finance. In the context of climate change, this should encompass socio-economic metrics, including, for example, improvements in the resilience of communities, and alignment with national priorities.

Baseline assessment

One of the Pathways2Resilience 'deliverables' or outputs. A document that identifies and evaluates climate adaptation options based on criteria like availability, benefits, costs, effectiveness, efficiency, and feasibility. The baseline is the reference point for measuring change.

Boundary conditions

Those elements that will constrain your climate resilience strategies and action plans, such as time, priorities, risks, geography, and other institutional, socio-economic, environmental or financial aspects.

C

Capacity

The combination of strengths, attributes, and resources available to an individual, community, or organization to achieve their goals.

Capacity building

The process of enhancing the strengths, attributes, and resources of an individual, community, or organization to better respond to change.

Cascading impacts or effects

A chain reaction of events triggered by an initial disruption, leading to larger social, economic, or environmental impacts.

Catalogue of transformative options

A list of innovative strategies and measures compiled by Pathways2Resilience experts that can significantly change and improve systems in response to climate change.

Challenge statement

Also: problem statement

A short, clear explanation of an issue or challenge that sums up what you want to change.

Climate adaptation

The process of adjusting to current or expected climate impacts to reduce harm or take advantage of opportunities.

Climate finance

Financial resources allocated by public and private actors to address climate change. These resources can be delivered through various instruments like grants, loans, and budget reallocations.

Climate mitigation

Actions taken to reduce greenhouse gas emissions in order to slow or stop global climate change.

Climate neutrality

Climate neutrality surpasses carbon neutrality by encompassing all greenhouse gas emissions, not just carbon dioxide, and includes broader climate impacts. It aims for a comprehensive balance, neutralising the total emissions through equivalent reductions or offsets to address the full spectrum of climate change contributors.

Climate resilience

The ability of social, economic, and environmental systems to cope with climate change impacts, maintaining their core functions while adapting, learning, and transforming.

Climate Resilience Action Plan

One of the Pathways2Resilience 'deliverables' or outputs. This document outlines specific actions a region or community will take to enhance its resilience to climate change. It includes objectives, measurable actions, timelines, and monitoring and evaluation plans.

Climate Resilience Investment Plan

One of the Pathways2Resilience 'deliverables' or outputs. This document identifies and prioritizes investments needed to strengthen a region or community's climate resilience. It focuses on funding avenues and resources required to implement specific projects.

Climate Resilience Strategy

One of the Pathways2Resilience 'deliverables' or outputs. This document outlines long-term goals and approaches for improving a region or community's climate resilience. It provides a roadmap for integrating resilience into planning, policy, and decision-making processes.

Climate risk

The potential for negative consequences due to uncertain outcomes of climate-related hazards, affecting lives, livelihoods, health, ecosystems, and infrastructure. Risk results from the interaction of vulnerability, exposure, and the likelihood of the hazard occurring.

Climate risk management

Plans and actions designed to reduce the likelihood or impact of climate-related risks, based on assessed or perceived threats.

Climate vulnerability

The likelihood of being negatively affected by climate change, including sensitivity to harm and limited capacity to cope and adapt.

Climate-resilient pathways

Ongoing processes for managing change within complex systems to minimize disruptions and maximize opportunities related to climate change.

Co-benefit

Positive effects that a policy or measure aimed at one goal might have on other objectives, increasing overall benefits for society or the environment.

Co-creation

A collaborative process where stakeholders, including communities, governments, and experts, work together to design and implement climate resilience strategies, ensuring that diverse perspectives are included in the decision-making process.

Cohort

The group of regions selected under each Pathways2Resilience call. 40 regions form the first cohort participating in the programme, 60 regions will form the second cohort in 2026.

Community of practice

Groups of people who share a common concern or passion and learn together through regular interaction.

Community-based

Approaches that focus on empowering local communities by considering their context, culture, knowledge, and preferences as strengths.

D

Desirable futures

Alternative, qualitative visions of climate resilient futures developed by and for each region, which address the key climate risk and planning goals, but in different ways. They are based on risk-based scenarions, but complement them with aspects such as culture, values, and governance.

E

Enabling conditions

Factors that affect the feasibility of adaptation and mitigation options, accelerating systemic transitions to limit temperature increases and enhance adaptive capacities while achieving sustainable development and reducing inequalities. (See also *Key Enabling Conditions*.)

EU Mission on Adaptation to Climate Change

Also: Mission Adaptation

EU initiative to support regions, cities, and local authorities in building resilience against climate change impacts. It is one of five EU Missions established by the European Commission to tackle big societal challenges through innovative policymaking.

European Green Deal

The EU's policy package, launched in 2019, aiming for a green transition and climate neutrality by 2050, covering climate, environment, energy, transport, industry, agriculture, and finance.

F

Finance

Money provided by a lender which must be repaid over a period of time, typically with interest. Examples include a European Investment Bank Framework loan, commercial loans, or Green Bonds.

Finance Innovation Lab

One of the Pathways2Resilience capability building activities. The lab focuses on fostering innovative financial solutions to support climate solutions, including new funding mechanisms and investment models.

Funding

Money provided without expectation of being repaid (though it may have conditions attached). Examples include European Commission grants, Technical Assistance from the European Investment Bank, philanthropic grants, or intergovernmental transfers.

H

Handbook

A practical manual introducing the Pathways2Resilience programme and providing guidance and resources for participating regions.

I

Innovation

Putting into practice new ways of doing things across various domains, including technology, governance, social structures, and finance, to generate meaningful change.

Innovation action

Any set of actions that takes existing and/or new knowledge and transforms it into products, frameworks or services that add value to one or more specific groups. Value, in this case, is understood in the broader sense, not only monetary value but also improvements in quality of life (human and non-human).

Innovation portfolio

A logical set of innovation actions that are expected to work together, maximizing benefits and addressing strategic risks and uncertanties related to the innovation process. An innovation portfolio is supported by an innovation policy mix and implemented iteratively, through cycles of learning and adaptation.

Innovation Practice Group (IPG)

One of the Pathways2Resilience capability building activities. These collaborative groups bring together regional representatives, experts, practitioners, and other stakeholders to share knowledge, develop new ideas, and test innovative practices for improving climate resilience.

Instruments (finance)

Mechanisms which enable the provision of finance from one actor to another, or to a dedicated project which delivers adaptation. Examples include grants, loans, taxes, debt. Instruments may vary in complexity: they can be generic (e.g. grants) or tailored (e.g. the Hamburg Green Roof Subsidy), or somewhere in between.

J

Just resilience

Ensuring that no one is left behind at all stages of climate adaptation planning, implementation, and monitoring, as well as at all governance levels. This approach recognises that the most vulnerable people - due to their age, health, place of residence, or socio-economic status - and systems are most at risk from climate change impacts, have the least capacity to adapt, and are the least likely to be heard.

Just transition

Principles and practices ensuring no one is left behind in the shift to a low-carbon economy. This includes targeted measures to minimize negative impacts and maximize benefits for affected groups, emphasizing fairness, decent jobs, social protection, and inclusive decision-making.

K

Key Community Systems (KCS)

The key areas of interaction between humans and the environment, that meet essential societal needs but are increasingly impacted by climate change. They are six: local economic systems, 'natural' ecosystems, water management, land use and food systems, health, and critical infrastructures.

Key Enabling Conditions (KEC)

Key elements of our systems where we can intervene to accelerate and enhance our societies' capacity to adapt to climate change, while achieving sustainable development. The Mission Adaptation identifies four: access to knowledge and data, finance mobilisation, multilevel governance and citizen engagement, and changes in human behaviour and lifestyles.

Key performance indicator (KPI)

Metric used to evaluate progress towards specific goals. As such, it must be measurable.

Key Thematic Area

A specific focus area or topic tackled as part of the Pathways2Resilience programme, within the broader field of climate resilience, such as water management, energy systems, or community engagement, that requires targeted actions and strategies.

L

Levers of change

Areas of work or entry points for interventions that have the potential to unlock wide-ranging and positive change in a given place, industry or both. In the context of climate adaptation, some examples of powerful levers of change are policy, finance, technology, and citizen engagement, among others, especially if the interventions are designed following an innovation approach.

M

Maladaptation

Actions that may lead to increased risk of adverse climate-related outcomes, including via increased greenhouse gas (GHG) emissions, increased vulnerability to climate change, or diminished welfare, now or in the future. Maladaptation is usually an unintended consequence.

Monitoring, evaluation and learning (MEL)

Mechanisms to track and assess progress, aiming to identify and improve strategies over time based on the insights obtained.

Multi-annual financial framework (MAFF)

A seven-year EU plan which sets annual ceilings of expenditure that can be spent on various policy areas.

Multi-level governance

A system where different levels of government—local, regional, national, and sometimes international—work together with non-governmental organisations, businesses, and communities to address complex issues. This approach aims to improve efficiency, inclusiveness, and responsiveness by involving various stakeholders in decision-making processes.

N

Nature-based solutions (NBS)

Strategies that use natural processes to address societal challenges, providing environmental, social, and economic benefits while enhancing resilience. They include actions like restoring

wetlands for flood control, urban greening to improve air quality, or conserving forests for carbon sequestration.

Net Present Value (NPV)

The difference between the present value of cash inflows and the present value of cash outflows over a period of time. All future cash flows are discounted accordingly to ensure time consistency and comparisons. The higher the NPV the more promising the potential investment/project.

NetZeroCities

A project supporting the EU Mission to achieve climate-neutral cities by 2030, providing cities with expertise and tailored services.

Non-governmental organisation (NGO)

A group that functions independently of any government with the objective of improving social conditions. NGOs are typically non-profit institutions.

O

Onboarding kit

The initial set of resources and information provided to Pathways2Resilience participants, with detailed guidance, resources, templates and other information.

Outcome

A change in behaviour, actions, or relationships of individuals, groups, or organisations within the sphere of influence of an intervention. These changes are intermediate results that occur downstream of an initiative's activities but upstream from longer-term, broader impacts.

P

Participatory design

A democratic process where citizens are involved in public decision-making, using methods like online ideation and voting.

Pathways2Resilience

A programme under the EU Mission on Adaptation to Climate Change, supporting 100 European regions to identify transformative adaptation pathways and develop climate resilience action plans. Pathways2Resilience is running between 2023 and 2027 and is implemented by 14 partners.

Pathways2Resilience Climate Toolbox

A collection of tools, resources, and methodologies gathered by Pathways2Resilience experts to help regions and communities build their climate resilience. It includes data, models, planning tools, and best practices to support adaptation efforts.

Peer-led mentoring

A mentoring approach designed by Pathways2Resilience experts, where individuals or groups with experience in climate resilience provide guidance and support to others who are newer to the field, fostering knowledge sharing and capacity building.

Planning objective (for adaptation or resilience)

Planned accomplishments or results that are specific, measurable, attainable, realistic, and time-limited. They can be primary if they directly address climate risks or secondary, such as job creation, improving public health, social well-being, and economic development.

Public Financial Management (PFM)

A material element of public administration, encompassing all the mechanisms through which public resources are collected and allocated. It includes the whole budget cycle, public procurement, audit practices and revenue collection.

Public Investment Management (PIM)

A comprehensive framework to assess infrastructure governance practices for countries and regions at all levels of economic development. It allows authoritie sto evaluate planning, and implementation of public investments.

R

Regional Adaptation Support Tool (RAST)

An interactive tool by CLIMATE-ADAPT designed to help local and regional authorities with climate change adaptation strategies and plans – from development and implementation to monitoring, evaluating and updating them. RAST provides practical guidance in 6 steps aligned with the key features of climate adaptation policy processes.

Regional Resilience Journey (RRJ)

An adaptable, iterative framework developed by Pathways2Resilience experts, providing step-by-step guidance, learning activities, tools and milestones to either develop or enhance climate resilience plans and intervention portfolios.

Regions and communities

In the context of Pathways2Resilience and the Mission Adaptation, regions are defined according to the Nomenclature of Territorial Units for Statistics (NUTS) classification, specifically at the NUTS 2 level, which typically represents larger administrative areas like provinces or regions within a country. Communities, on the other hand, are groupings of people connected by social ties, shared values, or common interests, who work together on joint actions. Unlike regions, communities can vary in size and are not always limited to a specific geographic area.

Resilience maturity

The level of development and preparedness a region or community has reached in terms of its ability to anticipate, prepare for, and respond to climate crises.

Resilience Maturity Curve (RMC)

The Resilience Maturity Curve is a monitoring and evaluation tool designed to help assess the resilience of European regions to shocks and stresses. The tool is constructed from the aggregated score of a set of indicators to evaluate the extent to which a European region has developed the capacity to anticipate, prepare for, and respond to climate crises.

S

Scenario

A plausible description of how the future may develop based on the regional climate risk assessment, and a coherent and internally consistent set of assumptions about key driving forces (e.g., rate of technological change, prices) and relationships.

Sensemaking

The process of interpreting and piecing together complex information to understand how various aspects of a system are interconnected. It entails creating shared narratives that guide collective decision-making and action in the face of uncertainty.

Shared vision

A collective and agreed-upon understanding of the desired future state and how to achieve it.

Small and Medium-Sized Enterprises (SME)

Enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million.

Sources (finance)

The entities able to provide the money to fund adaptation activities within a region. Examples of sources include the European Commission, the European Investment Bank, businesses, commercial banks, SMEs, and universities.

Stakeholder

Any individual or group that has an interest or is affected by the actions, objectives, policies, or services of an organisation.

Stakeholder engagement

Systematic identification, analysis, planning and implementation of actions designed to influence stakeholders, taking into account their needs and ensuring they are met.

Structuring (finance)

Financial structuring refers to the creation and organisation of dedicated financial arrangements between relevant parties for a programme, project or action to achieve the adaptation objectives. This is an iterative process which focuses on maximizing benefits, minimizing costs, and ensuring regulatory compliance, and optimises risks between the parties.

Systemic change

Also: transformative change

A significant shift in the core attributes of natural and human systems, including structural changes. It involves changing parts of a system and how they work together to create a completely new, more effective system.

Systems map

Analysis of the system you are going to change, including its components, functions, and characteristics as well as interactions and dependencies. The map should help you understand key barriers and challenges, but also opportunities and levers of change.

T

Theory of Change (ToC)

A framework for planning, implementing, and evaluating programs, outlining the expected sequence of events from activities to outcomes and the assumptions involved, aiding in effective programme design.

Transformation pathways

Scenarios describing how greenhouse gas emissions, atmospheric conditions, or global temperatures might evolve based on significant economic, technological, societal, and behavioral changes, including shifts in energy use, resource management, and institutions.

Transformative adaptation

Adaptation measures that fundamentally change the attributes of a socio-ecological system in response to climate change, including changes in values, regulations, financial systems, and technology.

W

Whole-of-government

Collaborative approach between the different public bodies that extends beyond their respective fields of competence with a view to providing the public with a combined response from a single body.

D. Technical guidance on how to complete tasks

This appendix provides detailed technical guidance to support you in implementing the Regional Resilience Journey framework. It includes practical, step-by-step instructions on how to develop and implement climate resilience strategies and action plans tailored to your region's specific needs.

In addition to outlining key processes, this appendix provides a comprehensive set of enabling actions at different stages of the journey. These actions are designed to help you overcome challenges and ensure successful implementation at each phase, by leveraging the six key enabling conditions described in the main document body.

Drawing from the Regional Resilience Journey, this section breaks down each phase into clear, actionable steps and provides tools and resources to effectively drive climate resilience efforts in your community.

D1. How to leverage key enabling conditions for Phase 1- Technical guidance

What concrete actions can you take to foster enabling conditions to prepare the ground?

Knowledge & data	• Enhance the **availability, accessibility, reliability and usability of climate and non-climatic data**. This means:
	  ○ Exploring **best practices** of data collection and management in different regions and discuss in available platforms with peers or experts
	  ○ Keeping up-to-date and sharing access to **comprehensive databases** across different departments and administrations, from micro- to macro-regional levels
	  ○ Ensuring relevant data and information can be **accessed by all relevant stakeholders** and the general public (possibly, different levels of information are accessible to different stakeholder groups according to the needs)
	  ○ Where specific databases are not available at regional levels, getting familiar with and using **national and/or EU-scale open-source databases** (e.g. ESPON, Copernicus, DRMKC - Risk Data Hub, EM-DAT, Eurostat)
	  ○ Dedicating appropriate resources and involving different (public and private) data owners in the process of **production of climate information**
	  ○ Establishing a process to **cleansing data regularly**, ensuring integration across departments
	
	• **Explore new technologies and methodologies** to prepare the ground, and in particular:
	  ○ To **gather and visualise data and knowledge**, such as Artificial Intelligence and Machine Learning, Remote Sensing and Earth Observation, Big Data and Blockchains, Building Information Modelling and the Internet of Things

	○ To **map stakeholders** and gather information about them, such as online collaborative platforms and the Artificial Intelligence ○ To conduct **climate risk and vulnerability assessments**, such as Artificial Intelligence softwares
Governance, engagement & collaboration	• Have a clear overview of **climate-related national polices** and identify the limitations and barriers they may pose in implementing climate adaptation action • Investigate established **governance mechanisms** (i.e. responsibilities, platforms and spaces, ...) - including gaps and challenges - that serve to foster collaboration on climate change adaptation with: ○ Various **departments in your region** ○ Various **scales of governments**, from local to international levels (including national agencies, such as national meteorological institutions) ○ **Transnational regions** (e.g. neighbouring regions from other countries) • Investigate **established collaborations** (responsibilities, platforms and spaces, ...) - including gaps and challenges – **with key stakeholders**, including NGOs, experts and academia, private investors and insurers, etc. And, in particular: ○ Explore how **knowledgeable** different stakeholder groups are on **climate risks** in your region ○ Identify the main **platforms** available in your regional administration to reach and raise awareness in the **civil society** ○ Have a clear understanding of which are the main **issues for ensuring climate justice** in your region (e.g. map recurring topics of civil mobilisation and protest related to climate change) ○ Discover the concept of **stakeholder fatigue** and always keep it in mind when organising stakeholder engagement processes: involve all relevant voices without overwhelming any groups
Capabilities & skills	• Establish accurate **indicators** to assess a region's institutional and financial capacity for climate change adaptation. Use the indicators outlined in **Pathways2Resilience's Evaluation Rubrics for the Resilience Maturity Curve** • Develop a **systemic way of thinking,** including: ○ Analysing **causal relationships** in the system ○ Identifying possible **obstacles** • Map and enhance **institutional capabilities and skills** related to the assessment of climate change impacts ○ Engage **skilled third parties** to undertake climate risk assessments where your internal skills are not sufficient

	○ **Identify transition risks** linked to the shift towards a low-carbon and resilient economy and the related needs to enhance internal skills
Behaviour change	• **Empower** key vulnerable stakeholders involved in your resilience journey by: ○ **Identifying cultural values and practices** conducive to behavioural change, such as community involvement ○ **Raising awareness on adaptive behaviours**, aiming for the normalisation of household adaptive practices ○ Facilitating participation of individuals in **public discussions that may trigger changes** in social behaviour related to climate adaptation. • **Promote understanding of climate impacts** across the system through stakeholder engagement in discussions around the assessments of climate risk by: ○ **Involving them early** in planning process to set strategic agendas ○ **Including them in assessing** current and future climate risks to foster knowledge sharing and experiences ○ **Enhancing understanding of climate impacts** across the system through stakeholder involvement in discussions around the assessments of climate risk • Recognise and leverage the influence of **existing networks** in capturing and disseminating social attitudes towards climate adaptation, thus: ○ Connect with them to **disseminate info** and promote adoption of new behaviours ○ Map the **most used platforms** in the region and create a social media strategy to interactive with your audience
Experiment, learn & reflect	• Create and enhance a **culture of experimentation and learning** by: ○ Organising **workshops for academics and non-academics** to share knowledge and innovation ○ Incorporating **citizen science** in your knowledge gathering activities ○ Brainstorm alternative scenarios to f**ind possible limitations to adaptation** • **Establish a Monitoring, Evaluation and Learning (MEL) framework** to periodically assess and improve your operations, and at this phase particularly: ○ Your stakeholder mapping approach and engagement strategy, particularly related to the most vulnerable populations ○ Your risk and vulnerabilities assessment and prioritisation
Finances & resources	• Encourage and implement smart allocation of budget, involving **key financial stakeholders in discussions** around:

	○ Comprehensive data gathering ○ Stakeholder engagement ○ Risk assessment ○ Climate emergency responses • **Explore comprehensive existing tools** for financial analysis ○ **Adaptation finance tracking**, a methodology for tracking climate change adaptation finance. (e.g. use of green budgeting approaches / tagging). ○ **EU Sustainable Finance Taxonomy** may help you to identify private companies to be involved in your climate resilience journey • Understand the **range of sources and instruments of finance currently in use**, by ○ **Mapping** key actors, the sources and instruments on offer ○ Revisiting the **costs of historic impacts**

 **Supporting resources:**

Tools and resources leveraging knowledge and data

- *Innovation and Adaptation in the Climate Crisis: Technology for the New Normal*
- *Data for adaptation at different spatial and temporal scales*

Tools and resources leveraging governance, engagement & collaboration

- *Stakeholder and community engagement - How to engage stakeholders for powerful and inclusive climate action planning*
- *OECD Water Governance Indicator Framework*
- *Environmental Justice Element*
- *Community-Driven Climate Resilience Planning: A Framework*
- *Guide to Citizen Science developing, implementing and evaluating citizen science to study biodiversity and the environment in the UK*
- *Vrijburcht: a privately funded climate–proof collective garden in Amsterdam*
- *The 'C40 Governance Self-Assessment"*

Tools and resources leveraging capabilities & skills

- *Competencies and Learning Pathways for Community Climate Coaches*
- *The CCC Good and Emergent Practice Guide*
- *Climate Adaptation Competency Framework*
- *Adaptation Capability Advancement Toolkit (Adapt-CA)*
- *Overview: Guidelines to assess and anticipate skills for the green transition*
- *Skills for a greener future: challenges and enabling factors to achieve a just transition*
- *Skills assessment for national adaptation planning*
- *A just transition for climate change adaptation: Towards just resilience and security in a globalising world*
- *Adaptation capability frame*

Tools and resources leveraging behaviour change

- *Harnessing Behavior Change For Urban Climate Action. A Guide For Local Policy Makers*
- *Improving people's health: Applying behavioural and social sciences to improve population health and wellbeing in England*

Tools and resources leveraging experimentation, learning & reflection

- *Maladaptation Self-Assessment Checklist*
- *The Learning Space in Rijkswaterstaat (NL)*
- *Crowd4SDC - a guide to challenge-based innovation workshops for citizen science*

Tools and resources leveraging finance & resources

- *Cost of Doing Nothing Toolbox*
- *Costing Guidelines – Guidelines for costing the impacts of extreme weather events*
- *Aligning Regional and Local Budgets with Green Objectives: Subnational Green Budgeting Practices and Guidelines*
- *Monetary Valuation of Risks and Opportunities in CCRA3*
- *Towards a Climate Ready Clyde: Climate Risks and Opportunities for Glasgow City Region - Economic Assessment*
- *Barriers to financing adaptation actions in the UK*
- *Climate assessment of local authority budgets*
- *The rationale for public sector intervention in the economy. Part 2*
- *Adapting to climate change: Analysing the role of Government*
- *Capacity gaps in accessing adaptation funding (2021)*
- *The State of Cities Climate Finance Part 1: The Landscape of Urban Climate Finance.*
- *The Roles of the Private Sector in Climate Change Adaptation – an Introduction*
- *EIB Global's approach to a just transition and just resilience.*

BACK TO PHASE 1 CHAPTER

D2. Task 1.1.1 Gather evidence – Technical guidance on how to complete

How can you complete this task?

- **Develop a data collection plan**
    - Define data needs: identify the specific information and data you need for your Regional Resilience Journey, such as regional vulnerabilities, climate risks and impacts, adaptive capacity, and adaptation needs in the areas or sectors of your concern. Considering your baseline, define specific metrics and indicators (e.g., temperature trends, population at risk, critical infrastructure) that need to be measured or assessed.

- Identify potential data sources and data collection methods: prioritise collecting existing data from secondary sources to reduce costs and time. This includes sources, such as governmental reports and official databases; climate risk projections and impact assessments from credible sources; other relevant studies conducted by research institutions, universities, NGOs, and local organisations. Also consider primary data sources (e.g., surveys and interviews with relevant stakeholders; field measurements; direct observations) where gaps exist or where specific, localised data is necessary.
- Assign a task force for data collection: form a multidisciplinary team responsible for overseeing the data collection process, ensuring representation from climate and environmental science, economics, sociology, urban planning, engineering, health, and policy.
- Establish a timeline: create a detailed schedule with milestones for data collection, analysis, and reporting phases. Consider the iterative nature of this task which informs and is informed by the parallel tasks of problem framing (Task 1.1.2) and systems mapping (Task 1.2.1).

Food for thought

Three fundamental aspects to consider in this task are: i) the availability and reliability of data sources, ii) the time frame scope over which the baseline is constructed including both historical data and current conditions, and iii) the geographical scope to which the baseline applies (spatial boundaries), which is also linked to the framing of the problem (Task 1.1.2).

- **Collect data**
  - Gather secondary data: use national or local meteorological services, climate databases, and socioeconomic statistics. Compile existing research studies, impact assessments, and climate projections developed by research and academic institutions. Utilise relevant reports and data from local organisations and NGOs. This is a list of data conventionally collected in this task:
    - Climate data: historical weather data, such as temperature records, precipitation, seasonal variability, extreme events (e.g., frequency, extension, duration, and intensity of past events like storms, floods, droughts, and heatwaves) from meteorological departments and climate databases.
    - Socio-economic data: includes data on population and demographics (e.g., current population distribution, density, and demographic factors, as well as projections, and public health), economic indicators (e.g., income levels, employment, economic sectors and productivity), and infrastructure and services (e.g., roads, water supply, energy, healthcare, education) from national census records, regional databases, and socioeconomic surveys.
    - Environmental data: information on natural resources, land use patterns, air quality, the current state of ecosystems and biodiversity from environmental agencies, research studies, and NGO reports.

- Risk-related data: this includes aspects such as climate-related impacts on sensitive sectors, communities, or groups, as well as existing and projected climate risks identified in previous studies. Collect information on the impacts of previous extreme events (including economic and non-economic losses and damages) from official or sectoral reports.
- Adaptive capacity data: information on the current capacity of communities, institutions, and systems to respond to changes in climatic conditions. This can be found in existing policies, strategies, plans, and regulations related to climate adaptation and disaster risk management; in available funding mechanisms (including government programs, international aid, and private sector investments) and financial tools that support or hinder climate adaptation; in the roles, mandates, and operational capabilities of key institutions involved in climate risk management (e.g., Civil Protection agencies, Forest Departments, Water Utilities, River basin authorities); or by accounting for technologies, practices, measures, and responses for climate adaptation and disaster risk reduction already in place as well as ongoing climate adaptation initiatives.

- Supplement with primary data (if needed): Compare collected data against the defined information needs to identify missing or outdated data. Where gaps are identified, plan and conduct primary data collection through surveys, interviews, or field studies.
  - Identify primary data sources: you can collect qualitative and quantitative data from key stakeholders, including academic experts, researchers, practitioners, and local authorities, or record on-site data, such as temperature readings or water levels. If possible, seek input of communities, the private sector, NGOs, and incorporate local knowledge about historical climate patterns and coping strategies.
  - Prioritise primary data collection: since this may be costly and time consuming, you can prioritise data that directly inform key aspects of your baseline (e.g., vulnerability, risks, or adaptive capacity) and choose the most cost-effective methods focusing on high-impact areas that can be addressed within the budget and time constraints.

Food for thought

All the collected information together (primary and secondary data) helps you understand better your region's context, trends, and dynamics— necessary for better undertaking your Regional Resilience Journey.

- **Analyse evidence and derive insights:**
  - Organise data: Integrate the data in a database and organise it into relevant categories (e.g., socio-economic, climate, environmental, institutional data).
  - Process collected data: use, for instance, statistical analysis or data visualisation tools (e.g., GIS) to identify patterns, trends, dynamics, and other relevant information related to climate risks, vulnerability and resilience of your region.

- Extract insights: review the evidence focusing not only on vulnerabilities and resilience of single systems or elements (i.e. community, infrastructure, area), but also on the interdependencies between them (e.g. water supply system depending on the energy grid, or industries depending on transport and communication infrastructure) and how these affect other 'hidden' sectors and populations indirectly.
- *Tip: The AGORA Climate Data Academy can support you in understanding climate data and the importance of their collection and visualisation.*

- **Report findings**
  - Synthesise information: extract key findings, including past climate impacts, ongoing risks, critical vulnerabilities, and local resilience capacities and opportunities. Highlight any insights or gaps in data and knowledge that may require special attention in the future.
  - *Tip: Be aware of the iterative nature of data collection and its continuous feedback with the parallel tasks of 1.1.2 Frame the Problem and 1.2.1. Map Relevant Systems. Input from these two tasks requires adjustments in data collection, revision of the data collected, and additional information as more insight into the challenge is gained.*

Supporting resources:

- The Climate Resilience Measurement for Communities (CRMC)
- European Climate Data Explorer
- JRC PESETA IV
- World Bank's Climate Change Knowledge Portal
- ThinkHazard.org
- ResourceWatch Dashboards
- ClimateAnalytics's Climate Impact Explorer
- ARCH Resilience Assessment Dashboard RAD
- COACCH Climate Change Impact Scenario Explorer
- Open Climate Data: Open Gov Guide
- Examples of climate data projects
- Citizen Generated Data: Toolkits and Guides

Back to Task 1.1.1

D3. Task 1.1.2 Frame the problem – Technical guidance on how to complete

How can you complete this task?

The actions described in this task are intended to be co-developed by a core group of representatives from the region, including different sectors and expertise. This group should perform the following actions during a series of (preferably in-person) workshops.

- **Review the gathered evidence (Task 1.1.1) and system understanding (Task 1.2.1)**:
  - Reflect on the gathered evidence base, as well as your understanding of the underlying causes, direct and indirect effects of the problems in your region. Derive your current adaptation and resilience needs and how these are expected to develop in the future. Potential questions to guide your analysis include:
    - What does the gathered evidence tell you about the climate-related problems that your region is facing (and/or may be facing in the future)?
    - Do you expect risks to change? To what extent could change occur? When does the evidence suggest these risks could be experienced?
    - How do these problems manifest in the affected KCSs? Where are your principal impacts experienced? What are these impacts?
    - When multiple problems are identified, is there one overarching problem/driver that leads to the majority of issues?
    - Can multiple sector-/KCS-specific problems be merged into one broader problem/driver?

- **Formulate a prioritised initial set of problem or challenge statements**:
  - Summarise and express your adaptation and resilience needs as a set of concrete problems or challenge statements to be addressed by the Climate Resilience Strategy. Express your challenges in a simple and accessible way, connecting to both your region's existing problems as well as their potential evolution in the future. Example problem statements include:
    - Mitigate the impacts of regional flood risks until 2100
    - Mitigate risks to critical road transport corridors until 2050
    - Mitigate the public health impacts of regional heat stress until 2050

  - Identify the KCSs which are most affected by these challenges. Using your systems map (Task 1.2.1), identify how risks from climate hazards propagate through your integrated regional system. Do not forget to account for cascading indirect impacts, which may be more significant than the direct impacts. Identify the KCSs you think will be most affected (i.e. generate the greatest impacts). This helps to define the set of initial boundary conditions for your Climate Resilience Strategy (i.e., which KCSs to include, which to exclude, etc.).

  - In the case of multiple climate-related challenges, prioritise your challenges according to their expected impacts across the relevant KCS. It may be that you will not be able to address all challenges within your Climate Resilience Strategy and investment plan. Select those (prioritised) challenges to carry forward with you for the remainder of the Regional Resilience Journey. This prioritisation will be a qualitative assessment, but in later iterations of your problem framing, more quantitative information can be introduced from, e.g. the climate risk assessment.

- **Formulate an initial set of planning objectives**:
  - Use the set of problem statements to specify an initial set of planning objectives to both address the prioritised climate risks and build broad-based system resilience in the prioritised KCS. Your objectives should be both achievable and measurable and should clearly relate to the climate related challenge being addressed.

- Focus first on defining those objectives which *directly address impacts* for your identified climate risks. These will become your set of *primary adaptation objectives*. It is against these objectives that you *assess* the performance of your system in your climate risk assessment (Task 1.3.1). You also use these objectives to assess the risk-reduction performance of your adaptation options and formulate pathways (Task 3.2.1). Hence, it is already useful to be thinking about the types of adaptation options you might use to address your climate-related problems and confirm that their relative performance can be assessed against the specified adaptation objectives. Similarly, you should ensure that your objectives are sensitive to the prioritised (uncertain) drivers of risk (used to specify the climate risk scenarios in Task 1.3.1). If either of these are not the case, you may need to reframe your objectives to be more in line with the options and risk drivers you will likely wish to assess. The more specific you can be in relation to these objectives, the better.
  We strongly recommend keeping the number of adaptation objectives to a minimum, as each separate objective will likely demand its own risk assessment, options assessment and set of adaptation pathways to include in your final Climate Resilience Strategy.
  Example primary adaptation objectives include:
  - Reduce 1:25 year flood damages to acceptable levels and maintain these until at least 2100, while accommodating a growing population.
  - Reduce expected annual damage to critical road transport corridors to acceptable levels. Maintain these levels until at least 2050, while accommodating a 25-50% increase in traffic volumes.
  - Reduce annual number of heat-related deaths to below acceptable limits and maintain these until at least 2050, while accommodating a growing population.

- Focus next on defining an initial more general set of (related) objectives to improve your region's overall system resilience. You use the performance against these *secondary resilience objectives* (e.g., job creation, improvement in public health, improvement in social well-being, economic development, etc.) to *evaluate* the relative performance of the alternative adaptation pathways and innovation portfolio (Tasks 3.2.2 & 3.2.3). These secondary objectives will unlikely be assessed quantitively during the strategy formulation process[4], such that you do not need to specify these to the same extent as your adaptation objectives. As these objectives relate more to the broader aspects of your shared vision (Task 2.3.1) and theory of change (Task 2.4.1), the initial set defined in this task will need to be revised during Phase 2 of the Regional Resilience Journey. Example secondary resilience objectives include:
  - Increase biodiversity within aquatic ecosystems.
  - Improve the quality of the urban environment to improve liveability, connectivity, and social connectedness.
  - Reduce regional unemployment by stimulating growth in targeted economic sectors.

[4] This is not to say that their performance will not be quantifiably monitored during implementation of the Climate Resilience Strategy.

- **Identify an initial set of appropriate performance metrics**:
  - For each of the planning objectives, specify appropriate metrics with which to measure the relative performance of the adaptation options, pathways and innovation actions. Metrics should be S.M.A.R.T. (specific, measurable, achievable, relevant, and timely).

  - For your *primary adaptation objectives*, quantifiable metrics are preferred, particularly if you are going to implement a quantitative or semi-quantitative risk assessment. **It is against these metrics that any computational modelling studies should generate results.** Also specify any key (existing) adaptation limits or thresholds to constrain your risk analyses and indicate instances of unacceptable system performance. Examples for the above listed adaptation objectives could include:
    - Number of properties impacted in a 1:25 year flood
    - Expected annual direct flood damages for 1:25 year flood
    - Expected annual indirect economic impacts for 1:25 year flood (flood duration)
    - Expected annual direct road damages from various climate hazards (landslides, floods, coastal inundation)
    - Expected annual indirect economic impacts of road closures due to climate hazards (recovery duration)
    - Heat stress index
    - Proportion of population 65+ years
    - Number of annual heat-related deaths

  - For your *secondary resilience objectives*, either quantifiable or qualifiable metrics are possible. Quantifiable metrics will be useful to inform the development of your monitoring plan during Phase 3 (Task 3.3.2), however for the purposes of strategy formulation, more qualifiable metrics will suffice, provided the relative performance of the different adaptation options and innovation actions can be evaluated. Note that you may choose to leave specification of your secondary resilience metrics until the visioning (Task 2.3.1) and theory of change (Task 2.4.1) tasks during Phase 2, once your set of planning objectives have been finalised. Examples for the above listed resilience objectives could include:
    - Number of indicator species
    - Populations for each indicator species
    - Water quality parameters (e.g. BOD, DO, pH, E.coli, Heavy metals, etc.)
    - Length of connected (public) green space
    - Area of (public) green space
    - Proportion of population unemployed
    - Proportion of population underemployed

- **Specify the key boundary conditions for the Climate Resilience Strategy**:
  - Specify the set of remaining boundary conditions for your prioritised challenges and planning objectives to constrain the subsequent climate risk assessment and other planning processes during the Regional Resilience Journey, including:
    - Strategic planning time horizon. Here the preference is to consider a time horizon that will account for relevant long-term climate risks. E.g. for SLR, you might like to consider a time horizon of 100+ years. For extreme precipitation and heat, stressing the effectiveness of a strategy against an initial time

horizon of 25-50 years may be sufficient given other socioeconomic factors may be more dominant drivers of risk.
    - Prioritised uncertainties to be actively confronted and managed by the Climate Resilience Strategy, e.g. drivers of climate risk, drivers of regional economic performance, drivers impacting ecological health, etc. (using outputs from Task 1.2.1)
    - Geographical extent of the system and other system boundaries (e.g. institutional, socioeconomic, etc., using outputs from Task 1.2.1).
    - Other system boundaries and constraints, e.g., institutional, socioeconomic, environmental, financial.

 **Supporting resources:**

Useful tools

- 21 ecological and social dimensions – Doughnut Economics framework
- The Climate Resilience Measurement for Communities (CRMC)
- European Climate Data Explorer
- JRC PESETA IV
- World Bank's Climate Change Knowledge Portal
- ThinkHazard.org
- ResourceWatch Dashboards
- ClimateAnalytics's Climate Impact Explorer
- ARCH Resilience Assessment Dashboard RAD
- COACCH Climate Change Impact Scenario Explorer

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D4. Task 1.2.1 Map relevant systems – Technical guidance on how to complete

How can you complete this task?

- **Identify system boundaries**:

  Identify and prioritise which climate hazards, key community systems and sub-systems to include in the analysis, including all relevant system components, functions, and characteristics. This list serves as the foundation from which you will build your systems map in the next activity. Commence by identifying the system boundaries of the key community systems being managed. **The key question to answer while you are completing this activity is, 'What is important to include in the analysis of the climate risk-related problem?'**

  Key considerations may include:

- Spatial and geographical extent of the problem area potentially impacted by the climate risks.
- Temporal extent and resolution (i.e. planning time horizons) of the risk-related planning challenge.
- Relevant sectors, population centres, infrastructure, natural features for the key community systems situated within the problem area or indirectly impacted if located elsewhere.
- Key system functions, characteristics, and constraints to include in the analysis. Although not mandatory, breaking integrated systems down into constituent aspects can help in this regard. For example, you could consider each of the biophysical, socioeconomic, administrative/institutional subsystems of the key community systems in turn (as demonstrated in Table below). Alternatively, you could apply a more extensive PESTLE (Political, Economic, Social, Technological, Legal, Environmental) analysis of the key community systems. Comprehensively unpacking your systems in this way ensures that you identify the functions, characteristics and constraints across your entire system that are relevant to addressing your climate-related problems.

Note that it is not the intention to account for every possible element and relationship present in the system, but rather prioritise these according to the core risk-related issues being addressed.

Table D4.1: Example system functions, characteristics and constraints for biophysical, socioeconomic and institutional sub-systems.

	Biophysical	**Socio-economic**	**Institutional**
Functions	- Rainfall, river discharge - Heat regulation - Primary production - Hazards, e.g. extreme weather, flooding, pandemic	- Water supply - Flood protection - Food production - Energy production - Tourism services - Transportation - Health services - Recreational services, e.g. fishing, swimming, hiking - Financial crisis	- Governance responsibilities - Subsidies - Penalties/fines - Hazards, e.g. state capture, corruption
Characteristics	- Self-regulating - Suffering scarcity or degradation	- Social values, e.g. allowable water use, transportation preferences, dietary requirements - Economic dependencies, e.g. supply chains	- Hierarchies, within and between institutions - Institutional dependencies, e.g. transport fines that fund road improvements
Constraints	- Resource availability, e.g. water, wind, soil - Environmental requirements, e.g. e-flows, maintenance of biodiversity	- Demand requirements, e.g. water, energy, food, transport - Minimum production limits	- Regulatory limits - Jurisdictional boundaries - Planning controls, zoning

** Note that this table is to serve as inspiration only. You do not need to consider all the listed elements, but only those (and others) of relevance to your climate challenges.*

- **Map relevant systems**:
  Within the constraints of the identified boundary conditions, analyse and elaborate the included (sub-)systems spatially and/or conceptually. Here the aim is to generate either/both a geographical representation of the integrated system and its functions or/and an integrated conceptual model of the key processes influencing the key impacts of concern (to be expressed by the planning objective metrics to be specified in Task 1.1.2). **The level of detail needed for this activity does not need to be particularly deep, but deep enough to sufficiently inform your problem framing (Task 1.1.2).**

  Geographical representations can be based on GIS data, land use maps, or similar (see Figure D4.1). **The objective is to agree on the set of physical features and regional functions to include in your analysis.** This can include both natural features and infrastructure, as well locations for any critical service facilities, economic activity centres, etc. Focus on those features which are most relevant to the climate challenge being addressed. For example, in an urban centre vulnerable to flooding, make note of any existing water courses, flood defences, as well as any critical services (energy facilities, health facilities, educational facilities, major transport routes), commercial zones, and/or vulnerable groups that may be situated in potentially vulnerable locations. Identify any interactions or interdependencies that may be present between these elements, and which may result in indirect risk impacts.

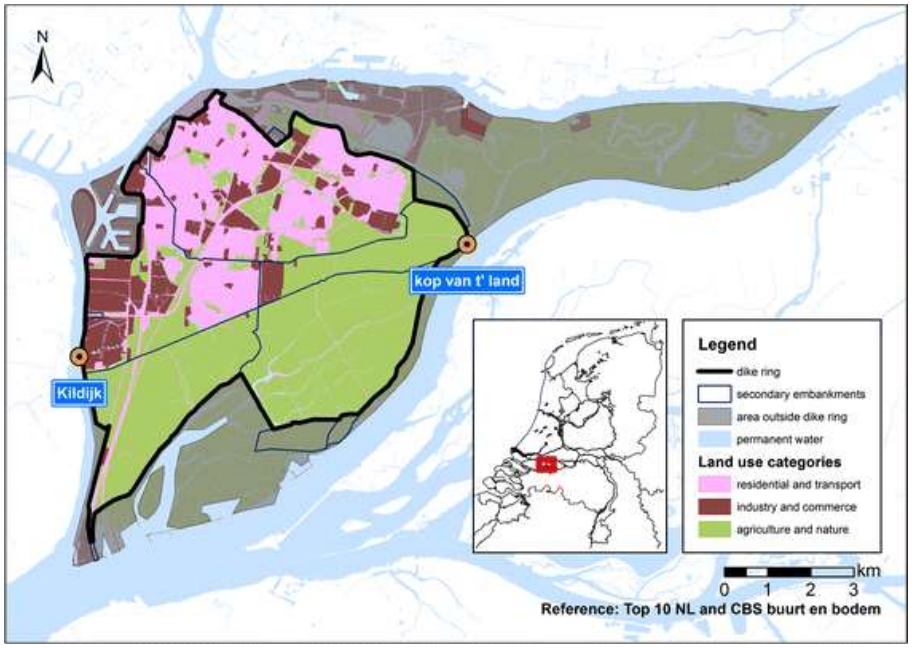


Figure D4.1: Example geographical system map indicating land use and key flood defence infrastructure for the City of Dordrecht, Netherlands (de Bruijn et al., 2016)

Conceptual models can be developed through analysis of causal relationships present between the various system elements. **The objective is to develop an agreed representation of how the system functions overall, which can then be later used to highlight both its vulnerabilities but also the opportunities present to transform it and improve its resilience.** It is therefore important to establish both the main drivers of changes within the system as well as the principal impacts generated. Here,

applying conceptual frameworks such as DPSIR (Drivers, Pressures, States, Impacts, Responses, EC, 1999, see Table below) can help to structure your thinking in terms of upstream drivers and pressures that lead to downstream state changes and impacts in your system.

Table D4.2: DPSIR framework for causal relationships (EC, 1999)

Drivers	Social, demographic, and economic developments which influence human activities and which directly impact the environment.
Pressures	Consequences of the driving force, which in turn affect the state of the environment. They are usually depicted as unwanted and negative, based on the view that any change in the environment caused by human activities is damaging and degrading.
States	Physical, chemical and biological conditions in the environment or observed temporal changes in the system. These may refer to natural systems (e.g.: atmospheric CO2 concentrations, temperature), socio-economic systems (e.g.: living conditions of humans, economic situations of an industry), or a combination of both (e.g.: number of tourists, size of current population).
Impacts	How changes in the state of the system affect human well-being. Often measured in terms of damages to the environment or human health, or by simply indicating a change in environmental parameters.
Responses	Actions taken to address the problems of the previous stages, by adjusting the drivers, reducing the pressure on the system, bringing the system back to its initial state, and mitigating the impacts.

Figure D4.2 provides a simple example of applying the DPSIR framework in the domain of flood risk management.

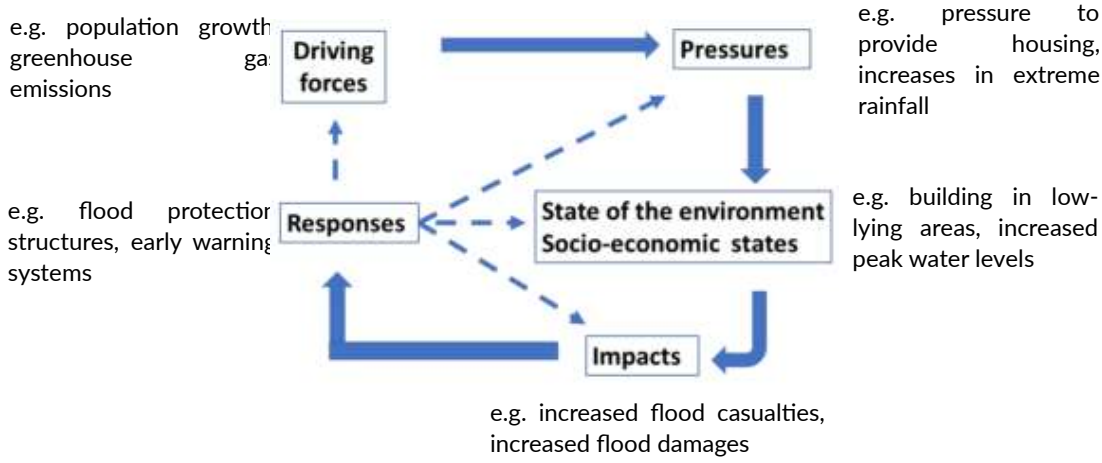


Figure D4.2: DPSIR framework of causal relationships (EC, 1999)

When mapping your system, be sure to identify and map all relevant processes across the integrated system, to highlight any important interactions, dependencies, barriers, obstacles and enablers present between key community systems and/or their various sub-systems. One way to visualise your systems map by way of a causal relationship diagram (see Figure D4.3). These can take the forms of chains, loops, matrices, or webs, and can be generated using a variety of available manual or digital drawing tools (e.g. whiteboards and post-its, Miro, Kumu, etc.).

As the key community systems are typically complex systems, consider analysing each of the included sub-systems individually first before exploring the interactions and interdependencies present between these. **Limit your analysis to those aspects of the systems which are relevant to adapting to the risk-related challenge being confronted in your region.**

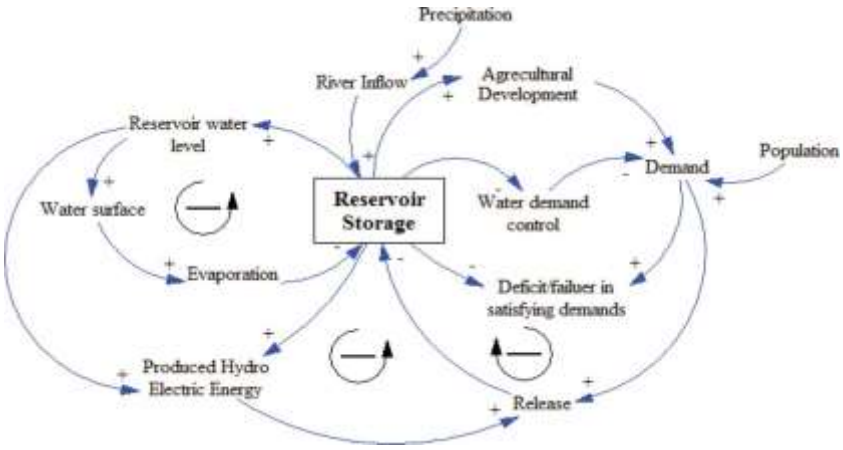


Figure D4.3: Example causal loop diagram for water management (Source: Felfelani et al., 2013)

- **Consider cascading effects**:
  When mapping your systems, do not limit your analysis to only the direct effects of risk drivers and pressures. Consider also how climate hazards may indirectly propagate through the system, amplifying or triggering additional processes in other key community systems . Also think about any additional impacts that may occur during compound or consecutive hazard events. For example, heavy rainfall that causes direct flooding in an area that triggers an electrical blackout as energy facilities are inundated. Diagrammatically visualizing your system as suggested above can help to explore and illustrate these effects as well as identify additional interdependent elements impacted by the climate hazards.

- **Consider the role of the identified stakeholders in system functioning**:
  Building on the work undertaken in Task 1.2.2, elaborate the systems maps with the key stakeholders influencing and affected by the various system elements and functions. Map their key functional relationships and dependencies in relation to the governance of the key community systems, which can then be used to identify how these may either enable or obstruct effective risk management.

Supporting resources:

Useful tools

- The Context map
- Toolkit for designing climate change adaptation initiatives
- Systems innovation climate toolkit

Useful methods

- Group model building

- Collaborative (geographical) mapping
- Network analysis
- GIS-based spatial analyses

Back to TASK 1.2.1

D5. Task 1.2.2 Identify stakeholders: Technical guidance on how to complete

How can you complete this task?

The actions described in this chapter are intended to be co-developed by a core group of representatives from the region, including different sectors and expertise. This group should perform the following actions during a (preferably in-person) workshop.

1. **Identify all potential stakeholders & groups** (stakeholder map): Start from the identification of key categories and specific sectors/groups you want to involve in your transformation process towards climate resilience. Explore key stakeholder mapping and engagement initiatives in the AGORA Explorer. Join the AGORA Community HUB to discuss your doubts with peers and experts. A schematic example of how to develop a stakeholder map is below:

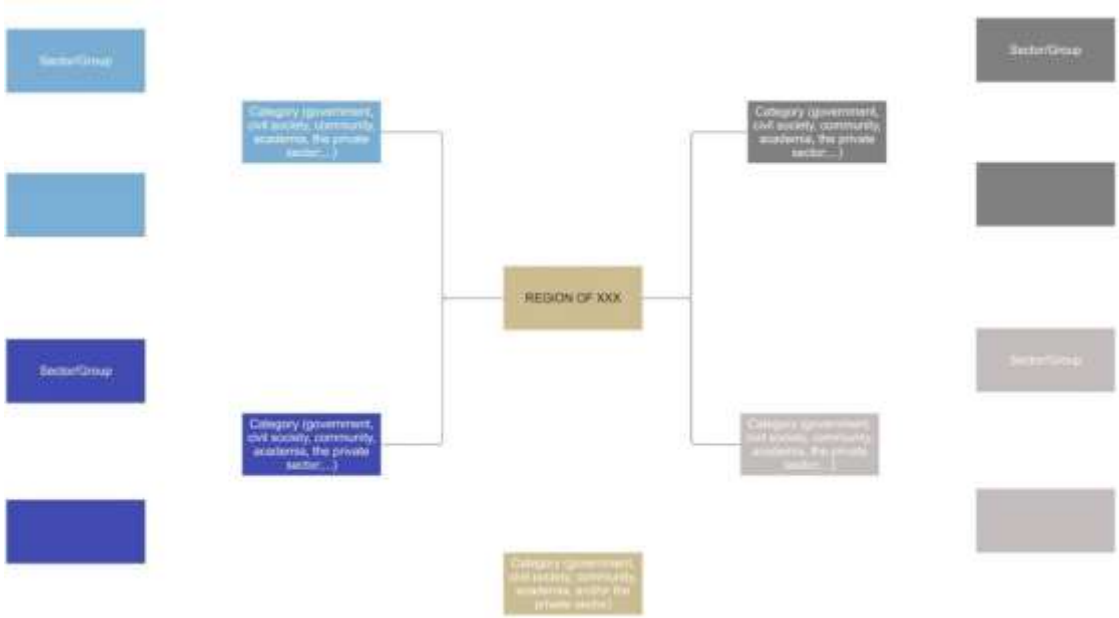


Figure D5.1: Schematic example of a stakeholder map

For each sector/group identified, map more detailed information on specific actors to be engaged, namely:

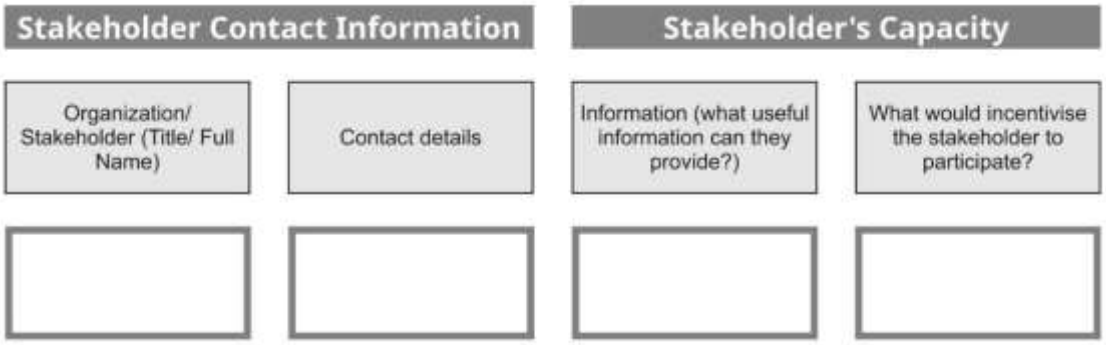


Figure D5.2: Detailed information on specific actors to be engaged.

2. **Assess and prioritise the stakeholders** (stakeholder assessment matrix): Assess the stakeholders' interest and influence in the region's transformation towards climate resilience. In order to do so, you should position the identified actors within a Stakeholder Assessment Matrix:

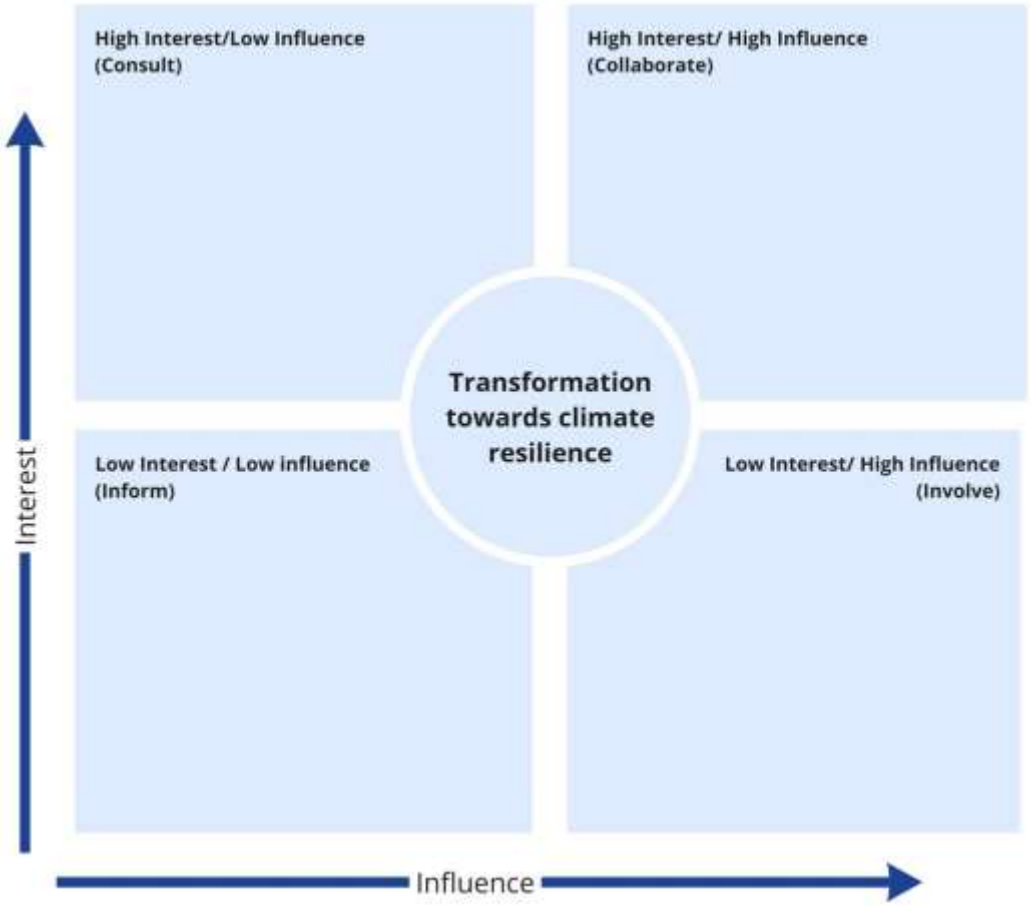


Figure D5.3: Stakeholder Assessment Matrix.

Variables affecting stakeholders' relative interest and influence are diverse. Some examples are:

Formal organisations/institutions:

- Legal hierarchy (command & control, budget holders)

- Authority of leadership (formal, informal, charisma, political, familial or cadre connections)
- Control of strategic resources
- Possession of specialist knowledge & skills
- Negotiating position (strength in relation to other stakeholders)

Informal interest groups and other stakeholders:

- Social, economic and political status - degree of organisation, consensus and leadership in the group
- Degree of control of strategic resources and power.
- Informal influence through links with other stakeholders
- Degree of dependence on other stakeholders

This exercise will serve to map the stakeholders against the four quadrants of the matrix. According to their position, you will understand which type of engagement you should aim for with each of them. More specifically:

- Those in the **'consult**' box have high interest but low influence and although by definition they are supportive, they lack the capacity to significantly help the project and deliver impact; however, they may become influential by forming alliances with other more influential stakeholders. These are often the marginal stakeholders that may also be considered 'hard to reach', and that might warrant special attention to secure their engagement and to empower them to engage as equals in the research process with more influential participants. The low level of influence held by this group is often used as a justification for excluding them from the research process.
- Stakeholders in the '**collaborate**' box are those with which it is likely to be most beneficial for your region to engage with. They may be able to supply relevant information, permissions and resources, or may be markedly impacted by the eventual outcomes.
- Those in the '**inform**' box are stakeholders who have limited interest in or influence over the resilience process outcomes. If project resources are low, these stakeholders should not be prioritised in an engagement strategy.
- Those in the '**involve**' box are highly influential but have little interest in the region's work on resilience or low capacity/resources to engage. Because of this, they may have significant influence over the success of the project but may be difficult to engage with. As such, particular effort may be necessary to involve this group and therefore they should be prioritised in the engagement process.

3. **Develop a detailed understanding of your stakeholders** (stakeholder profile): In order to better understand the role that your stakeholders can play in the region's transformational journey, it is key to define their detailed profiling. This is meant to collect information about their agenda and arena of influence. More specifically:

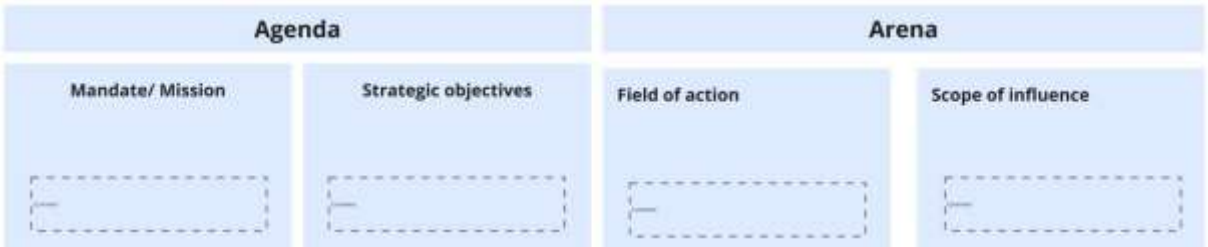


Figure D5.4: Stakeholder mapping according to Agenda and Arena.

In this phase, the relations between stakeholders should be also mapped better, highlighting their interrelationships and type of collaboration:

- Institutionally regulated relationship
- Ongoing information exchange
- Coordinated action
- Co-production with common resources

Supporting resources:

Useful tools

- TransformAr stakeholder management https://transformar.eu/storage/2024/01/TransformAr-D1.5.pdf
- NetZeroCities Civic Environmental mapping tool https://netzerocities.app/resource-3333

Useful methods

- AGORA framework to co-evaluate citizen and stakeholder engagement methodologies. https://adaptationagora.eu/wp-content/uploads/2023/12/AGORA-D3.2.pdf
- In-person co-creation workshop with key representatives of the region (collaborative exercises on flipchart/whiteboard)
- Online co-creation workshop with key representatives of the region (collaborative exercises on online platforms such as Miro, Mural, or similar)
- The Adaptation Mission project AGORA is a key reference to learn more on engagement innovation and community building, By joining the AGORA Community HUB, for example, you will be able to exchange with a group of peers with experience in stakeholder engagement and provides you relevant resources and knowledge to face challenges.

Back to TASK 1.2.2

D6. Task 1.3.1 Assess climate risks – Technical guidance on how to complete

How can you complete this task?

Risk assessments are essentially conducted in three phases (see Figure D6.1): risk identification, risk analysis, and risk evaluation. Each of these three phases can be completed as follows:

Figure D6.1: Three phases of risk assessment.

Food for thought

Consider engaging a suitably skilled consultant to assist you in this work if you do not have the necessary technical skills to undertake this task yourself.

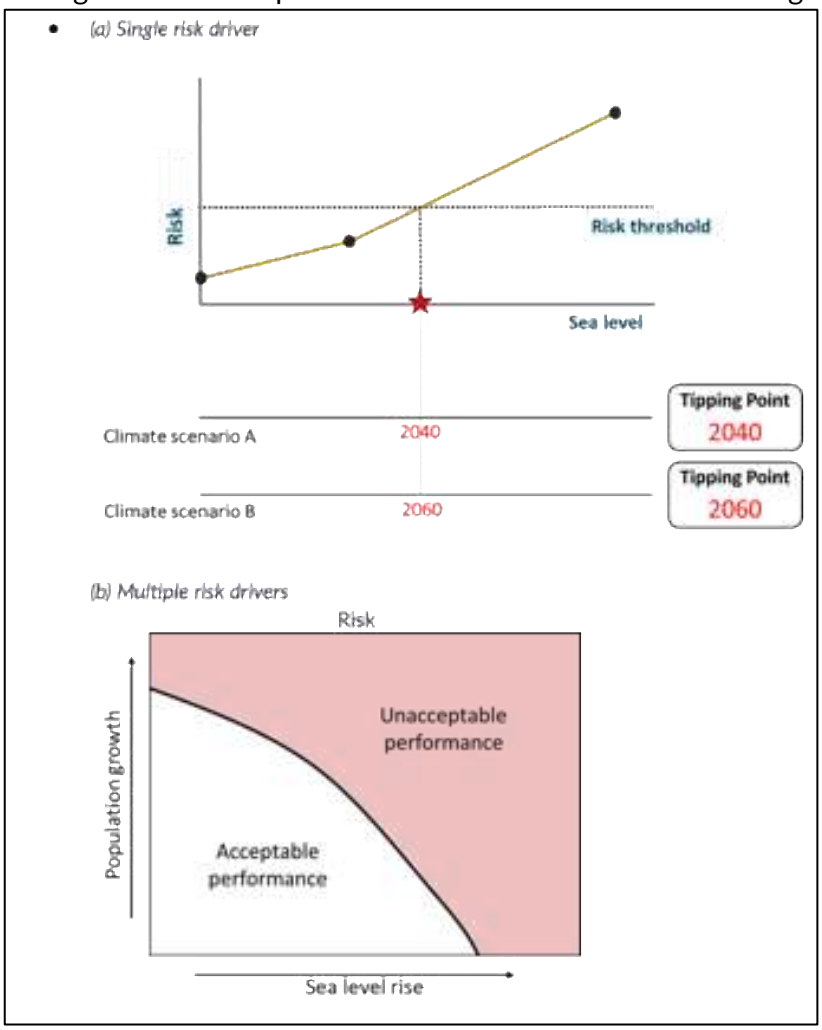
- **Risk identification**: With reference to your problem framing (Task 1.1.2), supplement the information contained within the initial baseline analysis (Task 1.1.1) with additional existing knowledge (e.g., hazard event databases, previous risk and vulnerability studies, expert and stakeholder input, etc.). Identify the most relevant hazards, impacts and risks to assess in the CRA. Consider both current and potential future risks when identifying those to be assessed.

- **Risk analysis:** Analyse current and future climate risks according to the specified CRA methodology (i.e. qualitative, semi-quantitative, quantitative, see below). Analyse current and future climate risks according to the specified CRA methodology (see below). Assess risks and their evolution in time using climate hazard, exposure and vulnerability data. Apply scenarios to determine the range of potential impacts that may be experienced depending on the conditions that emerge.

  Establish adaptation limits
  The evolution of risk through time is an important element to consider in adaptation planning as it is from this basis that adaptation pathways are formulated in Task 3.2.1. Here, applying the concept of adaptation limits or thresholds (see explainer in main guidance) is important to determine when further adaptation will be required as conditions continue to change. Establishing the conditions and (indicative) timings for these limits within both your existing regional system (as well as with various adaptation options implemented, in Task 3.2.1) therefore serves as an important component to your risk analysis.

  Adaptation limits are established depending on the CRA methodology being applied (see below). In more qualitative and semi-quantitative assessments, these can simply be estimated in terms of when risk impacts will be expected to exceed a specified narrative-based threshold (e.g. tropical night-time temperatures occurring 10 times per year), while in more quantitative assessments, such conditions can be calculated

through interpolation or stress-testing methodologies.



- Figure *D6.2* illustrates two examples of quantitative analyses to establish adaptation limits for coastal flood risks. The first (a) considers a single uncertain risk driver (sea level rise), while the second (b) presents the relationship between two risk drivers (population growth and sea level rise) in the form of a response surface generated through modelling. The question you are trying to answer with these analyses is, **"under what conditions will my system no longer perform acceptably?"**

- *Consider system interactions and cascading risk impacts*
  When analysing your drivers of risks, also be sure to take into account any integrated system interactions and interdependencies across the affected KCS, and especially how risks and impacts can propagate through the systems. These may amplify, trigger or otherwise exacerbate impacts. For example, extreme precipitation may directly yield flood damages, but it may also cause associated landslides that further increase the economic losses experienced. Failing to account for these effects could mean that unacceptable adaptation limits are breached much earlier than expected by the climate resilience strategy.

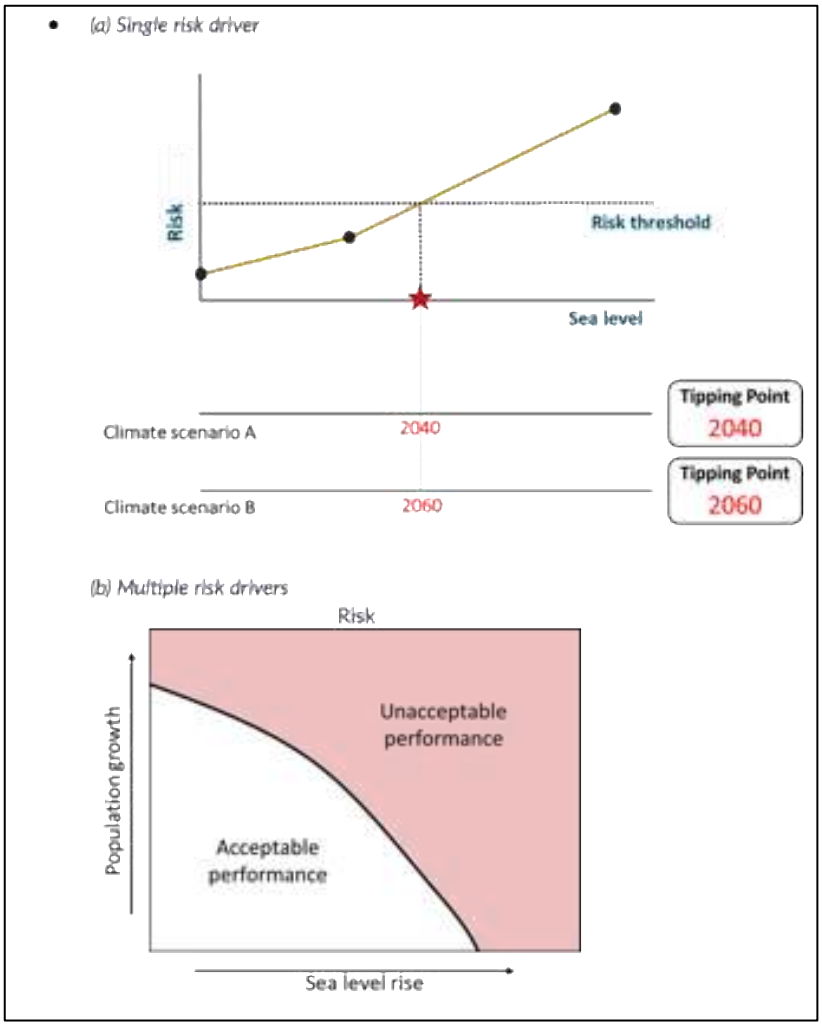


Figure D6.2: Analyses to establish adaptation limits (or tipping points). (a) Single risk driver: coastal flood risk (green line) increases as sea levels rise, the red star indicates the (interpolated) point at which the adaptation limit is reached, and when risks begin to exceed the acceptable threshold. Scenarios can then used to determine indicative timings for this limit being reached. (b) Impacts from multiple (two) risk drivers expressed as a response surface: risk increases as population grows and sea levels rise. The response surface is generated by systematically modelling multiple combinations of the risk drivers against a specified impact indicator. The black line indicates the sets of conditions that yield the adaption limit, beyond which further increases lead to unacceptable performance. Multiple scenarios can then be overlaid onto the surface (not shown) at different time steps to determine when the adaptation limit may be breached. (Adapted from source: ADB, 2021)

- **Risk evaluation:** Evaluate the analysed risks according to aspects such as their urgency (timing), severity (significance of impacts in the local context), your region's local absorptive and adaptive capacity (tolerance), and preferences (risk perception). Risks can either be evaluated using qualitative or semi-quantitative risk matrices (see below), or directly through comparative evaluation of relevant calculated quantitative risk indicators (established via, e.g., modelling).

The three additional risk assessment activities associated with the preceding three phases can be completed as follows:

- **Formulate risk assessment methodology:** Establish how you will undertake your climate risk assessment. CRAs can be undertaken according to one of three general approaches: *qualitative*, *semi-quantitative*, or *quantitative*. The selection of the approach largely depends on:

- the level of detail required for the assessment
- the availability of data to inform the assessment
- the resources available to conduct the assessment.

Each of these sets of approaches differ in the type of information they generate and their ability to be spatially explicit regarding risk impacts (see Figure D6.3). In addition to the three 'pure' approaches, hybrid approaches towards risk assessment are also possible, depending on the type of outputs (e.g. indicators) needed to inform decision making, and the capabilities to generate these qualitatively, semi-quantitatively, or quantitatively. The following paragraphs outline some of the key features, advantages and limitations of the three approaches.

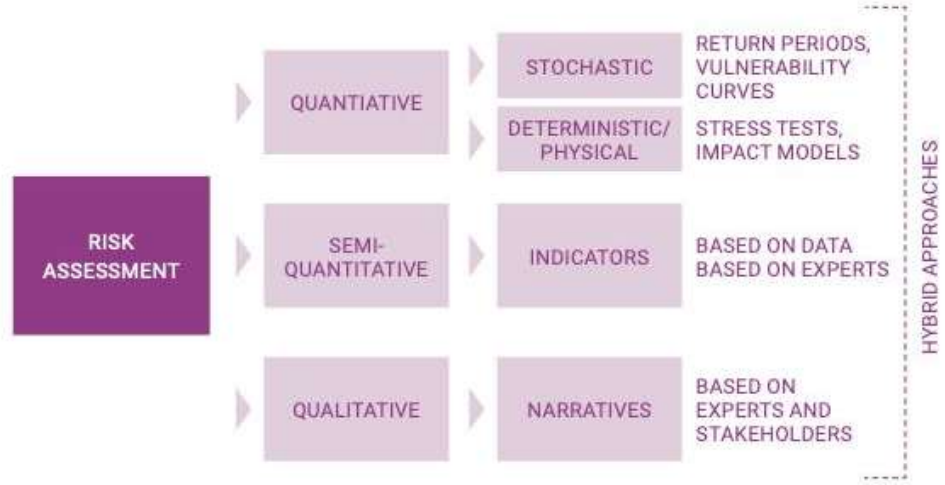


Figure D6.3: General approaches to assessing risks associated with climate change, the type of information these generate, and the information upon which they are based. Source: Technical guidance on comprehensive risk assessment and planning in the context of climate change

Insight

Make sure that your risk assessment methodology will deliver the necessary information on your specific primary adaptation objectives per your problem framing. Keep in mind that ideally you will assess the adaptation effectiveness of adaptation options during Task 3.2.1 using the same assessment methodology.

Qualitative approaches

Qualitative approaches are particularly useful in instances when knowledge about the risk to be assessed in limited or the available information is scarce. These are usually based upon expert knowledge and/or the inclusion of stakeholder-derived information about risks that is organised into more narrative descriptions. Qualitative risk assessments usually evaluate risks using risk matrices (see Figure D6.4), in which one axis represents the likelihood of a hazard occurring and the other axis represents the magnitude of the consequences. Evaluating qualitative risk analyses are relatively straightforward as they do not require the precise (quantitative) definition of threats, but rather analyse these based upon general identified trends. Stakeholder

participation in these processes and the inclusion of their (competing) knowledge and values is essential.

LIKELIHOOD	CONSEQUENCES				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	M	H	H	E	E
Likely	M	M	H	H	E
Possible	L	M	M	H	E
Unlikely	L	M	M	M	H
Rare	L	L	M	M	H

Figure D6.4: Qualitative risk matrix. In this example, L: Low, M: Medium, H: High, E: Extreme (Source: DRMKC, 2017)

Semi-quantitative approaches

Semi-quantitative approaches are similarly useful in instances when there is insufficient knowledge, data or resources available to conduct a fully quantitative modelling assessment. Evaluations for these typically elaborate qualitative risk matrices by applying a scoring system to assess the relative severities of risk consequences and likelihoods (i.e. risk level = impact x likelihood). This provides a more structured and nuanced analysis compared to purely qualitative methods. The relative scores are informed by a mix of quantitative and qualitative indicators characterising the risk components (hazard, exposure, vulnerability), with risk analyses for these and the ensuing impacts derived from available data sources, modelling studies, or expert knowledge (see Figure D6.4). Typically, information on the spatial aspects of risk is available in these types of analyses, such that hazard effects can also be mapped and analysed within Geographical Information Systems (GIS).

Quantitative approaches

Fully quantitative approaches involve the application of mathematical models (e.g. climatic, hydrodynamic, ecological, impact functions, etc.) that are more or less complex but generally require a medium to high level of technical specialisation. These types of approaches rely upon the availability of detailed quantitative data to serve as inputs to the (often multiple) computational models used, which can be derived from local monitoring (preferred), global databases (e.g. populated via remote sensing), and/or climate and socioeconomic projections. Similarly, suitably qualified technical experts are needed to build, run, calibrate and analyse the models. These types of assessments provide the most precise estimates of risk impacts, insofar are they are capable of yielding spatially explicit, detailed results on the different biophysical and/or socioeconomic variables of concern. Model results can either be stochastic and expressed statistically (e.g., through return periods, vulnerability curves), or deterministically calculated from, e.g., stress tests and/or impact models.

(a) Likelihood scale

1 -Very unlikely	2 - Unlikely	3 - Moderately likely	4 - Likely	5 - Very likely
<10%	**10-33%**	**34-66%**	**67-90%**	**>90%**
The event has a remote chance of occurring in the current year. e.g. seasonal hazards that have happened once in the last 20 years.	The event has a low chance of occurring in the current year. e.g. seasonal hazards that have happened one to three times in the last 20 years.	The event has a viable chance of arising in the current year. e.g. seasonal hazards that have happened three to five times in the last ten years.	The event has a significant chance of arising in the current year. e.g. seasonal hazards that have happened every second or third year.	The event is almost certain to arise. e.g. seasonal hazards that have happened every year in the last five years.

(b) Impact scale

1 - Negligible	2 - Minor	3 - Moderate	4 - Severe	5 - Critical
Minor additional humanitarian impact, 10,000-50,000 people affected. Government capacity is sufficient to deal with the situation.	Minor additional humanitarian impact, 50,000-100,000 people affected. Current country level inter-agency resources sufficient to cover needs beyond government capability.	Moderate additional humanitarian impact, 100,000-250,000 people affected. New resources up to 30 per cent of current operations needed to cover needs beyond government capacity. Regional support not required.	Substantive additional humanitarian impact, 250,000-500,000 people affected. New resources up to 50 per cent of current operations needed to cover needs beyond government capacity. Regional support required.	Massive additional humanitarian impact, >500,000 people affected. New resources over 80 per cent of current operations needed to cover needs beyond government capacity. L3- scale emergency.

(c) Risk matrix

Figure D6.5: Semi-quantitative risk assessment (a) likelihood scale, (b) impact scale, and (c) risk matrix, in which Risk score = Impact x Likelihood (Adapted from source: UNDRR, 2023)

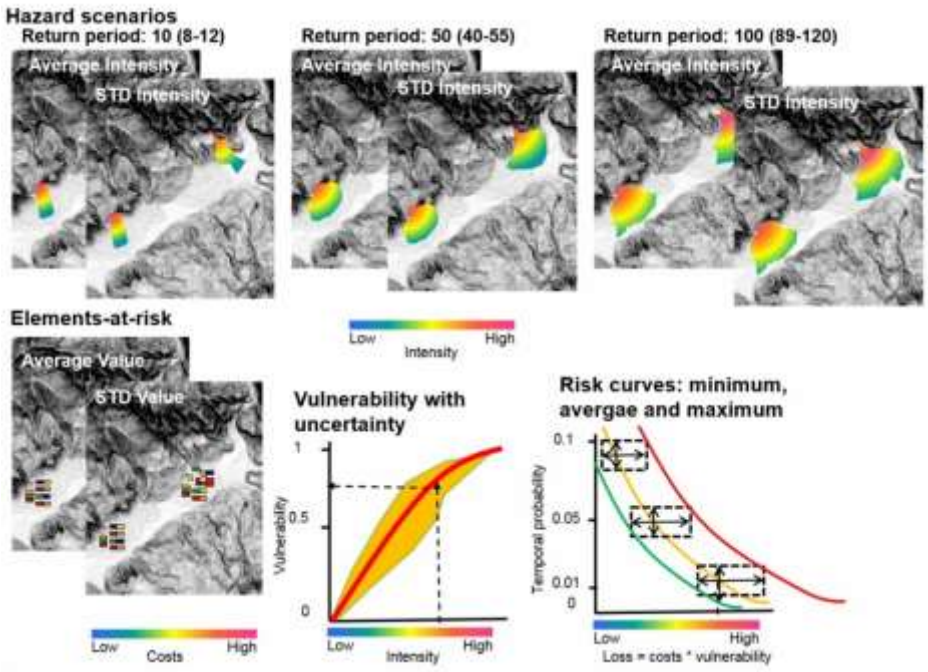


Figure D6.6: Quantitative (stochastic) risk analysis incorporating uncertainty in future hazard, exposure and vulnerability projections (Source: CEDMA, 2024)

Insight

In quantitative assessments, formulate a modelling approach that applies tools relevant to the climate hazards and KCS under consideration, e.g. for a flood risk analysis, use a suitable flood impact assessment tool.

Table D6.1 summarises some of the key differentiating features of the three approaches.

Table D6.1: Differentiating features of qualitative, semi-quantitative and quantitative risk assessments

	Qualitative	Semi-quantitative	Quantitative
Data collection	Expert knowledge Stakeholder interviews, focus groups, etc.	Available data (reports, previous studies, modelling) Expert knowledge	Extensive data collection from monitoring and/or local/global databases for all modelling inputs
Spatial explicitness	None	Results can often be mapped	Mapped with high precision
Reliability	Dependent upon participating expertise	Precision of results dependent upon level of detail of the available data and resulting analysis	Numerical risk results often more objective, reliable and detailed. Level of precision dependent upon the resolution of the available data and modelling
Stakeholder participation	Essential to incorporate and rationalise breadth	Essential for validation of inputs and results, and especially for	Important for validation of input data sources and results

	of competing perspectives of risk	selecting, scaling and aggregating indicators	

Table D6.2 summarises the key advantages and limitations of the three types of approaches.

Table D6.2: Summary of advantages and limitations of qualitative, semi-quantitative and quantitative risk assessments

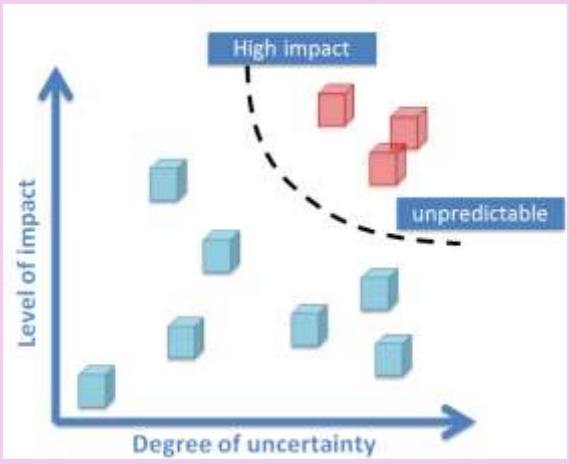
	Advantages	**Limitations**
Qualitative	• Flexible approach to risk assessment when knowledge and data availability and capacity are limited • Permits the incorporation of diverse qualitative information and local knowledge that may be highly relevant in certain contexts	• More subjective assessment given the possible incorporation of biases into the analysis • Inability to replicate results with different sets of experts/stakeholders • Impossibility of comparing results across different study areas
Semi-quantitative	• Ability to combine data from heterogeneous sources • Ability to combine both qualitative and quantitative information • Does not have to rely upon knowledge of empirical relationships between system variables • Permits objective, replicable assessments (subject to scaling and aggregation choices)	• Potential introduction of biases when selecting, scaling and aggregating indicators. Transparency for stakeholders surrounding these choices is paramount • Results often translated into categories (e.g., very low → very high), which do not allow for comparison of results between different study areas
Quantitative	• Robust modelling software has been developed for many problem domains in KCS (e.g. flood risk management) • These assessments tend to be more objective and replicable, and can help to resolve disagreements over drivers of risk impacts • Ability to compare results with other study areas	• Demand detailed technical understanding of variables and their relationships that influence the system: hazards, exposure and vulnerability and their evolution, as well as models to model these • Demand large amounts of data to feed these analyses (e.g. climate projections, biophysical data, socioeconomic data) • Provide a 'false' sense of certainty about the results, which is dependent on the quality of the input data and system model developed

- **(Supplementary) data collection/generation:** Collect and/or generate additional data necessary for the risk assessment according to whether a qualitative, semi-quantitative or quantitative assessment is being carried out. Qualitative data can come either from expert elicitation and/or social science research (e.g. interviews, surveys, focus group discussions). More quantitative data for modelling assessments can be drawn from European data repositories: e.g., Copernicus, CLIMAAX toolkit (if available), national or regional data repositories, etc. (refer to Task 1.1.1 for more information). Organise your data in a suitable database or information system. Revise your risk assessment methodology and/or problem framing if the necessary information cannot be collected/generated.

- **Scenario formulation**: From the system mapping (Task 1.2.1), prioritise the set of (uncertain) drivers of climate and socioeconomic changes in the system (e.g. sea level rise and population growth). Do not include all potential drivers, but rather focus on those to which the system is most sensitive. Use collected data on projections for these drivers to specify plausible sets of future conditions against which to assess climate risks and to formulate your climate resilient strategy. Scenarios may be more narrative based for qualitative assessments or sets of quantitative indicators of future conditions derived from climate and socioeconomic projections.

Insight

Use an Uncertainty-Impact chart or matrix to prioritise your uncertain drivers from which to formulate scenarios (see figure below). Prioritise those which generate the highest impacts and are most uncertain. Make sure that your developed scenarios only include potential changes in your system lying beyond your *direct control* as planners. Elements within your system that you can control or manage are assessed through the later selection of appropriate adaptation options, innovation actions and their associated action planning actions.



Example Uncertainty Impact chart to prioritise risk drivers

The number of scenarios formulated depends on the CRA methodology adopted. While many scenarios can be computationally assessed in a fully quantitative assessment, it is only feasible to assess a much more limited number in qualitative and semi-quantitative assessments. Nevertheless, it is important to formulate (and analyse)

multiple scenarios that cover the plausible (uncertain) range of potential future conditions such that the uncertainty surrounding these conditions can be reflected in the climate resilient strategy. This range should cover both the available historical record and any future (extreme) projections. Ideally, the scenarios should include a temporal component, such that your region's changing risks can be traced through time. This is achieved through either development of continuous scenario time series (quantitative assessments), or by formulating sets of scenario conditions at two or more specified time points in the future (all types of assessments).

Note that in quantitative assessments, it is also generally possible to incorporate many more scenario parameters into the analysis, and/or assess the impacts of multiple incremental changes in the system in the form of a stress-testing ensemble. The latter can be applied to help establish more precise conditions and timing of any adaptation limits.

 **Supporting resources:**

Useful tools

- Uncertainty-impact matrix
- Impact-Likelihood assessment framework
- CLIMAAX toolbox
- Urgency Scoring
- Climate impact chains

Back to TASK 1.3.1

D7. How to leverage key enabling conditions for Phase 2 - Technical guidance

What concrete actions can you take to foster enabling conditions to build a shared vision?

Knowledge & data	• Sustain a platform for knowledge **co-creation** by:
	  ○ **Creating spaces** such as communities of practice, networks of knowledge exchange, and peer-to-peer learning
	  ○ Facilitating **inclusive co-creation of knowledge** while recognizing different sources of knowledge (e.g, indigenous/local knowledge).
	  ○ Ensuring **periodic knowledge exchange** between stakeholders and peer-to-peer learning platforms, to include new understandings and knowledge into your Theory of Change.
	
	• Engage in **existing networks of knowledge**, and in particular:

	○ Explore innovative technologies and methods for **visualising possible futures** ○ **Foster exchanges** among networks of knowledge ○ Experiment **diverse knowledge systems**, including those held by Local Ecological Knowledge holders, to foster the discovery of innovative solutions and the exploration of alternative futures
Governance, engagement & collaboration	• Build a strong understanding of the **governance system** for **gaining the political support** necessary to approve your action plan. This means: ○ Discussing **previous experiences** of political support for transformative action in your region ○ Engage decision makers early in discussion, raising awareness on key climate resilience issues and **showing negative (economic, social, environmental) outputs** for inaction • Ensure **meaningful engagement with key identified stakeholders** by collaborating with trusted messengers and institutions and using appropriate communication channels and mediums, according to the local needs. In particular: ○ **Raise awareness** on local issues and risks ○ Develop **target-oriented communication strategies** tailored to different stakeholder groups ○ Establishing **transparent communication channels** to facilitate dialogue and information sharing between the local authority and stakeholders • Ensure **efficient interactions** with the different stakeholders, by: ○ Establishing a clear **understanding of roles, responsibilities, and expectations** upfront ○ Based on previous research, establishing **governance mechanisms** (i.e. responsibilities, platforms and spaces, ...) that facilitate productive interactions among formal government institutions, the private sector, and civil society ○ Establishing **community hubs, climate action hubs, and citizen assemblies** as spaces for community engagement and connection of different projects on climate change adaptation ○ **Incorporate grassroots actions into your possible future** to harness their importance and power in shaping the regional transformation
Capabilities & skills	• Foster **internal capabilities and skills needed for meaningful engagement with non-governmental organisations and communities**, and in particular: ○ Key staff with relevant positions should be offered **courses** in climate change adaptation and mainstreaming ○ Improve internal **skills necessary to conduct participatory processes** and facilitate interactions among stakeholders,

	including the ability to serve as mediators, translators, and facilitators. • Incorporate and **exchange lessons and experiences** from other regions and contexts in building institutional capabilities and skills for climate adaptation. This means: o Encourage and join **exchange activities** with national and international peers o Discuss **best practices as well as maladaptation**
Behaviour change	• Include actions towards communities and key stakeholders in your **communication strategies**, including: o Communicating actionable steps and **examples of positive change**, emphasising **practical actions** stakeholders can take o Provide localised **climate information and projections** relevant to stakeholders' specific contexts, making the data more relatable and actionable • Observe **collective behaviour** in social media and/or community spaces to identifying opportunities for intentional interventions that drive system transformation
Experiment, learn & reflect	• Engage in **experimentation and collaborative learning** to promote ownership and commitment among stakeholders, thereby enhancing democracy and social capital. More concretely: o Implement **radical niche innovations**, introducing new ways of doing, thinking, and organising. • Set **learning as a specific objective** in your vision for the future and particularly: o Critically examine and involve stakeholders in determining **who decides what is 'good'** o Establish **feedback mechanisms** to capture and incorporate stakeholder input into decision-making processes, demonstrating responsiveness and accountability o Implement **sensemaking practices** to facilitate continuous learning and adaptation, contributing to more effective strategies and decision-making, and informing learning loops and capacities
Finances & resources	• Involve **financial stakeholders** who have the potential to support your resilience actions and help them understand regional needs and opportunities by: o Exploring the **role of private financing and investments** in regional climate adaptation efforts in the past and present and identifying possible new opportunities o Gathering information on how **adaptation measures can benefit private actors** and their businesses, utilising existing best practices as examples • Identify the **changes needed** (in the appraisal methods and financing terms) needed to better achieve the vision

	○ Sustain your **integrated adaptation finance tracking** ○ Allocate **sufficient resources**, including funding, staff, and time, to support participatory processes and stakeholder engagement activities, and ensure their effectiveness ○ Identify **financial gaps and challenges** from previous implementation experiences • Implement a **strategic alignment of finance**, including: ○ Ensuring that all **financial planning and investment** are directly **aligned with the long-term resilience** goals of the region and the goals of Theory of Change ○ Prioritizing projects that offer the **highest impact** on climate resilience and leveraging finance that supports these goals

 **Supporting resources:**

Tools and resources for Phase 2

Leveraging Knowledge & data

- *Teaching The Future project*
- *Climate Literacy: The Essential Principles of Climate Science*
- *Accesing and using climate data and information in fragile, data-poor states*

Leveraging Governance, engagement & collaboration

- *Governance - good climate governance. How to strengthen climate governance for an effective climate action plan*
- *Guide to Equitable, Community-driven climate preparedness planning*
- *Online co-creation toolkit*
- *Gender mainstreaming list for projects*
- *Her4Climate*
- *The just transition and climate change adaptation*
- *Collaborative planning for climate resilience. An Integrated Science-based Framework for the San Diego Region*

Leveraging Capabilities & skills

- *CCC Blended Curriculum*
- *Community Climate Coaching*
- *Nature-based Solutuions learning scenario - Encouraging students to learn and care about water management at urban areas*
- *Skills for a just transition to a green future*
- *No just transition without skills. Skills for climate change policies*

Leveraging Behaviour change

- *The Theory & Techniques Tool*

- *Six steps to undertaking a climate behaviour change project*
- *Improving health and wellbeing: A guide to using behavioural science in policy and practice*

Leveraging Experiment, learn & reflect

- *Reflexive Monitoring in Action (RMA)*
- *A practical guide to using reflexive monitoring for nature-based solutions*
- *Preparing for a climate assembly*

Leveraging Finances & resources

- *Methodologies for assessing adaptation needs and their application*
- *Catalogue of sources and instruments*
- *REGILIENCE Funding Opportunities Catalogue*
- *Adaptation finance archetypes: local governments - persistent challenges of funding adaptation to climate change and ways to overcome them*

back to phase 2 chapter

D8. Task 2.2.1 Develop possible futures – Technical guidance on how to complete

- **Agree on the challenges that your futures will need to address to be considered desirable**. Building on the initial set of problem/challenge statements framed during Task 1.1.2, agree on the set of challenges to be addressed in your alternative futures. Start with your drivers of climate risk, before including the other challenges that your region is seeking to address, such as inequality, regional development, wellbeing, etc. These should be aligned with your planning objectives. It is important to focus on the most important challenges for your region, and not try to cover everything. Think also of the principles or "non-negotiables" that your futures should have to be considered desirable. These could link to just transitions, ecological sustainability, or others.

- **Understand what is already changing and how these changes can affect your region's future**. The methodology most used for this purpose is called "horizon scanning" which is defined as the systematic outlook to detect early signals of potentially important development.[5] In other worlds, it is a method to identify emergent changes happening in your region, as well as elsewhere, that can have an important influence in the future. In particular, consider how the potential development of your climate risks will influence your broader system in the short- medium and long-terms.

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[5] *"Models of Horizon Scanning How to integrate Horizon Scanning into European Research and Innovation Policies" (PDF). Fraunhofer ISI. 2015.*

There are some horizon scanning databases available, for example Forum for the Future's Signals of Change https://www.thefuturescentre.org/signals-insights/ or the Global Trends reports produced by ESPAS https://espas.eu/gtr.html as well as the Megatrend Hub of the JRC https://knowledge4policy.ec.europa.eu/foresight/tool/megatrends-hub_en . You can use these sources to identify changes and trends that might affect your region; but it is important to also complement it with changes that are locally happening, for example, new transformative innovations (technological, social, or other) that offer alternatives to the status quo.

- **Select a small set of these changes and use them to explore how the future might look like.** You can select those changes that are more relevant for your region (i.e. "drivers" of change), because they might have the highest impact, and/or because you see them as emergent opportunities. It is important to include at least one climate driver in this exercise. To map how these futures will look like, there are several methodologies. We suggest three options, which you can choose from based on your time and resources:
  - **2x2 matrix.** This is the simplest method, in which you chose two drivers that are potentially particularly impactful in your region and position them across an XY axis with high/low versions of the driver. For instance, if your drivers are 'political polarisation' and 'digitalisation', you will have an X axis from 'low political polarisation' to 'high political polarisation'; vs a Y axis between 'low digitation' and 'high digitalisation'. You then describe how each of these 4 futures would look like, thinking of social, technical, ecological, political, dimensions. Note that in this case you will generate desirable and undesirable futures, and you will have to select and adapt futures to make them desirable for your region.

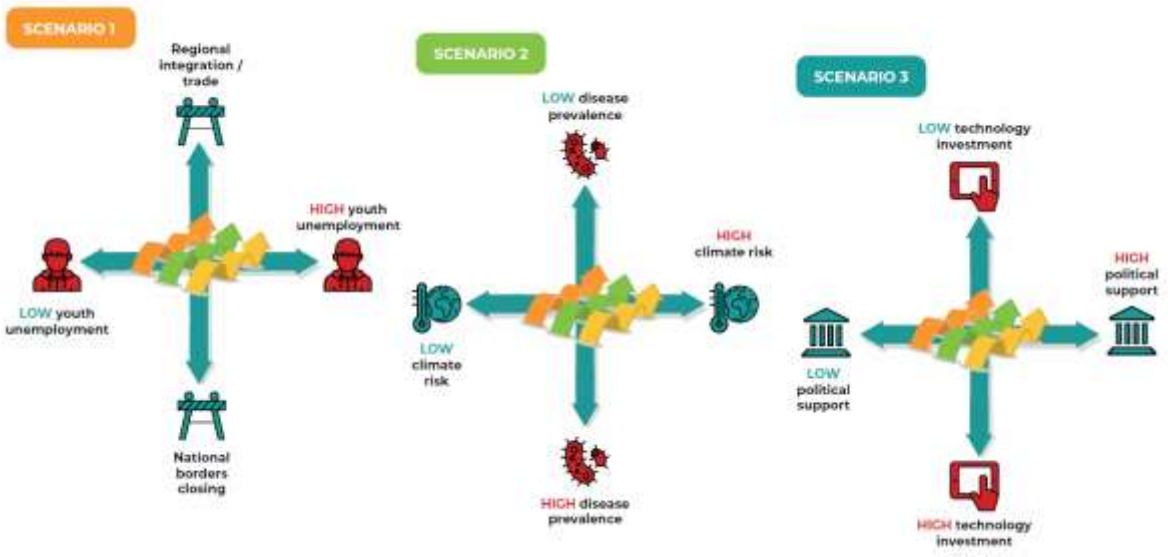

Figure D8.1: Example of 2x2 scenarios. Source: Chesterman S, Neely CN. 2021. Foresight for Future Planning Training Series: Information Pack. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Available online at: www.ccafs.cgiar.org.

  - **Futures wheel**: This is a visual method to identify cascading events emerging from a set of drivers or seeds. Select 2-3 drivers and seeds, perhaps those that you expect to be most impactful. What would be the primary consequences? What

technological, social, policy, market changes would this lead to? And what would be the consequences after that? After you have done this for every driver and seed, think about what the consequences of two or three seeds and drivers would be combined. Try and do this exercise for 3-4 layers of the cascade of events. Once you are finished, write a narrative that described the visual map that you have developed. As in the previous case, not all your futures will be desirable, so you will have to select and further tweak your futures to make them desirable.

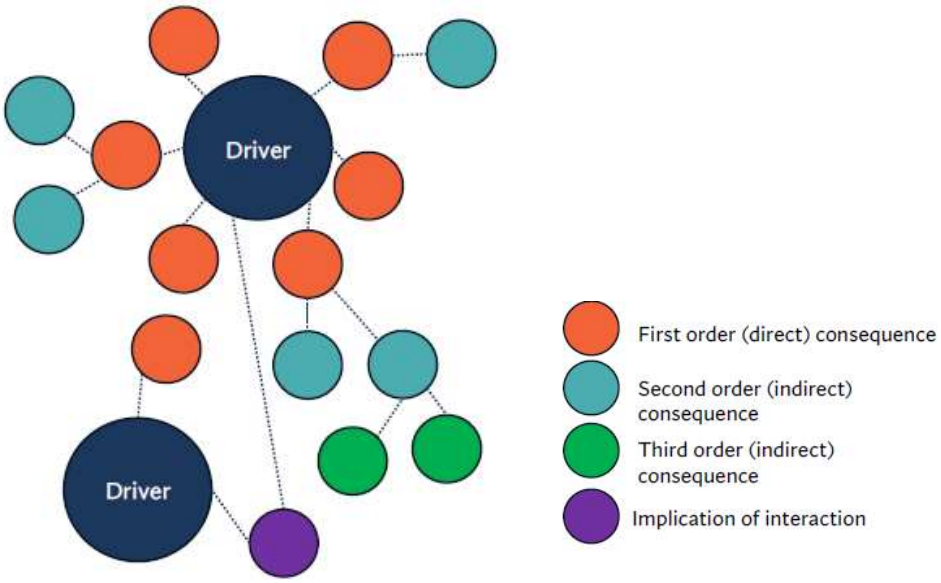

Figure D8.2 1: Diagram of a Futures Wheel exercise. Source: Policy Fit for the Future. The Australian Government Futures Primer. Available at https://nsc.anu.edu.au/content-centre/research/policy-fit-future-australian-government-futures-primer

- **Use the "seeds of the good Anthropocene" methodology:** This methodology will allow you to develop desirable futures based on existing changes, and it combines "Futures Wheels" with "Three Horizons" approach. It is different from the other approaches since it starts from innovations or seeds already happening on your region, that could lead to transformations if scaled. It is an engaging, participatory methodology that will develop rich narratives of desirable futures, but to be performed correctly it would need at least a two-day participatory workshop. If resources are available, it is advised to use this approach. A guide can be found in the toolbox and list of resources.

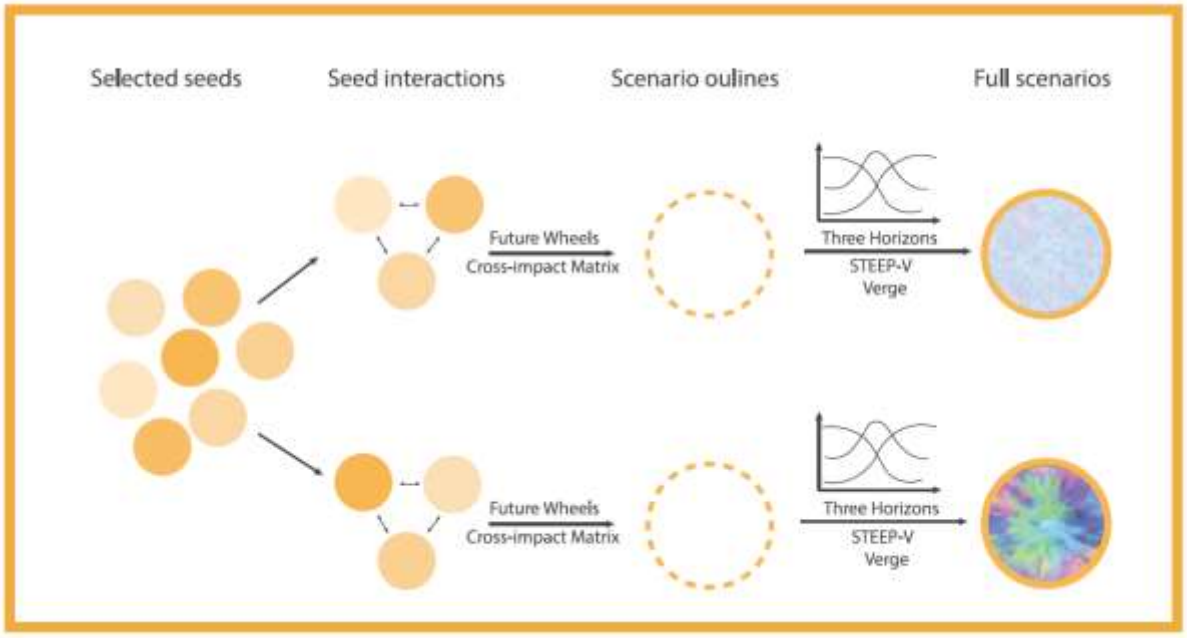

Figure D8.3 2: Summary of the "Seeds of the Good Anthropocene" approach. Source: Tanja Hichert, Reinette Biggs and Rika Preiser (2019) CST Toolkit 2019

If you use the 2x2 approach or the Futures Wheel, define which futures are "desirable". To do so, use the criteria that you identified initially (challenges to be addressed, principles) and see in which cases these are met. You can refine your initial futures to make them more desirable, if there is internal coherence within them.

- **Identify key levers of change for each desirable future**. For the alternative desirable futures that you have developed, identify what would be the main drivers of change that would allow your region to achieve that future. This is what we call "levers of change", which can be understood as areas of intervention where targeted action can lead to significant and transformative changes. These can be concrete things like subsidies, standards, regulations, but also infrastructures, social practices and values, etc. An deeper explanation of this concept, with examples can be found here https://donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/.

- **Develop narratives and/or visuals representing the selected futures**: Select a few of these futures and translate them into a short narrative and/or visual that you can use in the rest of the participatory process. This narrative describes how we will live in each of these futures, encompassing social, ecological, technical, political, and other dimensions. It also identifies what are the main features of this future and what makes it unique. A good narrative is an internally coherent and consistent, with elements within the story fitting together, even if the future portrayed is very different. At the same time, a good narrative is engaging and emotionally compelling, it connects with the reader because they can relate to the characters and elements of the story and challenges them to think differently. An additional layer of engagement can be achieved using experiential futures, which is bringing these narratives and futures into concrete experiences and everyday objects. A guide in to this method can be found here https://futuryst.blogspot.com/2017/06/ethnographic-experiential-futures.html.

Insight

This is an example of a narrative for the Nature futures developed by IPBES.

Future 1: Optimising nature
- 'Nature for society'

A highly connected world that shares knowledge and technology to maximise efficient and sustainable utilisation of nature's contributions to people while ensuring maintenance of the key ecosystem functions that underpin them.

Key words: eco-efficiency, green growth, smart cities, urban-rural integration, land-sharing, optimised ecosystem services, engineered ecosystems

Future 2: Reciprocal stewardship
- 'Nature as culture/one with nature'

In this world, values of reciprocity and harmony drive the relationships of humans with nature at all levels of human organisation. Biological and cultural diversity are co-conserved and co-managed across a wide range of interconnected bio-cultural systems.

Key words: bio-cultural heritage, stewardship, commons, post-growth, cultural landscapes, engineered ecosystems, self-sufficient settlements

Source: IPBES (2023). The Nature Futures Framework, a flexible tool to support the development of scenarios and models of desirable futures for people, nature and Mother Earth1,2 and its methodological guidance

Supporting resources:

Useful tools

- Foresight for Future Planning Training Series Toolkit CGIAR https://aiccra.cgiar.org/publications/foresight-future-planning-training-series-information-pack
- Towards a climate-resilient future together: A toolbox with participatory foresight methods https://www.researchgate.net/publication/345733771_Towards_a_climate-resilient_future_together_A_toolbox_with_participatory_foresight_methods
- The Futures Bazaar Toolkit https://www.bbc.co.uk/gel/features/futures-bazaar-toolkit
- Future's Signals of Change https://www.thefuturescentre.org/signals-insights/
- Global Trends reports produced by ESPAS https://espas.eu/gtr.html
- Megatrend Hub of the JRC https://knowledge4policy.ec.europa.eu/foresight/tool/megatrends-hub_en

Useful methods

- Generating vision of good Anthropocene: the Manoa Mash-up scenarios methodology (Seeds of the Good Anthropocene Methodology) https://www0.sun.ac.za/cst/wp-content/uploads/2020/01/Manoa-Report-Digital.pdf
- IPBES Nature Futures Framework https://besjournals.onlinelibrary.wiley.com/doi/10.1002/pan3.10146
- Ethnographic Experiential Futures https://futuryst.blogspot.com/2017/06/ethnographic-experiential-futures.html
- The Nature Futures Framework, a flexible tool to support the development of scenarios and models of desirable futures for people, nature and Mother Earth, and its methodological guidance https://zenodo.org/records/8171339

Back to TASK 2.2.1

D9. Task 2.4.1 Reflect on how change is supposed to happen – Technical guidance on how to complete

To complete this task, we suggest a participatory workshop setting conducted in two broad stages: (i) defining the broad systemic changes and high-level outcomes needed to achieve the vision, as well as their underlying assumptions and (ii) aligning these changes and outcomes with the principles, adaptation objectives, assessment and evaluation criteria identified previously.

For part **(i) defining the broad systemic changes and high-level outcomes**, we suggest the following sub-steps:

- **Revisit your vision developed in in 2.3.1 and the system map developed in 1.2.1**: This will provide the basic context for your discussions in terms of what are the changes you want to achieve, in which timeframe, as well as what is (are) the systems in which you would need to intervene to achieve that vision.

- **Identify the "changes" that underpin your vision:** Start with the longer-term changes, followed by mid and shorter-term changes. Express these changes in terms of outcomes: how would your region, or a specific part of your region, look like once that change takes place? This process works well when done visually, where the outcomes can be "boxes" connected by arrows (see Figure D9.1). We suggest using a template with space for short-, mid- and long-term outcomes, defining roughly what these time frames mean. We advise against the traditional theory of change template with input-activities-outputs-outcomes, because at this point, we would like to focus the discussion on high level system changes and outcomes, rather than specific activities which will come further down in the process (Phase 3).

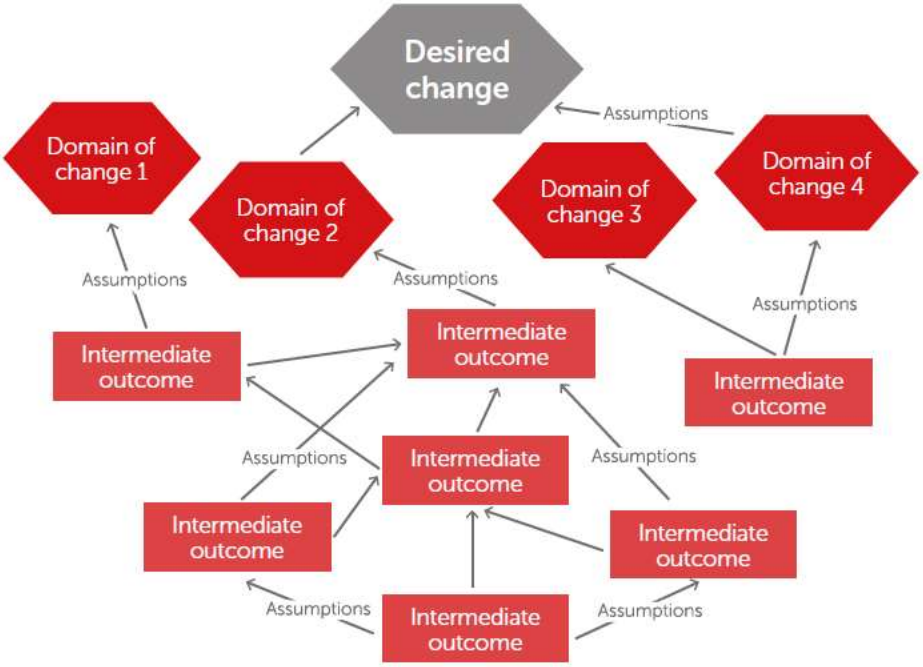

Figure D9.1: Example of how changes and outcomes can be connected in a Theory of Change diagram. Source: HIVOS Theory of change guide (2015)

- **Review and consolidate your identified changes:** There may initially be many outcomes identified. Review and consolidate these to avoid outcomes that include multiple changes - check there's only *one* outcome per change statement. If there are a lot of related outcomes identified these can be clustered into groups and ordered. You will notice that outcomes will refer to a similar theme or area of change (for example, policy, behaviour, technology, etc.). You can choose to prompt these areas of change, if relevant, by using the levers of change that were identified during task 2.2.1.
  - Depending on the size of the group you are working with, there can be a large diversity of outcomes in the first iteration. This is not a bad thing! But it does make this step particularly important, and you should allocate some time so each group or subgroup clusters and consolidates outcomes.
  - Remember that your goal is not to have a detailed explanation of every step in the process, but a general understanding and agreement on the most important system changes that are required for your vision.

- **Indicate when systemic changes and outcomes connect through feedback loops with arrows:** These do not necessarily need to reflect "causal" relationships (one thing leading to another) but simply indicate that two or more outcomes are related.

- **Analyse the consolidated changes and outcomes**, which includes:
  - Ensure that you have covered all the sectors and relevant stakeholder groups that you identified in your systems and stakeholder map. How will they need to change? How will these change affect them? Who will benefit? Who will resist that change? It can be useful to indicate with a figure or a particular colour if a specific

stakeholder group is expected to play an important role in a given systemic change.

- Consider not only positive changes, but also what needs to diminish. What current activities or practices will need to be discontinued?
- In both cases, think of what conflicts could emerge and how could these be addressed. Identify the power imbalances that might hinder achieving your desired outcomes, and how you can address them.

Insight

It is important to consider the negative or undesirable consequences of changes. When these potential conflicts are brought to surface, it creates a space to discuss what are the changes that each of the different stakeholder groups are willing to engage with, and how to anticipate and address potential conflicts. These discussions might expand or change what you thought of changes initially but will help to make your Climate Resilience Strategy more relevant and robust.

- **Identify your underlying assumptions:** When you are describing outcomes, there are implicit assumptions about factors, internal and external, that are likely to affect the success of the initiative. These can be positive (enablers) or negative (risks). Identify these. List these assumptions at the bottom of your diagram.

Explainer: What do we mean by 'assumptions'?

Assumptions emerge from values, beliefs, norms, or expectations about the future. For instance, when planning online meetings we assume (take for granted) that the electricity and internet service will be working. In many cases and contexts, this is not true. There are different types of assumptions:

- *Assumptions about the contexts, actors, and factors at play:* these includes assumptions about people's needs, motivations, capacities, relationships between actors; norms and values, etc.
- *Assumptions related to change:* these are assumptions related to the causal mechanisms and/or interrelations between different interventions, e.g., in saying that if we do A it will lead to B, this causal link might be true only under certain conditions. Making these conditions explicit is a way to identify assumptions.
- *'Risks', or assumptions totally outside of the control of the project*, e.g., that there is no political unrest, etc.

It is important to identify those assumptions which are non-obvious. For instance, saying that there are sufficient funds to implement a strategy is a basic precondition of implementation; however, if there is something to say about the conditions in which these funds are available, it is worth highlighting.

For part **(ii) aligning these changes and outcomes with the principles and adaptation objectives**, we suggest the following activities:

- **Cross-check your chain of outcomes with your guiding principles and updated planning objectives and performance metrics** (from Task 2.3.1), and revise them accordingly.
  - Are the outcomes consistent with the guiding principles that you have defined for your Climate Resilience Strategy?

- Do these outcomes align with your planning objectives?
- Do the performance metrics reflect all the relevant aspects of the outcomes you've identified?

- **Share your aligned outcomes, assumptions, principles and objectives with other stakeholders:** Translate the outputs from the above activity into a simplified diagram and a short narrative to share with other stakeholders.

Figure D9.2: Glasgow City Region Adaptation Strategy - Theory of Change. Available at https://climatereadyclyde.org.uk/gcr-adaptation-strategy-and-action-plan/

Supporting resources:

Useful methods

- https://hivos.org/document/hivos-theory-of-change/
- https://thepalladiumgroup.com/news/How-to-Design-Better-Programs-in-Complex-Systems
- Michael Patton's Theories of Transformation https://www.youtube.com/watch?v=9zQhbwcE5Eo

Back to TASK 2.4.1

D10. How to leverage key enabling conditions for Phase 3 - Technical guidance

What concrete actions can you take to foster enabling conditions to define pathways?

Knowledge & data	• Promoting **interdisciplinary exchange of knowledge** on the effectiveness of promising available and emerging adaptation options, including: ○ Accessing **historical data and knowledge** repositories to understand past adaptation responses and their performance, implementation, outcomes and learnings (challenges, limitations, barriers, good practices) ○ Learning from the experience of other regions (**best practices and maladaptation**) in implementing adaptation measures ○ **Improving access** (i.e. enhanced shared access with relevant stakeholders) to available data on performance of different adaptation pathways, different resilience dividends and other performance criteria • Employ **new supportive technologies** for:

	○ **Analysing/evaluating** adaptation options comprehensively ○ An **integrated approach** to adaptation (e.g., adaptation packages) ○ Advancing the **evidence base** on the effectiveness of promising adaptation measures such as Nature-based Solutions (NbS)
Governance, engagement & collaboration	• **Sustain engagements** between climate information users, producers, and translators of climate services, inclusive co-creation of knowledge, and ongoing education of practitioners, and in particular: ○ Promoting **co-design, co-development, and co-production of knowledge** among different actors through methods such as action research, transdisciplinarity, rapid assessment processes, participatory integrated assessments, and communities of practice ○ Connecting **R&D**, as well as **local and situated knowledge**, with the development of innovations that support the specific adaptation needs of your region ○ Discussing priority adaptation measures with national and local governments so as to **align priorities** and foster impact • **Incorporate formal policy mechanisms with innovation** by private firms, and informal grassroots interventions by: ○ Using **pre-existing platforms** (e.g., innovation hubs, thematic networks, sectoral roundtables, public forums, neighbourhood associations, community councils) where **adaptation issues can be integrated** and local actors and stakeholders can be heard and contribute ○ Exploring of **new adaptive governance models** that allow the inclusion of a wide range of adaptation solutions (which may be the responsibility of multiple institutions) in the pathways ○ **Prioritising equity and justice** in adaptation interventions, while avoiding the reinforcement of existing inequalities
Capabilities & skills	• Assess the region's **preparedness to develop, investing in, or prioritise capabilities and skills** on climate change adaptation during a long-lasting transformational process, by: ○ Comparing **specific vulnerabilities** of the region to **capability and skill development priorities** ○ Analysing capabilities and skills within citizens and particularly the workforce in your region to **engage in new economic sectors or activities** ○ Fostering technical capacity to **evaluate pathways against a broad range of indicators**, prioritizing different aspects (e.g. use of multi-criteria analysis) • Identify the **capabilities and skills required** to implement and maintain specific adaptation options, and more specifically:

	○ Building **technical expertise** within local governments and organisations to understand and assess (social, technical and financial) mechanisms underpinning different adaptation options ○ Building **specialised skills** and expertise to tackle **innovation** comprehensively in the transformational resilience journey
Behaviour change	• Explore how **responsibility for societal transformations** goes beyond individual efforts, involving institutional and governance changes. In particular: ○ Research and disseminate among stakeholders involved in your resilience journey best practices of **policies, laws, and regulations changes that are motivators for behavioural change** towards resilience ○ Identify those **public and social innovations** that can trigger the required behavioural change for the successful implementation of your adaptation pathways, including the strategies for experimentation and scaling ○ Enhance **transdisciplinary thinking** to explore, identify, adjust, and innovate adaptation practices across different systems and sectors • Acknowledge that one-size-fits-all strategies may not be viable, even within the same community or region, and recognise the necessity of **implementing multiple interventions to address diverse needs and contexts**, through: ○ Organising **educational campaigns** to raise awareness about adaptation benefits and needs, enhancing community support ○ Promoting **creative thinking** that encourages exploration of innovative and potentially more transformational adaptation options, going beyond the conventional incremental approach; including consideration of path-dependency and lock-ins in the discussions, considering how the choices you make in the short-term might expand or shrink your options in the future
Experiment, learn & reflect	• **Engage citizens** in finding their own transformative solutions, resulting in outputs better tailored to their needs, by: ○ **Collaboratively testing and assessing** possible solutions involving public authorities, firms, research organisations, and citizens ○ **Developing an iterative process** of experimentation, learning and adaptation, acknowledging there might be different levels of capacity to experiment and learn within your stakeholders group ○ Exploring the **role of arts in transformative learning** by engaging with artistic processes can enhance transformative

	learning by boosting creative imagination, providing different perspectives, deepening the framing of problems, questioning mainstream structures and systems, and opening possibilities for new solutions and actions
	
	• **Identify and integrate experiments into long-term policies**, aligning their goals with existing policy objectives to enhance feasibility, and in particular:
	  ○ **Review the monitoring and evaluation of previous adaptation responses** to learn from successes and failures, as well as to refine future actions and approaches
	  ○ **Develop pilot projects** that test the practicality and impact of adaptation options in relation to their scalability
	
	• Use **collaborative experimentation**, **experience sharing**, and a robust **Monitoring, Evaluation, and Learning** (MEL) framework, including:
	  ○ Establishing **feedback mechanisms** to capture lessons learned from different adaptation actions and strategies, informing future decisions
	  ○ **Prioritising decision making** according to monitoring and experimentation needs
	  ○ **Allocating sufficient resources** to allow to reflect in depth on which adaptation options exist

Finances & resources	• **Diversify** and mobilise funding sources, including:
	  ○ Mainstreaming **adaptation into innovation funds**. Using structural funds to support an innovation portfolio can help significantly
	  ○ Seeking for **new financial products and services** for adaptation options that are more adaptive and flexible in nature to allow regions to progress along their pathways as required.
	  ○ Mapping different **policy options that can help mobilise additional resources** for the implementation of adaptation actions. This is tied to the Regional Adaptation Resilience Investment Plan.
	
	• Apply **integrated adaptation finance tracking** to monitor and learn from your investments. And in line with this:
	  ○ Develop an **overview of existing budget lines** which could finance a specific adaptation option/portfolio of options (incl. government budget, international aid/funds, and private investments)
	  ○ Use **comprehensive data and analytics** to understand the financial implications of different resilience options. This includes cost-benefit analysis, return on investment forecasts, and scenario planning to assess the financial viability and impact of proposed actions

	• Foster **multi-sector financing collaborations:** you should seek to create partnerships across different sectors, including public, private, and non-profit, to diversify funding sources and share financial risks. This collaborative approach can unlock new financing avenues for resilience interventions. To this end, you need to: ○ Allocate **resources for continuous engagement** and dialogue among stakeholders across multiple sectors ○ Allocate **resources to evaluate pathways** together with multiple stakeholder groups, possibly in a collaborative, workshop-like setting

 **Supporting resources:**

Tools and resources for Phase 3

Leveraging Knowledge & data

- *Climate Data Management Systems (CDMSs)*
- *Adaptation Fund (AF) Knowledge Products*

Leveraging Governance, engagement & collaboration

- *Good Climate Governance In Practice. Mainstreaming climate action: case studies from leading cities*
- *A practical guide to using co-production for nature-based solutions*
- *Good governance for critical infrastructure resilience*
- *Making Equity Real in Climate Adaptation and Community Resilience Policies and Programs: A guidebook*
- *Five Actions to Help Build Equitable Climate Resilience*
- *Applying citizen science for climate adaptation and resilience building*
- *Centering Equity in Climate Resilience Planning & Action - A Practitioner's Guide*
- *Socially just adaptation to climate change*
- *Equitable Resilience Builder (ERB 1.0) - User Guide*
- *Multi-level climate governance supporting local action*
- *Energycities- Best practices of multi-level governance*
- *Multi-level governance and coordination mechanisms to support regional attractiveness*
- *Multi-level governance tools: enabling sound regional governance*

Leveraging Capabilities & skills

- *CCC Blended Curriculum*
- *The Educational Partnerships for Innovation in Communities – Network (EPIC-N)*
- *Skills development and climate change action plans. Enhancing TVET's contribution*
- *Regilience - Open Training Sessions (OTS)*

Leveraging Behaviour change

- *The Long Tools to cultivate long-termism in institutions*
- *Behaviour Change Communication Guidance Framework Document*
- *Behaviour Change for Combating Climate Change*
- *Monitoring, Evaluation and Reporting*
- *Reflexive monitoring guidebook*
- *Guidelines for living labs in climate services*
- *Open Nature Innovation Arena*

Leveraging Experiment, learn & reflect

- *Reflexive Monitoring in Action (RMA)*
- *Monitoring, Evaluation and Reporting*
- *Reflexive monitoring guidebook*
- *Guidelines for living labs in climate services*
- *Open Nature Innovation Arena*

Leveraging Finances & resources

- *Financial Instruments Toolkit*
- *Climate Resilience Investment Plan - Climate Resilience Investments in Solutions Principles*
- *Mainstreaming, accessing and institutionalising access to finance for climate adaptation. - Learning paper*
- *Method. In: The Third UK Climate Change Risk Assessment Technical Report*
- *Developing adaptation finance business cases: Case studies and results*
- *A guide to adaptation climate finance*
- *Decision Support Methods for Climate Change Adaptation*
- *Adaptation Finance project*
- *UNFCCC Standing Committee on Finance*
- *Climate Adaptation Costing in a changing world - Valuing climate adaptation helps us orient our compass toward effective and resilient pathways*
- Methodologies for assessing adaptation needs and their application

Back to Phase 3 chapter

D11. Task 3.1.1 Identify options – Technical guidance on how to complete

- **Research potential interventions**: To steer the exploration of adaptation options, you should account for your region's context and conditions, particularly climate risks

identified in Task 1.3.1 and local capabilities from Task 1.3.2. Considering those helps you determine not only the adaptation needs, but also the geographical, sectoral, and thematic scope of your exploration. The shared vision of your climate resilience transition (Task 2.3.1) can also aid in deciding whether the focus is on a specific neighbourhood, population (e.g., elder, women, youth), sector (e.g., agriculture, water resources), or type of measure (e.g., structural, institutional, technological).

As a starting point, you can review past or ongoing adaptation efforts that could be improved, replicated, scaled-up or further complemented with other options. Also, you can look for existing adaptation strategies, initiatives, case studies from other regions under similar conditions. This may include academic papers, official reports, NGO publications, catalogues of good adaptation practices, and other analogue resources from organisations working on adaptation and resilience. Pathways2Resilience's Catalogue of Innovative and Transformative Adaptation Options can provide inspirational examples and novel approaches for your region. The purpose of this process is to collect evidence on what has worked well and what challenges were encountered from previous adaptation efforts and identify those options that may work for your region's climate challenges.

- **Co-creation workshops**: original and unconventional ideas, which might not have been produced through traditional planning processes, may emerge through co-creation as alternatives to address complex and evolving climate challenges. To do that, you can use different engagement approaches for co-creation such as participatory workshops (e.g., brainstorming sessions, world café, charrettes), open forums, or even, online platforms (e.g., crowdsourcing, social media). To encourage a creative and innovative process, include diverse groups of stakeholders (identified in Task 1.2.2 and 2.1.2) with different backgrounds, sectors, communities, governmental bodies, and expertise. This should include both those stakeholder groups impacted by climate risks as well as those which adaptation options could impact, so the creative process is more representative and meaningful. Importantly, ensure that their insights, ideas, priorities, and concerns are considered, not only because it increases social acceptance and ownership of the adaptation process, but also because these groups have valuable knowledge of effective adaptation practices and can offer novel approaches to address climate risks and vulnerabilities.

- **Adopt a systemic perspective:** A systems thinking approach in exploring adaptation options allows for generating innovative and transformative ideas for adaptation. This consists of revisiting the systems mapping from Task 1.2.1 to focus on alternative or novel ways to harness the system's interconnectedness, relationships, and dependencies to address risks more comprehensively. This includes interventions that can address direct and indirect risks, as well as their cascading, compounding, and interacting effects within and across systems. For example, a systemic focus aids in identifying those options that can perform better at the system level, not only by interrupting chains of climate impacts and risk propagation mechanisms but also by leveraging them to distribute benefits across the system. Also, it helps generate multi-functional adaptation options, addressing either various risks or contributing to the advancement of different development objectives and priorities beyond risk reduction. Moreover, a systemic perspective realises the complementarity and

synergies between adaptation options and, even, with other climate actions or development initiatives.

- **Categorisation and screening**: collect and compile all the adaptation options generated from the literature review and co-creation workshops. Organise the options into categories based on, for example, their type (e.g., structural, technological, community-based, institutional, nature-based, hybrid), scale (e.g., building, neighbourhood, regional), KCS (e.g., ecosystems, water, critical infrastructure), addressed hazards (e.g., drought, flood, extreme heat), management set-up (e.g., government-led, community-led, public-private partnership), adaptation level (absorptive, adaptive, transformative) and timeframe. Develop an inventory of identified adaptation options that later facilitate a detailed analysis and further prioritisation.

  As part of this process, it is crucial to ensure that the collected adaptation options reflect a diverse and sufficient range of possibilities. Refine your search for adaptation options by thinking about non-conventional alternatives or areas that have not been explored so far. Also, adjust your stakeholder engagement strategies to capture additional perspectives that may lead to transformative ideas. For instance, encouraging the participation of artists and people from other disciplines not yet involved or trying different ways of engagement (e.g., gamified challenges, community projects, art groups, pop-up events, creativity festivals, cultural exchanges). This approach contributes to ensuring that you are not overlooking innovative adaptation options that could be critical in addressing ongoing and future challenges.

  Once diversity and sufficiency are ensured, conduct a preliminary screening to filter out options that are clearly unfeasible or irrelevant. To do so, you need to consider several factors:
  - Context: alignment with the priorities, dynamics, and conditions of your region (Task 1.2.1), including the 'destination' or future vision of your region developed in Task 2.3.1.
  - Problem: consistency with the problem framed in Task 1.1.2.
  - Needs: local vulnerabilities and capacities identified in Task 1.3.2
  - Stakeholders' input: ideas, concerns, perspectives, and interests gathered during the co-creation activities in this task and the rest of the journey.

  Narrowing down the broad list of potential adaptation strategies to a more manageable and relevant set of options is instrumental for better appraising their effectiveness in the next step of your journey (Taks 3.1.2). Document the reasons for including or excluding each option –this helps keep traceability and transparency of your screening processes. Ensure the refined list is up-to-date, comprehensive, and reflective of the latest knowledge, and that it includes also options that challenge the status quo and promote systemic changes. Such adaptation options could include strategies that break down silos and promote cross-sectoral collaboration, institutional reforms, or interventions fostering behavioural change.

Case Studies: Identifying adaptation options

"Identifying practical adaptation options: An approach to address climate change-related health risks" (Ebi & Burton, 2008)

The case study provides a systematic process to identify a wide range of adaptation options to mitigate health risks exacerbated by climate change. The study focuses on generating a comprehensive list of all potential adaptation measures without regard to feasibility constraints. This includes existing practices, measures used in other regions, and new or innovative ideas generated through expert consultations. The aim is to capture the full spectrum of possible interventions, from well-established practices to emerging options that could address climate-sensitive health outcomes. Through this explorative process, the case study emphasises the importance of considering both current capabilities and future potential when identifying potential adaptation options.

"Identifying adaptation 'on the ground': Development of a UK adaptation Inventory" (Jenkins et al., 2022)
This case study outlines a process used to identify and document adaptation actions within the UK to build a comprehensive adaptation inventory including both current and planned adaptation actions. The inventory was populated based on (1) a systematic review of both academic and grey literature, focusing on actions that have been implemented "on the ground", and (2) a critical review of the Adaptation Reporting Power (ARP) reports submitted by public and private sector organisations. The ARP reports provided a wealth of data, documenting how organisations across various sectors are responding to climate risks. By focusing on actions that had been implemented, the inventory aimed to provide a baseline for understanding how adaptation is occurring across different sectors in the UK. This step helped spot those actions that demonstrated tangible progress in reducing vulnerability to climate change as well as adaptation action gaps (areas and sectors where adaptation is not occurring at the needed scale, pace and depth).

"Application of Multi-Criteria Analysis selecting the most effective Climate change adaptation measures and investments in the Italian context" (Zucaro et al., 2021)
This case study presents a screening process focused on identifying a manageable set of adaptation options in the agricultural sector, particularly concerning water management. The process began with the collection of data on nearly 894 projects across Italy stored in a national database, DANIA. To align the projects with the adaptation goals and objectives of Italy's Extraordinary Plan and the available funding, an initial filtering was applied considering three aspects: (i) *project stage* (only projects that could be quickly implemented were considered as they ensured readiness and immediate execution given the urgency of climate adaptation needs), (ii) *type of intervention* (only projects related to multipurpose reservoirs and water-saving measures in agriculture were prioritised because of their potential to address the dual challenges of water scarcity and increased demand due to climate change), and (iii) *regional priority* (only projects ranked as high-priority (level 1) by regional authorities were included in the shortlist). Using these simple screening criteria, the list of projects was reduced from the initial 894 to 55 and ensured that only the most relevant and ready-to-implement projects moved forward to the next stage of evaluation, where they would undergo more detailed analysis.

Supporting resources:

- Pathways2Resilience D6.5 – Catalogue of Innovative and Transformative Adaptation Options
- Methods and Tools for Adaptation to Climate Change: A Handbook for Provinces, Regions and Cities
- ARCH Resilience Measure Inventory (ARCH RMI)

- Nature-based Solutions: Technical Handbook Factsheets
- Climate Chance's Cartography of Action
-

Back to TASK 3.1.1

D12. Task 3.1.2 Assess effectiveness of options – Technical guidance on how to complete

- **Establish option evaluation criteria:** identify key criteria for the characterisation, appraisal, and prioritisation of the adaptation measures. This includes the primary and secondary performance metrics set to assess the impacts of your adaptation pathways against your planning objectives and progress towards your vision (Task 1.1.2, revised in Phase 2). But it also includes additional criteria relating to, e.g., adaptivity, implementation feasibility, and transitional qualities. It is important to ensure the criteria reflect community values, priorities, and needs, and are suitable for your region's conditions, objectives, and capabilities. Table outlines several potential criteria for assessing adaptation options in your region through a systemic perspective:

Table D12.1: Suggested additional criteria for assessing adaptation options in the Pathways2Resilience context.

Criteria		
Impacts		
Adaptation effectiveness: the capacity of each adaptation option to address the identified risks and their drivers sufficiently (primary adaptation objectives). This also includes aspects of deployment (the time an adaptation option will take to show initial benefits and reach full adaptive capacity) and coverage (the geographic area that may benefit from it) (Task 1.1.2).	**Potential to deliver integrated impacts**: the capacity of each adaptation option to deliver integrated co-benefits. This requires a comprehensive overview of benefits, adverse effects, trade-offs, and potential alignment with other relevant goals specified in the secondary resilience objectives (e.g., poverty alleviation, inclusion, water and food security) for each adaptation option (refer also to the Multiple Resilience Dividends concept in D6.5). To understand the extent to which the implementation of one adaptation option facilitates or hinders the achievement of other goals in other sectors/areas/projects (synergies and trade-offs), it is necessary to consider its dependencies within the system (Tasks 1.2.1 and 1.2.2). This allows you to compare options and determine '*what*', '*how much*' and '*when*' benefits will be delivered, mapping the overall resilience gains across the system.	
Adaptivity		
Robustness: analyse the capability of each adaptation option to deliver resilience gains in whatever conditions emerge and thereby be sustained in the long run. This includes considering factors like maintenance needs, and the potential to perform against a wide range of potential conditions (climatic and non-climatic). Along with the flexibility criterion, this allows you to evaluate the option's	**Flexibility**: analyse the capability of each adaptation option to adapt to the conditions that emerge in order to achieve resilience gains. This includes considering how easily the option can be modified or supplemented with additional options in response to new information or changing conditions. Along with the robustness criterion, this allows you to evaluate the option's performance under different futures.	**Potential regret**: determine the degree to which an adaptation option minimises risks of counterproductive irreversible changes (maladaptation) that lead to path-dependencies, critical trade-offs, lock-ins, or whether adaptation options create or exacerbate environmental impacts like pollution, biodiversity loss, and resource depletion. This ensures that adaptation efforts do not create new challenges for future generations, particularly by not limiting future populations' ability to adapt to evolving climate conditions.

performance under different futures.		
Implementation feasibility		
Technical feasibility: determine whether specific adaptation options can be implemented or not. This involves analysing the technical requirements of each adaptation option in comparison to the available technological resources, local expertise, and infrastructure. Doing so allows you to prioritise those adaptation options that benefit from the existing conditions by being ready for implementation without the need for major further investment.	**Economic and Financial viability**: estimate the upfront costs, maintenance, potential future upgrades, and broader economic effects on local economies and communities (e.g., employment, economic stability) that adaptation options bring individually. Also evaluate the option against its potential financing structures and attractiveness from an investment perspective. This involves analysing the composition of funding sources and available capital, how funds will be raised, allocated, and managed, a financial risk profile, potential revenue streams, cost recovery mechanisms, and expected returns to investors.	**Relevance (stakeholder priority):** evaluate adaptation options in regard to the level of urgency of the targeted risks and its ability to reduce these risks within the needed time frame, as well as its contribution to achieving the desired change, or 'vision' (Task 2.3.1).
Local suitability: examine the appropriateness and social acceptance of adaptation options given the local conditions and dynamics. It integrates stakeholder perceptions and priorities as part of the options evaluation, taking into account *what* benefits are relevant to *whom* and to *what* degree. Thus, it helps map specific communities, KCS, or areas where adaptation options are (more) suitable, considering both the local biophysical and climatological characteristics, as well as the socio-economic and cultural aspects.	**Policy relevance (coherence, institutional support)**: analyse the coherence and compatibility of each adaptation option with existing governance structures (e.g., roles, responsibilities, and mandates), legal framework (e.g., compliance of regulations, and norms), and other development initiatives (e.g., sectoral strategies, regional development plans). It also includes the assessment of institutional support and political will, as well as the institutional capacity to implement and maintain a particular option.	**Regional capabilities:** analyse the ability of local institutions, stakeholders, suppliers, etc. to implement and maintain each adaptation option. Are there sufficient regional skills and resources available to initially deliver and sustain the option in the long term? This also includes an assessment of whether there is sufficient will to acquire the necessary skills and resources to implement the option.
Transitional qualities		

Facilitates Just Resilience: Examine the extent to which an adaptation option will contribute to delivering just resilience. This means assessing each option through an equity perspective to evaluate how the benefits and burdens of the adaptation option will be distributed across different groups.	**Transformative power**: examine the extent to which an option brings significant and lasting changes or reconfigures existing systems, processes, or practices within a given context. It can be expressed in terms of *scalability* (whether the adaptation option can be scaled up if successful or if conditions worsen), *replicability* (whether the adaptation option can be standardised and/or replicated in other areas) and *leverage* (whether the adaptation option can induce deep forms of change by intervening most structural causes of risks and vulnerability).

- **Conduct feasibility studies:** undertake the studies necessary to evaluate the technical, economic, financial, social, environmental, and institutional feasibility for the options. This includes analysing the key enabling conditions for each adaptation option and comparing these to the local conditions, capabilities, and resources. To adopt a more transformative lens, we encourage you to consider the Multiple Resilience Dividends framework. This framework helps you to recognise adaptation measures capable of achieving multiple benefits and planning objectives in terms of risk reduction and other sectoral or social goals regardless of a disaster event while guiding your selection towards *low-regret options*— adaptation efforts that do not lock in unsustainable practices or create new vulnerabilities. Also, this allows you to identify potential adverse effects and trade-offs from your option.

- **Analyse opportunities:** Analyse the key enabling conditions under which conditions adaptation options may become more feasible, practical, impactful, or attractive in the future. This involves thorough examination of the technical, economic, financial, social, environmental, and institutional factors that could influence the feasibility/ implementation of these options, considering changes over time such as climate conditions, emerging technologies, societal values, and policy landscapes. For each measure, you may consider whether it could become more feasible, practical, impactful, or attractive in the future (
- Table) by applying the climate-resilient futures developed in Task 2.2.1.

Table D12.2: Conditions that may change the feasibility of adaptation options.

Conditions	Examples of key considerations
***Planned maintenance* and/or *end-of-design life* of current measures**	are there adaptation options which would become much more feasible when implemented during maintenance, upgrades or repairs of existing measures? Imagine, for example, how you could plan the repair of an existing dike as an opportunity to heighten it
***Sudden availability of resources* (including, financial, input, raw material, or labour)**	are there any options whose feasibility is mostly limited by the availability of resources? What adaptation options would become much more feasible if, for instance, financial constraints are overcome due to a new funding scheme, policy investment priority, or private capital available for particular measures (e.g. NbS)?
Institutional and/or political support	are there adaptation options that could become significantly more feasible with increased institutional or political backing? How might changes in policy or leadership incentivise early adoption of adaptation

	measures? Consider how specific adaptation policies, new or updated targets, changes in regulatory frameworks, institutional capacity building, or the establishment of new governance structures might enhance the feasibility of certain measures from a governance perspective.
Public support	in the form of increased social acceptability of some of the options due to e.g. changes in societal values and priorities, perceived risk and its acceptance. How would the feasibility of specific adaptation options change if communities placed greater value on sustainable outcomes rather than short-term gains? And how would the public demand for a particular option change when communities experience climate-related events (e.g., floods, heatwaves, or wildfires)? or with the intensification of these events over time?
Technological development	Are there adaptation options that may appear unfeasible given today's conditions but may become more viable in the future considering the development of emerging technologies? Are certain technological developments (e.g., artificial intelligence, big data, internet of things, 3D printing, building information modelling) that can decrease costs, enhance implementation, or ease the scalability and replicability of some adaptation options?
Market conditions	Are there adaptation options whose feasibility could be significantly enhanced by changes in market conditions? Consider how shifts in supply and demand, changes in the cost of materials? or the emergence of new markets (e.g., ecosystem services markets) might make certain adaptation options more economically viable? How could market incentives, such as subsidies or tax breaks, affect the feasibility and attractiveness of specific measures

This analysis can be especially valuable for adaptation options that seem to be more transformative and innovative but are currently considered less feasible given existing constraints (e.g., due to technological immaturity, financial barriers, or social resistance) or uncertainties, but can still play a crucial role in long-term planning. Take note of any factors influencing their realisation and potential timing as these will feed into the formulation of your pathways and innovation portfolio in later tasks.

- **Stakeholder review and validation**: based on your stakeholder engagement strategy (Task 2.1.2), involve groups affected directly and indirectly by both climate risks and adaptation options to present the assessment results. Gather their diverse input, including perspectives, preferences, priorities, and concerns regarding the adaptation options or the way they were evaluated (e.g., accuracy, relevance, completeness, alignment). Revise the assessment results based on stakeholder feedback to ensure they reflect community needs and priorities. This helps not only shape the options' prioritisation and make well-rounded decisions that address the most critical concerns of key stakeholders, but also secure the social buy-in of the appraisal process by taking into account a variety of viewpoints and interests. Seeking stakeholder validation can ultimately reduce the likelihood of conflicts or resistance, build trust in the adaptation process, and thus, increase the chances of success and achieve your desired outcomes.

- **Prioritise options**: use decision-support tools such as multi-criteria analysis (MCA) to (qualitatively and/or quantitatively) benchmark the adaptation options. Determine the weights of each defined criterion. Which criteria you will find most important will depend on your adaptation objectives (Task 1.1.2), future vision (Task 2.2.2) and local priorities. Compare their capacity to deliver *impacts* (i.e. net benefits from adaptation options), as well as their *adaptivity* (e.g. robustness/flexibility), *implementation feasibility*, and *transitional qualities* (e.g. transformative power). Rank them in terms of local capacity (Task 1.3.2), appropriateness to address the framed problem (Task 1.1.2), and ability to reach your region's ambition (Task 2.3.1). Prioritise adaptation options that offer the best balance of the weighted criteria, concentrating on currently available and appropriate adaptation options with a higher capacity to drive more profound change.

  An example of a nominal rubric for prioritising adaptation options is shown in Table below.

  While the primary focus should be on adaptation options that are currently available and appropriate, it is also important to remain open to those transformational options that are not feasible at present. These options should be kept under consideration and actively explored for future implementation, provided the necessary enabling conditions are developed. This ensures that immediate needs are met while also paving the way for transformational strategies in the long term, as knowledge, technology, and climate change progress.

Table D12.3: Nominal rubric for prioritising adaptation options

	Key Criteria (indicator)	Adaptation Option 1	Adaptation Option 2	Adaptation Option *n*
Impacts	Adaptation effectiveness (i.e. risk reduction)*	*High/ Medium/ Low*	*High/ Medium/ Low*	*High/ Medium/ Low*
	Potential to deliver integrated impacts (i.e. co-benefits)**	*High/ Moderate/ Low*	*High/ Moderate/ Low*	*High/ Moderate/ Low*
Adaptivity	Robustness (future proof)	*High/ Medium/ Low*	*High/ Medium/ Low*	*High/ Medium/ Low*
	Flexibility (adaptive)	*High/ Medium/ Low*	*High/ Medium/ Low*	*High/ Medium/ Low*
	Potential regret (risk of maladaptation)	*Low Risk/ Moderate Risk/ High Risk*	*Low Risk/ Moderate Risk/ High Risk*	*Low Risk/ Moderate Risk/ High Risk*
Implementation Feasibility	Technical Feasibility (technical readiness)	*Ready/ Needs Adjustment/ Not Ready*	*Ready/ Needs Adjustment/ Not Ready*	*Ready/ Needs Adjustment/ Not Ready*
	Economic & Financial viability (from Adaptation Investment Cycle step 3.1)	*Favourable/ Neutral/ Unfavourable*	*Favourable/ Neutral/ Unfavourable*	*Favourable/ Neutral/ Unfavourable*
	Relevance (stakeholder priority)	*Essential/ Important/ Non-Essential*	*Essential/ Important/ Non-Essential*	*Essential/ Important/ Non-Essential*

	Local Suitability (community support)	*Strong/ Moderate/ Weak/ Contested*	*Strong/ Moderate/ Weak/ Contested*	*Strong/ Moderate/ Weak/ Contested*
	Policy Relevance (coherence, institutional support)	*Aligned/ Partially Aligned/ Not Aligned*	*Aligned/ Partially Aligned/ Not Aligned*	*Aligned/ Partially Aligned/ Not Aligned*
	Regional capabilities (local skills and resources)	*Sufficient/ Needs development/ Not Ready*	*Sufficient/ Needs development/ Not Ready*	*Sufficient/ Needs development/ Not Ready*
Transitional qualities	Facilitates Just Resilience (equity of impacts)	*Positive/ Neutral/ Negative*	*Positive/ Neutral/ Negative*	*Positive/ Neutral/ Negative*
	Transformative Power (potential to stimulate systemic change)	*High/ Moderate/ Low*	*High/ Moderate/ Low*	*High/ Moderate/ Low*

* Note that this criterion could be separated out into multiple criteria according to your specified primary adaptation objectives (e.g. addressing flood risks, heat stress, etc.).
** Note that this criterion could be separated out into multiple criteria according to your specified secondary resilience objectives (e.g. job creation, public health, biodiversity restoration, etc.).

Case Study: Rebuild by Design (RBD)

The Rebuild by Design (RBD) competition was launched by the U.S Department of Housing and Urban Development after the devastating impacts of Hurricane Sandy on the greater New York City area in 20212. Its aim was to address flood risk and increase urban resilience by providing innovative design ideas which would result in multi-purpose flood risk management solutions across scales. The vision was to catalyse transformation of the affected region towards being flood resilient.

Seven international teams were selected to come up with designs that will transform urban areas, increase flood resilience while offering a number of ancillary co-benefits. One of the winning designs was Resist, Delay, Store, Discharge (RDSD): a comprehensive strategy for a city of Hoboken, New Jersey. The project envisioned urban transformation of Hoboken through a combination of coastal infrastructure, green areas to store excess stormwater, and green infrastructure on private and city properties. Sakic Trogrlic et al. (2018) researched the outcomes of RBD in Hoboken, and found that the RDSD was perceived as alleviating flood risk but also unlocking transformational change by providing many co-benefits (i.e., dividends). These included a new visual identity of a green city, recreational opportunities, decrease in combined sewer system overflows thus complying with federal environmental laws, and enhanced social capital. Most importantly, RDSD provided a structured vision for the city government through enhanced spatial planning. Although its initial objective was building flood resilience, the proposal tackled other recognised issues in the city, such as community need for more open space in the urban area.

Supporting resources:

- The Economics of Climate Change Adaptation: Insights into economic assessment methods
- NOAA's Feasibility of Adaptation Options
- Multi-criteria analysis: a manual

- Methods and Tools for Adaptation to Climate Change: A Handbook for Provinces, Regions and Cities
- Deltares' Adaptation Catalyst
- RIBASIM – River Basin Planning and Management
-

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D13. Task 3.2.1 Formulate pathways – Technical guidance on how to complete

You can choose to develop qualitative, semi-quantitative or quantitative adaptation pathways. The steps to follow when developing pathways are similar in all three cases, however each case typically applies different methods and resources.

The type of analysis you perform largely depends on the availability of data and models to calculate effects of concern for the options and pathways (i.e. the extent to which quantification is possible). For a quantitative analysis to be feasible, you need to be able to model the selected options making up the pathways using the same risk assessment tool you applied in Task 1.3.1. However, your choice also depends on the degree of quantification required for your region to take the investment decision to commence implementation of the pathways. Quantitative assessments may help to build confidence in the pathways, but this is not always possible to perform given time, data, capacity and budget constraints. The key question to consider is: to what degree will quantifying the effects of your pathways change the outcomes of your analysis?

Pathways are developed in the following steps:

- **Characterise your adaptation options as short-, medium- and long-term:** Commencing with the pre-selected options (Task 3.1.2), characterise every option based on whether these are more useful in the short-, medium- or long-term.
  - *Short-term options* tend to be low-regret, relatively easy to implement and often a continuation or upscaling of already implemented measures. They also often tend to require smaller investments.
  - *Medium-term options* are those to be implemented when the short-term options have reached their adaptation limits. They often have longer implementation lead-times and may not yet have been included in any existing plans.
  - *Long-term options* are those to implement when the medium-term options have reached their adaptation limits. These should be able to cope with any projected extreme climate change impacts.

  To inform this characterisation, initially assess the performance of each adaptation option against the prioritised adaptation objectives using your appraisal from Task 3.1.2. To what extent do you think each option will contribute to reaching the objectives and maintain them under growing climate and socioeconomic impacts?

  An example characterisation of options is shown in Table presented in the main guidance for Task 3.2.1.

Insight

When identifying long-term options, try not to think about whether the extreme scenarios in which they might be needed are realistic in the short-term, or even when these might occur, but instead focus on what you could do if these impacts were experienced in your region. This may lead you to consider larger-scale, more transformational options for inclusion in your pathways. While these may not be feasible in the short term, their suitability in addressing longer-term challenges will have been recognised, such that the necessary time, effort and resources can be placed in overcoming any barriers to their implementation if they are needed in the end. Additionally, the implementation of some measures may be sped up by specific opportunities for adaptation. These are the manifestation of the future conditions under which certain adaptation measures may become more attractive, identified in Task 3.1.2.

- **Identify potential adaptation limits**:
  Identify any limits for your considered adaptation options. These are conditions under which additional adaptation will be required. Identify the conditions under which unacceptable performance will occur, and estimate/calculate potential timings for these conditions being reached according to the risk-based scenarios (developed in Task 1.3.1). The methods with which you complete this activity differ depending on the type of analysis to be undertaken.

  Qualitative analyses
  In a qualitative analysis, compare how each adaptation option contributes to reaching your prioritised adaptation objectives. Your initial appraisal from Task 3.1.2 can again inform this analysis. Consider whether there are any limits to their effectiveness as climate and socioeconomic conditions change. Under what types of conditions will each option no longer be sufficient to achieve the adaptation objectives? Which options do you expect to reach their limits first? Which options do you expect to be effective for longer? How do the limits of the various options relate to each other? Depending on your specific adaptation objectives, establishing limits to certain options may be straightforward, e.g. a dike will reach its limit when the maximum water level exceeds the protective capacity of the dike. In other cases, it may not be possible to easily assess the limits of specific options. In this case, make a relative assessment of the different options, and determine the order in which you believe each of the short-, medium- and long-term options will reach their limits. Relate these limits back to your future climate risks assessed in the CRA to estimate their approximate timing (range).

  Semi-quantitative analyses
  As in the CRA, semi-quantitative methods tend to elaborate qualitative assessments by applying a scoring system to assess the relative risk reduction effectiveness of the options. These scores can be informed by either expert judgement, quantitative modelling, or a combination of both if different options demand different assessment methods. Similar to the qualitative analysis above, once the options have been scored, use these to establish corresponding adaptation limit scores for each option. Do so by relating the option scores back to the (scored) magnitude of your future climate risks as per your CRA (Task 1.3.1). Use the climate risk scenarios (Task 1.3.1) to determine

an approximate timing (range) for when you expect each of the short-, medium- and long-term options to reach their limits.

Quantitative analyses
Use the same quantitative modelling tools applied in Task 1.3.1 to assess the risk reduction impacts of each of your options according to your assessment metrics. Use the models to calculate the adaptation limits for each option. In instances where you are calculating multiple performance metrics for a given adaptation objective, the adaptation limit corresponds to the metric that breaches its acceptable performance threshold soonest. Note that the governing metric can change under different sets of scenario conditions. As with the CRA, adaptation limits can be established through interpolation, incremental stress-tests, or statistical means as appropriate. Having established the adaptation limit, apply your climate risk scenarios (Task 1.3.1) to determine timing projections for when each limit is reached in each scenario.

Adaptation limits for options are specified in two ways:

1. The **conditions** under which the limits are reached, and which are closely associated with your key drivers of climate risk (Task 1.2.1). For example:
   - When your adaptation objective relates to *flood management at the coast*, you could express the condition in terms of *cm of SLR*
   - When your adaptation objective relates to managing *extreme heat*, a useful metric could be *average night temperature*
   - When your adaptation objective relates to *drought management*, a potential metric could be *number of consecutive dry days*.

   In situations where you cannot identify the specific conditions under which adaptation limits are reached, you may instead choose to identify 'perceived' limits together with relevant stakeholders. Such limits represent what stakeholders perceive as (in)tolerable within the system of interest. For example, in the domain of flood risk management:
   - *Number of floods per year*
   - *Number of temporary evacuations per year*, etc.

2. The **range in time** when these will be reached (depending on the different climate and socioeconomic scenarios). For example, an existing levee may be able to prevent floods up to a certain water level (condition), but the timing when that specific water level is reached (through a combination of e.g. SLR, increased river discharge, tides, storm surges…) will depend on the specific climate impact scenario that is taken into account, and will occur much sooner in scenarios based on RCP8.5, rather than those based on RCP6.0, RCP4.5 and RCP2.6.

- **Explore logical combinations of short-, medium- and long-term options:**
  Build your adaptation pathways by sequencing and/or combining your short-, medium- and long-term options. Your objective is to formulate pathways that are capable of managing your climate risks in line with how you expect these risks to develop over time. This means that (combinations of) your short-term options need to be sufficient to address your current risks in the short-term, (combinations of) your short- and medium-term options need to be sufficient to address your potential risks in the medium-term, and (combinations of) your short-, medium- and long-term

options need to be sufficient to address your potential risks in the long-term, even against the most extreme risk projections you are assessing.

When formulating your pathways, consider which sequences of options are most compatible which each other, which options can be implemented in combination with others, as well as which options are mutually exclusive. In some pathways, you may wish to include a single short-, medium- and long-term option, while in others you may wish to combine multiple short-, medium- and/or long-term options together. Let logic and stakeholder preferences dictate your selections, but we do recommend that each pathway also includes longer-term options. This will ensure that the alternative pathways all continue to achieve the adaptation objectives under extreme climate change and help to avoid lock-in situations. Keep in mind the cumulative risk reduction effects of your pathways as you build them. For example,

> *If short-term option A is extended with option B in the medium-term, will their combined effects be sufficient against the entire medium-term time horizon, or do I need to supplement them further?*

To this end, analyse each option combination in terms of its sequential, cumulative risk reduction effects as each new option is added to the pathway. As far as possible, estimate/calculate any new adaptation limits associated with these. For *qualitative* and *semi-quantitative analyses*, you will need to estimate these effects via expert judgement. Consider this,

> *If option A reduces risks by X amount, and option B reduces risks by Y amount, what will be the combined effects of A and B? Is it X+Y, or more/less than this?*

For *quantitative analyses*, one can calculate these effects and estimate any new tipping points directly, given the ability of the applied models to model the adaptation options and pathways being considered. Quantitative analyses also offer the advantage that one can use your models to directly build up your pathways in line with the changing risk projections.

Food for thought

Some quantitative analysis methods can be resource intensive and demand specialised skills and capabilities. Only embark on such analyses if you have the necessary resources available and if this level of detailed analysis is required by your region to be able to take its investment decisions.

Consider to what extent will quantifying the effects of your options and pathways change the outcomes of your analysis?

At this stage, try to build as many logical alternative pathways as possible. When picking 'logical' pathways, you could choose to prioritise different outcomes. For example, you can develop pathways according to:

- the most effective measures in terms of risk reduction
- the cheapest measures

- the least environmentally destructive measures
- the most effective measures in terms of delivering the greatest co-benefits, etc.

- **Visualise your pathways alternatives:**
  Visualise your pathways according to whether you have carried out a qualitative, semi-quantitative or quantitative assessment.

  Qualitative analyses
  Visualise each of the pathway alternatives you developed in the previous step as sequences of options or clusters of options over time. Make sure to distinguish between short-, medium- and long-term options and highlight the points at which one option is no longer sufficient and is thus substituted/supplemented with the next ones. If you have identified any specific adaptation limits to any of the options, add these to your pathways visualisation. An example of how you could visualise your pathways at this level of detail is provided in Figure .

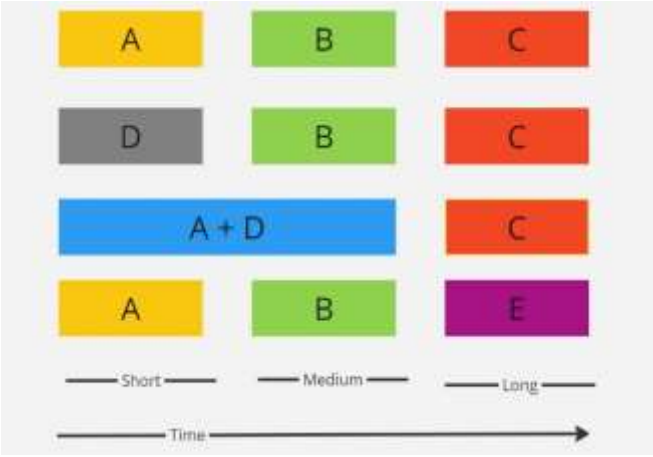


Figure D13.1: Qualitative visual representation of alternative pathways

Semi-quantitative & quantitative analyses
Visualise each of the pathways alternatives you developed in the previous step as a so-called 'pathways map' (Deltares, n.d., see figure in the explainer below). This is a visualisation technique which allows to showcase adaptation pathways in a way that is similar to metro-maps used in large cities. This approach to pathways visualisation permits the inclusion in the map of the timing and/or conditions under which the adaptation limits are reached. These visualisations look the same for both semi-quantitative and quantitative analyses, the only difference being how you determined the adaptation limits for the different options and their combinations in previous steps. You can use the tools mentioned below to guide you in the visualisation. Alternatively, you can also simply sketch the pathways alternatives on paper and/or using digital drawing tools, such as Microsoft Visio, or Miro.

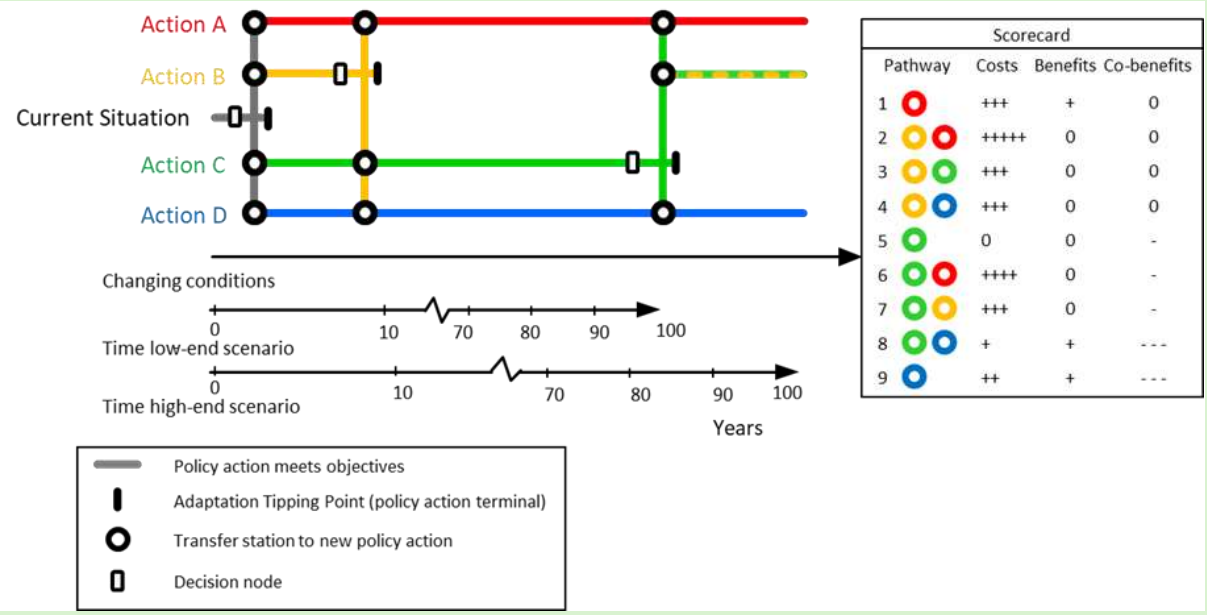
Explainer: Reading a pathways map

Consider the below coastal example where Action A involves constructing a sea wall, Action B entails sandbagging vulnerable households during high tides, Action C focuses on beach replenishment, and Action D enforces setback lines. Action A has three possible transfers: one

from the current situation (grey line), one from Action B (yellow line) when its adaptation limit is reached, and another from Action C (green line) when it reaches its limit.

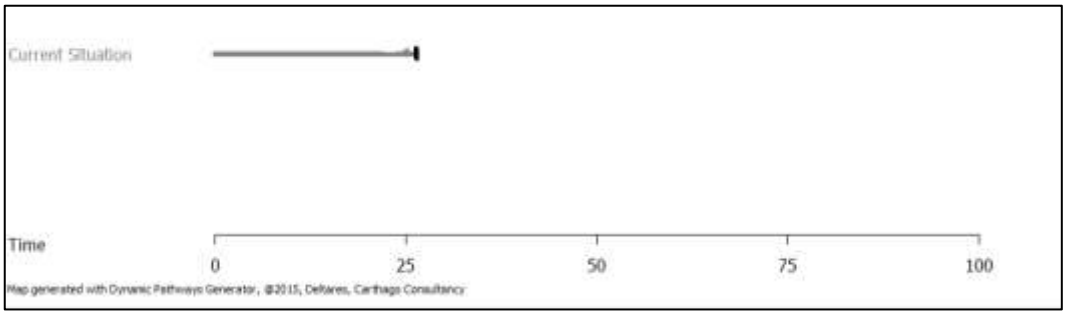
There are two types of transfers: one where the subsequent intervention replaces the previous one, and another where it supplements the existing measure. A solid colour transfer on the map indicates a replacement. For instance, the transfer from Action C to Action A (solid red) shows that Action A has replaced Action C. In contrast, the transfer from Action C to Action B (yellow/green) indicates that Action B complements Action C, which remains in effect.

Pathways maps typically includes multiple timing axes below them, reflecting the uncertainty around when specific conditions will arise under different climate risk scenarios. While the conditions requiring action are relatively clear, their timing is uncertain. The map helps clarify what is known and what remains uncertain.

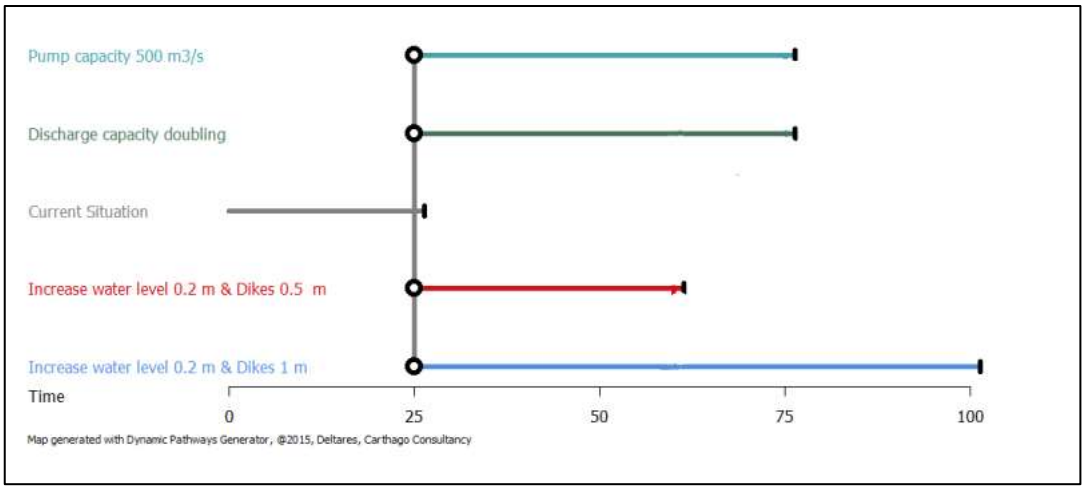


Typical metro-map to visualise adaptation pathways, including symbols to indicate transfer stations from one adaptation measure to another, adaptation limits (or tipping points) or effectiveness of each measure (sequence), and decision nodes to indicate the timing of the associated adaptation decision in recognition of the next measure's lead time (adapted from Haasnoot et al., 2013).

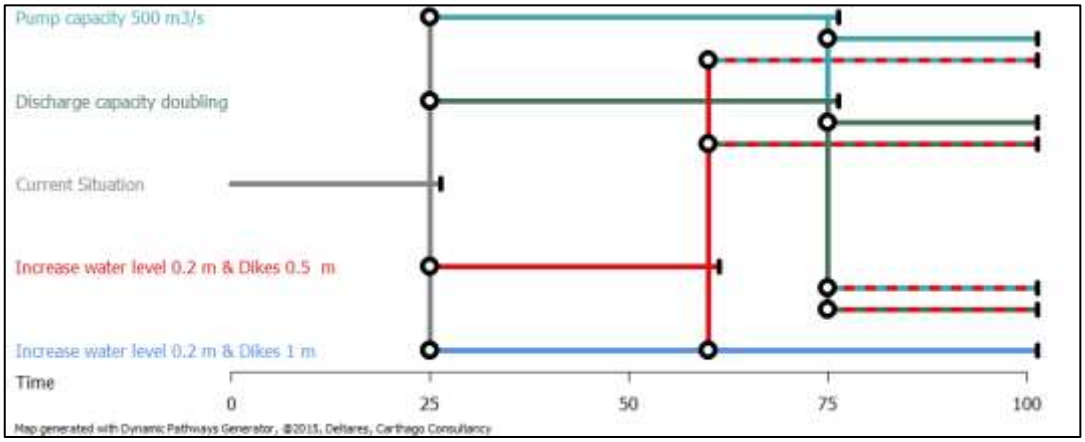
When building a pathways map, commence by drawing your x-axis, which can be described as time, and/or as changing conditions (depending on the manner in which you described you adaptation limits in earlier activities). You will fill in your map from left to right. Start by including one short line at the left border, which will indicate your current situation. Indicate the estimated/calculated adaptation limit of the current system with a short perpendicular line at the end of the line you just traced. The figure below provides an example of this in which the current situation reaches its adaptation limit after 25 years.



Add additional/alternative adaptation options to be implemented when your current system reaches it adaptation limit. The vertical lines connecting two or more measures indicate transfers between measures. Be sure to account for any lead times for any of the options. In the example shown below, there are four alternative options to manage drainage in a polder. For each option, indicate its adaptation limits as you have done before.



For those options which are not effective in the medium- to long-term (in the example, from top to bottom, options 1, 2, and 3), add options to be implemented when these reach their adaptation limits. Continue doing so in steps until all pathways are effective against the entire extent of the x-axis. In the below example, options in two colours indicate the simultaneous combination of two measures, whereas solid lines indicate single options that have replaced their predecessors. You can also choose to visualise your pathways differently if you wish.



Once you have formulated all your pathway sequences, you are left with a complete pathways map. Your map may be larger or smaller, and more or less complex than the above example, depending on how many different alternative pathways you have identified and from how many individual measures each pathway is comprised.

Once complete, use your visualisation to identify those moments in time when key adaptation decisions will need to be taken. That is, where a decision *must* be made relating to the overarching strategic direction that may lock out other options. In the above example, we can see the last option (increase water level 0.2m and raise dikes 1m) could be considered a lock-in. Once implemented, there is no option to divert course to another option. Hence, a key decision moment occurs at around T=60, when the decision to implement that option as opposed to others must be made.

 **Supporting resources:**

Useful tools

- Pathways generator
- Resilience pathway visualisation tool

Useful methods

- Stakeholder workshop
- Adaptation tipping point (ATP) analysis
- Literature review
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D14. Task 3.2.2 Evaluate pathways – Technical guidance on how to complete

You can complete this task using qualitative, semi-quantitative, or quantitative methods. The methods you have previously applied during tasks 1.3.1 (risk assessment) and 3.2.1 (risk-assessment of options and pathways) will inform the extent to which you can quantify your pathways evaluation. Completing the first activity of this task determines the evaluation method that is appropriate to your decision context.

You evaluate your pathways by stepping through the following activities.

- I**dentify the preferred pathways prioritisation methodology and associated evaluation criteria:** Determine how you will evaluate your pathway alternatives. Multi-criteria analysis is most often used, as it can be applied to either qualitative, semi-quantitative or quantitative analyses. However, more quantitative (or hybrid) approaches are also possible; for example, undertaking a full cost-benefit analysis or incorporating cost-effectiveness information. Within the Regional Resilience Journey,

we anticipate cost-benefit analysis being applied to your Action Plan, such that we recommend more qualitative or semi-quantitative methods for your evaluation here.

If you have formulated your pathways according to the Task 3.2.1 guidance, each pathway should be capable of addressing your climate risks against your planning time horizon more or less equivalently. Hence, there is not a need to evaluate the performance of your pathways against your *primary adaptation objectives*. The focus of this evaluation is rather on the impacts of your alternative pathways on your *secondary resilience objectives*, as well as any additional criteria relating to their implementation and delivery (either drawn or amalgamated from the set of options evaluation criteria from Task 3.1.2. e.g. costs, adaptivity, implementation feasibility, transitional qualities)[6]. Your evaluation methodology is therefore dependent on the type and amount of information you have available to measure your adaptation pathways against these criteria. If you have been able to quantify the impacts of your options and pathways, then more quantitative methods may be appropriate.

You also need to decide how and when you are going to involve your stakeholders in the pathways evaluation. Stakeholders can be involved in any (or all) of the following activities. Stakeholder engagement is compatible with either qualitative, semi-quantitative or quantitative methods, although their contribution may be larger when undertaking qualitative analyses.

- **Evaluate the performance of pathways alternatives:** Evaluate the performance or impacts of each alternative pathway against each specified indicator/criterion.

  Qualitative analyses
  A simple way to perform qualitative analyses is to use a simple multi-criteria scorecard. In the scorecard, you can relatively score the effects of each pathway using '+' or '-' symbols, or similar. Multiple plusses (e.g. '++', '+++') can indicate stronger positive impacts, while multiple minuses (e.g. '--', '---') can indicate stronger negative impacts. Assign a special symbol ('0', or an empty space for example) to pathways that lead to no discernible impacts on a specific indicator. You can also choose to qualify your scores with additional information as relevant, although your objective is to be able to easily compare your scores between the alternative pathways. An example scorecard evaluating the performance of four alternative pathways is shown below.

[6] For example, the degree of uncertainty you are confronting may mean that you wish to prioritise more flexible pathways, while in other instances, you may wish to prioritise more transformational, robust and/or path-dependent adaptations. This then allows you to evaluate the various trade-offs present between your alternatives and the relative abilities of your pathways to most effectively build towards achieving your shared vision.

Pathway alternative	Costs	Environmental impact	Feasibility	Sustainability	Transformative potential
Pathway 1	+	--	++	0	0
Pathway 2	-	+	--	+	+
Pathway 3	0	+	+	0	-
Pathway 4	-	+	0	+	++

Scores can be assigned to the pathways for each indicator in different ways. One approach can involve expert judgement, often supported by findings from the literature and past experience in your region. You will likely also want to consult relevant stakeholder groups during this evaluation. This can be achieved through participatory approaches, for example, via either a workshop setting or individual consultation (e.g., consult environmental groups to assess the environmental impacts of pathways, etc.).

Semi-quantitative analyses
In semi-quantitative analyses, you apply a more traditional weighted multi-criteria analysis. Score each pathway against each criterion against a common scale relative to the other pathways. In this approach, the scores can again be based on expert judgement as with qualitative evaluations, or rather be informed by more quantitative calculations/modelling for all or some impacts. In the above example, pathway, 'Costs' scores could for example be established by calculating the approximate capital and operational expenditure required to implement the measure. For relative emissions, you could use calculations of each pathway's 'net carbon emissions' to inform the scores. When scoring the criteria, be sure to involve your stakeholders in the process to ensure legitimacy of the evaluation results.

Quantitative analyses
In quantitative analyses, either the directly calculated outputs for each criterion can be listed and compared directly, or these can serve as inputs to a weighted multi-criteria analysis as above. These types of analyses typically rely on extensive computer modelling, in which domain- and sector-specific models may need to be applied. Different models may be needed for the calculation of different indicators. Only undertake these types of evaluations if the quantification is going to significantly impact the decision taken. In other words, will the additional precision lead to a different decision? Stakeholders should also be engaged in the evaluation, but more in terms of validating the modelled outputs.

- **Determine the overall performance of each pathway alternative**: Having scored the impacts of your pathways against each indicator, determine its overall performance

across all indicators. In more qualitative analysis, this can take the form of a sensemaking exercise (e.g. *'Based on these scores, I intuitively feel that pathway 2 is better than pathway 1, pathway 4 is better than pathway 3, and pathway 4 is better than pathway 2'*, in the scorecard above), while in semi-quantitative and quantitative approaches, each criterion can have weights assigned to it before calculating the combined effects of each pathway against the entire set of criteria:

$$X_{pathway} = \sum_{i=0}^{n} (w_i \times x_i)$$

Where, $X_{pathway}$ = Total score for a given pathway
w_i = Assigned weighting for criterion *i*
x_i = Assigned score for criterion *i*

If each criterion is valued equally, you can use a common weighting or simply average the individual criterion scores for each pathway. More commonly, different weights are assigned to the criteria, which need to be determined in consultation with your stakeholders to ensure the legitimacy of the derived results. Keep in mind that different stakeholder groups may have different priorities and preferences; your goal is to make sure that the final weighting is accepted by all stakeholders. Depending on stakeholder preferences, you can also set stricter selection criteria for the pathways, for example by excluding those pathways with any negative environmental impact, or only including pathways that are evaluated to be 'sustainable', etc.

- **Select the best performing pathways and visualise them in a simplified pathways map**: Based on the results of the evaluation, make a final selection of the pathways to include in your Climate Resilience Strategy. These will be the 3-4 'best' performing pathways, taking into consideration your evaluation results. Ideally, your preferred pathways will stem from the same set of (preferably low- or no-regret) short-term adaptation options, as these will be the set of options that your region will include within its Climate Resilience Investment Plan. In the mid- longer-terms, multiple pathways should still be possible depending on the set of conditions that emerges. Make a note of any dependencies or potential lock-ins present within your preferred pathways, alongside any critical key decision moments.

  As with the previous activities, involve your stakeholders in the final selection of preferred pathways. This is most usefully achieved via a workshop setting, in which stakeholders can discuss the results of the evaluation, revise these if necessary and agree on their preferred pathways. Visualise the preferred pathways in the form of pathways map using the same techniques described in Task 3.2.1.

 **Supporting resources:**

Useful tools

- Policy credibility assessment tool

Useful methods

- Multi-criteria analysis (MCA)
- Cost-Benefit Analysis (CBA)
- Pathways evaluation workshop
- Pathways evaluation surveys

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D15. Task 3.2.3 Develop a portfolio of innovation actions – Technical guidance on how to complete

The IA is supplemented by input from various steps along at the Regional Resilience Journey.

- **Identify innovation actions to build your portfolio.** Following the adaptation pathways that have been formulated in task 3.2.1, you can start building the innovation portfolio for your region. The innovation portfolio supplements the options making up the selected pathways. To structure the different innovation actions in your portfolio, we suggest looking at the different outcomes that are part of your vision, and map within them the innovations actions that can contribute to address them.

  The process of defining and selecting the innovation portfolio is often a process where private sector and citizens are invited to contribute with their proposals to address the selected directionalities. In this case, your region's local government does not a priori identify and select innovations, but instead, seeks to provide incentives for these innovations to flourish (through a policy mix). The definition and selection of innovations can be done through an (i) open call for innovations that can contribute to the goals of your climate adaptation strategy, followed by a (ii) collaborative workshop with key and diverse stakeholders in the region where you conduct an 'open peer review' process of the innovations presented and define which ones to support (see Reid et al., 2023 for examples of such process). The innovation portfolio should include innovations as well as those actions required to be able to take advantage and scale those innovations. An example are actions related to skills upgrade or infrastructure development that your region could take to increase the impact of a certain technological opportunity. Some of these innovation actions might only become necessary in the future, including mid- and longer-term plans.

  Consider that not all 'innovations' need to deliver concrete products or services in the short run. Following an adapted version of the OECD's facets approach, we suggest considering the following types of innovations:

  - ***Enhancement oriented innovation*** that focuses on upgrading, achieving efficiencies and building on existing structures. These innovations might lead to results on the short run but will most likely not enable long-lasting solutions for your adaptation challenge.

Also known as incremental innovation. *In the example: improved irrigation practices will sustain your vineyards for some time, but not in the long run.*

- ***Adaptive innovations*** that allow you to try and test new approaches that will make you capable to adapt to a changing environment. These innovations will help you understand better your challenge and might bring insights that will require you to reformulate your portfolio. *For example, innovations related to new climate monitoring systems that collect new data and insights; or innovations in the way in which public sector operates that allows more agile responses to climate emergencies or other public challenges.*
- ***Anticipatory innovation*** are innovations that allow you to explore how the future would look like for things that are not yet there. These can be innovation related to frontier research, but also social innovations that seek to explore radically different ways of organising society. These innovations tend to have more transformative potential.
- ***Exnovation,*** or the discontinuation or phasing out of unsustainable practices and technologies.

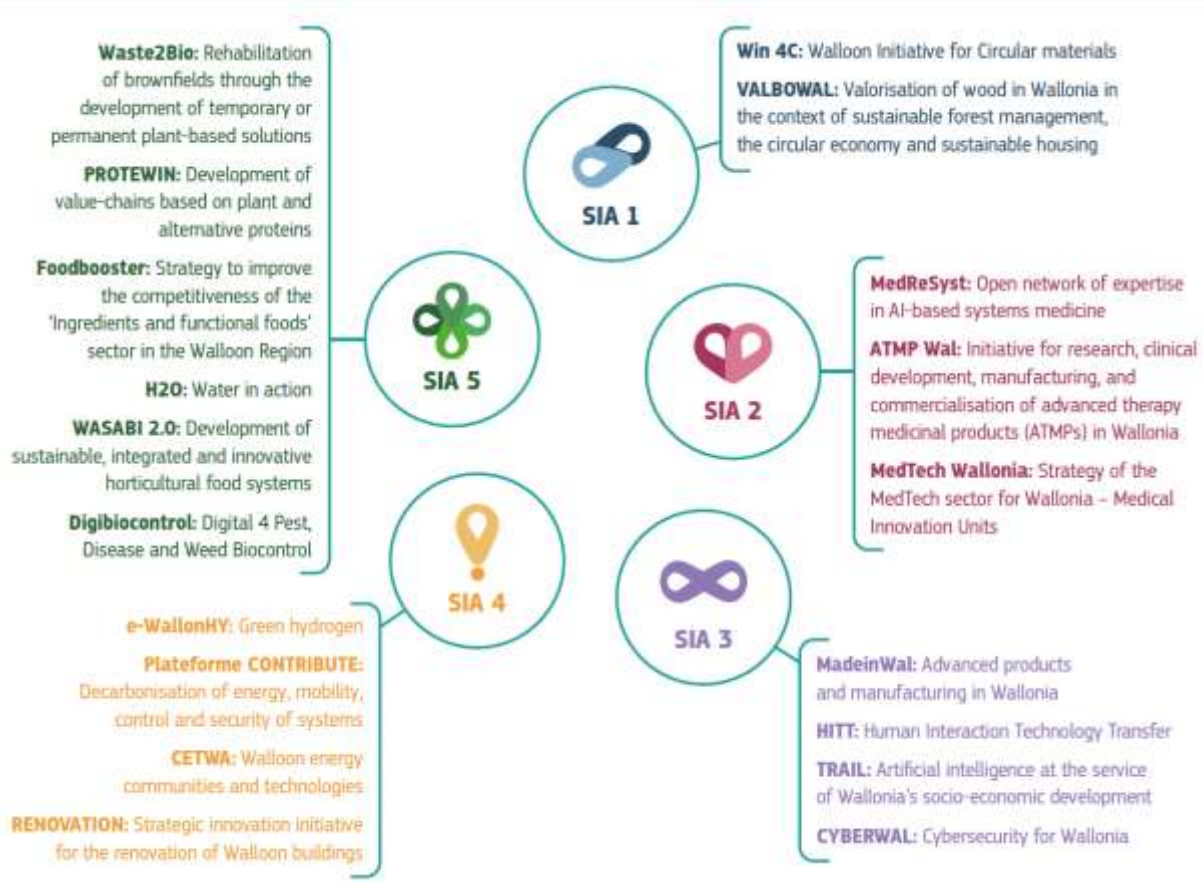

Figure D15.1: Innovation Portfolio of Wallonia. In this case Strategic Innovation Areas (SIA) are SIA1: Circular Economy, SIA2:Innovation for enhanced health , SIA3 Agile and safe design and production methods:, SIA4:Energy Systems and Sustainable Habitats, SIA5: Agri-food chains of the future and innovative environmental management. Source: Reid A., Steward F., Miedzinski M., Aligning smart specialisation with transformative innovation policy. Lessons for implementing challenge-led missions in smart specialisation, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/359295, JRC134466.

Note that these different types of innovation are meant to complement each other in the portfolio and over time.

Assess the quality of your portfolio. The directionalities linked to adaptation pathways give you a way to 'map' the innovation actions that will constitute your portfolio. You will have different sets of innovation actions that, together, address different aspects of your challenge and intervention and unlock more transformative solutions.

To assess whether the innovations that you have selected for your portfolio are the right ones, we suggest to use the three following criteria:

1. **Potential for Amplification (Scaling**): assess whether the innovations in your portfolio are scalable and what is required to do so. Following Lam et at (2020) classification, we suggest to look at:
    a. Amplifying within: whether the innovations can be conducted for longer term or faster; for example, smarter irrigation systems allow for agriculture to endure droughts more effectively.
    b. Amplifying out: doing the same or a similar (adapted) version of your initiative in other contexts; for example, agroforestry demonstration in one place may allow for replication across the region.
    c. Amplifying beyond: how the innovations in the portfolio change rules (beliefs that we use to define what is the "best way" of doing something) or values; for example, tying agricultural subsidies to environmental performance (e.g. soil health) can lead to generation of completely different business models.
2. **Synergies**: the main goal of a portfolio approach is to create results that are more than the results that each innovation can achieve individually. In this respect, it is essential to understand whether and how the innovations in the portfolio can create dynamics of pooling between actors in such ways that might create economies of scale or increase implementation feasibility. Synergies can be financial, capacities (human resources), improvements in infrastructure, data (collection or quality) and knowledge and competences. For climate adaptation is also essential to consider potential, negative synergies that might emerge from the portfolio (i.e. maladaptations).
3. **Risk vs Return**. We also recommend finding a balance of risk vs return that is suitable to your region at a given time. While transformational innovations are needed, these might take longer term to generate results, and often 'quick wins' are needed to create momentum and maintain the legitimacy of your activities. There will be a balance in risk vs return in your portfolio if you already considered the 4 categories of innovations introduced earlier (enhancement, adaptive, anticipatory and exnovation), but choose a portfolio that reflects the ambitions of your adaptation pathways and also meets the expectations and needs of key stakeholders.

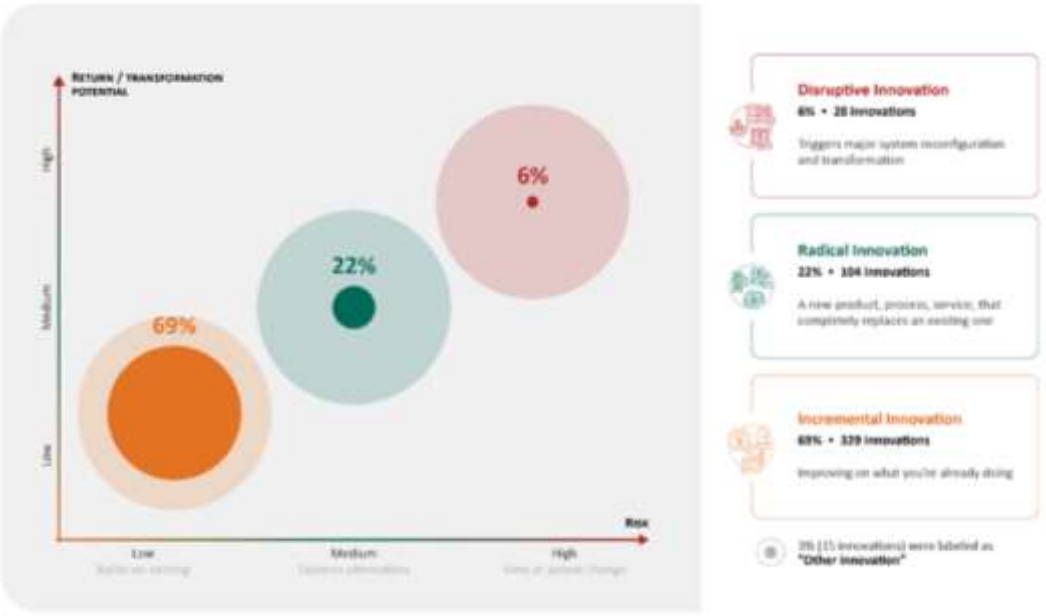

Figure D15.2: Portfolio composition from CGIAR in 2022 (. Source (Schut et al., 2024)

- **Identify the policy and governance mix that supports the implementation of your innovation portfolio**

The public sector has a variety of policy instruments that can be leveraged to support the implementation of your portfolio. Nevertheless, given the multi-agency and long-term nature of your adaptation pathways, a policy mix should not only focus on the instruments, but also the different mandates, logics and strategies of the different agencies involved. Each agency has a different way of 'seeing' and hence targeting a problem, and different ways of assessing success. Hence, a policy mix approach also helps you creating mutual understanding and alignment between the different public sector parties involved. Note that for EU regions it is particularly relevant to consider EU level policy strategies, such as the Green Deal and the EU Missions, as well as Cohesion Policy, Recovery Funds, etc. Overall, embed your policy mix in the different policy development opportunities available. Some regions might have a Smart Specialisation Strategy (S3) in place, which might be a good starting point to envision and articulate regional diversification and climate resilience, but note that the focus of the Regional Resilience Journey is much broader.

FIGURE 10 *Multi-level governance and policy context of S3 missions*

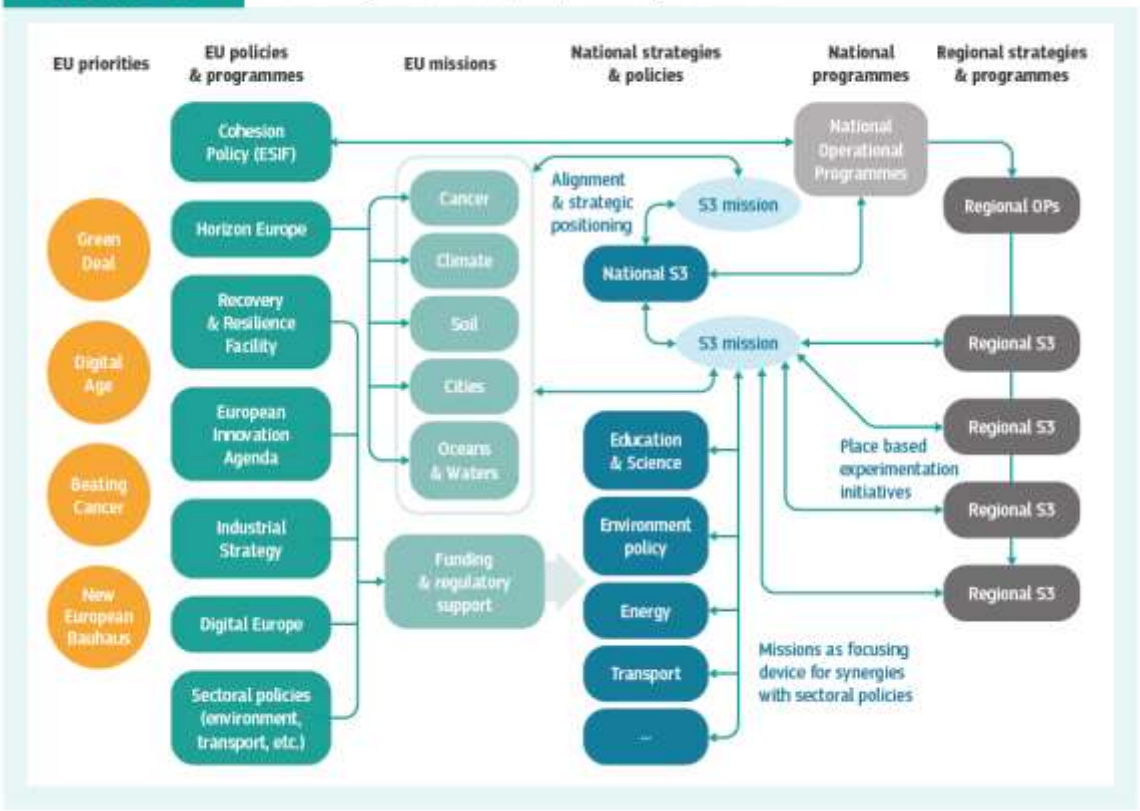

Figure D15.3: Example of Policy mix and multi-level governance of a variety of policy goals and strategies. Source (European Commission et al., 2023)

-Policy strategies include the policy objectives and the plans to materialise them. For European regions, relevant policy strategies can be found at EU (Green Deal), National (Adaptation Plans, Research and Innovation frameworks), and regional level (S3). See Figure .

-Policy instruments associated with a specific goal and design features. Policy instruments can cover (see Table D15.1: Policy instruments to support innovation for sustainability. Note that this list of policy instruments includes both national and regional level instruments. Source: (Adapted from UNCTAD, 2019) for a more detailed overview).

- Supply: support to R&D, support to venture and seed capital, support to technology transfer, support shared R&D infrastructure, competence building and skills upgrade.
- Demand: public procurement, living labs, incentives, regulation (inc. sanctions and disincentives), codes of conduct, public communication, etc.
- Ecosystem instruments: cluster development, innovation platform, flagships or consortiums, support to intermediaries, etc

-Policy processes, which refers to the relationships and decision-making processes that take place to achieve this mutual alignment and architecture of your policy mix. This refers to the “governance” of your policy mix.

Table D15.1: Policy instruments to support innovation for sustainability. Note that this list of policy instruments includes both national and regional level instruments. Source: (Adapted from UNCTAD, 2019)

Regulatory Framework	Policy instrument	How can they support innovation for sustainable development?
	Environmental and health protection regulations	Provide incentives to innovate to comply with regulatory framework (e.g. substitution of harmful chemicals). Provides disincentives for free riders by introducing penalties
	Product and industrial process standardisation	Provide incentives to innovate to comply with environmental and social performance standards for products and processes
	Consumer protection, labels and certification	Promotes innovative products and processes by providing information on environmental and social performance of products and services to customers
	Intellectual property rights	Encourages firms to engage in innovation activity by protecting their knowledge; and opens access to knowledge and technologies contributing to sustainable development
	Competition Law	Prevents the emergence of monopolies or cartels that can stifle innovation and hold back its benefits for consumers or the environment
	Bankruptcy Law	Can help to engender a risk-taking, entrepreneurial culture, protecting investors, firms and consumers against some of the negative effects of failure
Economic instruments	R&D funding	Provides direct support for R&D underpinning sustainable innovation
	Innovation funding for companies	Provides direct support for innovation activities aiming in the areas relevant for sustainable development
	Equity support to venture & seed capital	Provides equity dedicated to innovation; de-risks innovation investments
	Feed-in-tariffs and similar subsidy schemes	Provides financial incentives to adopt and diffuse innovative technologies in selected technology areas (e.g. renewable energy)
	Tradable permit systems (e.g. emissions trading)	Allocates or sells emission rights to polluters which can be traded. The price for emission rights and prospect of reduction of emission rights creates incentives for innovation
	Removal of subsidies for unsustainable activities	Removes distortion from markets that inhibits sustainable innovation (e.g. subsidies for fossil fuels)
Fiscal instruments	Tax incentives for R&D for companies	Tax reduction (CIT) for companies undertaking R&D underpinning innovation
	Tax incentives for technology adopters	Tax reduction (CIT) for companies adopting innovations with environmental and social benefits
	Environmental taxation	Tax reduction (CIT) for companies undertaking R&D underpinning innovation
	Removal of tax reliefs for unsustainable activities	Removes distortion from markets that inhibits sustainable innovation (e.g. subsidies for fossil fuels)
Demand support	Sustainable public procurement	Creates markets for goods and services with positive impacts on the local community in the areas relevant for sustainable development (e.g. Green Public Procurement)
	Pre-commercial procurement (R&D and innovation procurement)	Creates markets for innovative goods and services and stimulates experimentation of new application of emerging technologies
	Support to private demand	Provides incentives (e.g. vouchers) for consumers to purchase innovative goods and services with demonstrated positive social and environmental impacts
Education and training	Adaptation of formal education curricula to address the SDGs	Adapting higher education and vocational training curricula to consider sustainable development challenges. The curricula may be developed jointly with industry and other organisations. Provides qualified and skilled workforce

	Placement schemes and staff mobility	Supports learning, knowledge exchange and connections between actors in the innovation system with a focus on actors active in promoting sustainable innovation
Regional Innovation strategy & networks	Clusters, industrial zones, and science and technology parks	Encourages smart specialisation in innovation and technological areas relevant for societal challenges in regions with high potential and/or need for goods and services with environmental and social benefits
	Technology platforms and networks	Promotes information and knowledge sharing on innovation
	Roadmaps and technology foresight	Creates shared vision, commitments and roadmaps for experimentation, investment and development of eco-innovation, "wires up" the innovation system
Capacity building and information provision	Business advisory services	Promotes skills and knowledge relevant for innovation
	Local entrepreneurship and business incubation	Promotes local entrepreneurship and local innovation
	Technology transfer and matching	Promotes identification and acquisition of innovative technologies relevant for tackling specific challenges
	Capacity building for governments	Promotes building up government capacity to design, implement, coordinate and evaluate STI policy with a view of its support for sustainable development
	Market intelligence services	Promotes information, data and knowledge sharing on innovation trends related to sustainable development (reduces information asymmetry)
Information and cultural instruments	Education and awareness raising	Campaigns or programmes can 'popularise' science, cooperativism, technology and innovation and – if appropriately designed – enhance democratic inputs to innovation policy
	Network facilitation and enhancement	Aids lesson learning and sharing e.g. events such as Failure Nights, Start-up weekends etc
	Virtual and material infrastructure/ events for innovation network-building	Hackathons, maker spaces, transformation labs

- **Monitor and evaluate the performance of your innovation portfolio, and adapt accordingly**

To monitor the progress and implementation of your portfolio, we suggest to conduct three process.

First, to create a "dashboard" and/or report where you summarise how your innovations individually and as a whole are performing regarding the criteria that you have selected (amplification, risk vs reward, synergies) and in relation to the adaptation challenge and its directionalities. The dashboard will provide you with a picture of the current state of your portfolio and its potential, and should include key metrics that can indicate the performance of the policy instruments that are being used (R&D spending, growth of companies, etc), as well as how they respond to the criteria of your portfolio defined in Step 5 and your adaptation challenge.

Secondly, evaluate whether the policy mix that you have put in place is supporting the implementation of your innovation portfolio in line with its intended outcomes. Questions that can be asked are:

i. Is the policy mix coherent with other interventions within the Regional Resilience Journey/adaptation pathways?
ii. Is the policy mix efficient in terms of resources? Is it effective to achieve the desired goals?

iii. Does the innovation portfolio have the right support among different public and private stakeholders involved and affected by its implementation, including citizens?

Last, there are many 'learnings' based on experience and insights from those working on the portfolio implementation and how addressing the adaptation challenge. Often these methods are best suited to capture unexpected and unintended (positive and negative) outcomes, given that you involve a diverse set of stakeholders in the process. These "soft" insights are equally relevant and can be triangulated with other forms of data to ensure they reflect real changes. Methods that can be used are 'Most Significant Change' or 'Outcome Harvesting'.

Taken these three inputs together, decide on changes and adaptations to your innovation portfolio and supporting policy mix. Note that it is important that this process is collaborative and transparent, as it will keep the momentum and enhance the mutual alignment between the different agencies and stakeholders involved in the implementation of your innovation portfolio.

Case Study: Norther Netherlands Innovation for Climate Adaptation

The Norther Netherlands region (the provinces of Drenthe, Groningen and Friesland – grouped as one for purposes of the RIS3) is an example how multilevel innovation activities can be aligned with Climate Adaptation goals. It shows how national policies such as the National Adaptation Strategy (NAS), Delta Programme (water management) and Mission-Driven Top Sector (innovation strategy) as well as S3 innovation strategies can meet and align with respect to climate adaptation goals, which are also coordinated at the regional and local level.

The NAS has progressively expanded its view on climate adaptation, from a strong focus on water to the inclusion of other climate risks. With its focus on "making room for the river" the NAS has become itself more transformative, starting to include other climate risks besides flooding. This national level strategy has been translated to regional CCA foreach of the 3 provinces, enjoying high profile within regional policy making, with the three regions being signatory of the charter for the EU Mission on Climate Change Adaptation.

With respect to innovation policy at the national level, the Mission-Driven Top Sector and Innovation Policy (in place since 2011, but recently renewed for 2024-2027) guides the development and implementation of knowledge and innovation portfolios, public-private partnerships in "top sectors" with direct funding for innovative research and innovation. At the regional level, the Norther Netherlands region has developed a Smart Specialisation Strategy 2021-2027 (RIS3) that adopts the approach from the Top-sector innovation policy. It includes the following areas innovation portfolios, among others: Agriculture, food and water; energy transition and sustainability; and health and care.

While the RIS3 does not explicitly address Climate Adaptation, it opens room for relevant actions under the "Agriculture, water and food" innovation portfolio. Similarly, the Top Sector policy is not explicit mission on climate adaptation, but several of the mission-drive innovation programmes relate to this theme: Climate-proof rural area: prevention of flood and water shortages; climate-adaptive agricultural and horticultural production systems; water-robust and climate-proof urban area; improve water quality. Since there is no dedicated spending for climate adaptation within these policies it is hard to estimate what is the overall budget for innovation in this respect.

Both climate adaptation and innovation strategies operate in a multilevel manner and include several mechanisms for effective citizen engagement. There are increasing cross-domain synergies between climate adaptation strategies and innovation strategies, particularly in the use of inter and transdisciplinary approaches in some of the top-sector innovation portfolios relevant to climate adaptation. However, a strong focus on economic issues remains, overlooking other dimensions of adaptation such as people, culture and nature. These strategies meet in making room for experimentation, for example, experimenting on new business models in large public-private collaborations under the Top Sector Policy. These are not yet mainstreamed to climate adaptation solutions that would benefit from experimentation.

Overall, the way in which Climate Adaptation and Innovation strategies are integrated at different levels in the Norther Netherlands region shows how mainstreaming of climate adaptation can happen within existing innovation strategies, as well as the advantages that this integration brings in terms of experimentation, knowledge co-creation and capacity building for climate adaptation.

 **Supporting resources:**

Useful tools

- Brink guide to Behavioural Innovation
- JRC Action Book

Useful methods

- Portfolio Facet (OECD Portfolio Facets – [note that this is official under a OECD) paywall]
- Portfolio approaches (UNDP Guidebook for Adopting Portfolio Approaches)
- Innovation roadmap approach (Inno4SD Innovation Roadmap approach)
- Transformative theory of change (MOTION Handbook – Transformative Theory of Change for Innovation Portfolios)

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