

Work Package 7

‘Values, attitudes and incentives for transformational change’

D7.1– Guidance and score-card readiness assessments of transformative change across regions



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Work Package 7 Values, attitudes and incentives for transformational change

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Guidance and score-card readiness assessments of transformative change across regions

TASK 7.1 Green transformational framework and processes

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GLOSSARY

Entry	Definition
Adaptation limits	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.’
Adaptation options	Different strategies and actions that can help address climate adaptation. These actions can be structural, institutional, ecological, or behavioural.
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.
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.
Challenge 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 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 vulnerability	The likelihood of being negatively affected by climate change, including sensitivity to harm and limited capacity to cope and adapt.
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.

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.
Innovation	Putting into practice new ways of doing things across various domains, including technology, governance, social structures, and finance, to generate meaningful change
Key Community Systems	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.
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-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.
Nature-based solutions	Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions. Nature-based solutions must therefore benefit biodiversity and support the delivery of a range of ecosystem services.
Participatory design	A democratic process where citizens are involved in public decision-making, using methods like online ideation and voting.
Pathway	In the context of climate adaptation, a pathway is a strategic roadmap that links the current state to a shared vision of a resilient and sustainable future. It highlights key actions, decisions, and strategies needed to achieve this vision while addressing uncertainties, trade-offs, and emerging challenges. To remain effective, pathways must be collaboratively discussed, agreed upon, and regularly reviewed. They serve as a foundation for developing a detailed action plan that translates these key actions into specific, time-bound tasks with clear roles and responsibilities.

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
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.
Stakeholder mapping	Stakeholder mapping in climate adaptation is a process of identifying, analysing, categorizing and connecting individuals, groups, and organizations with a vested interest in or influence on adaptation strategies. It helps understand their roles, needs, and capacities to enhance collaboration and ensure equitable outcomes. This tool is essential for designing inclusive and effective climate adaptation interventions, enabling co-creation and ownership among diverse actors.
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.
Vision	In the context of climate adaptation, a vision refers to a shared, long-term aspiration that outlines the desired future state of a community, region, or system resilient to climate impacts. It serves as a guiding framework for aligning stakeholder efforts, fostering collaboration, and driving transformative change. A well-articulated vision integrates environmental, social, and economic dimensions, ensuring inclusivity and sustainability. This vision must be discussed, agreed upon, and regularly reviewed throughout the process among stakeholders.

ACRONYMS

Abbreviated	Extended
EC	European Commission
EU	European Union

IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
MEL	Monitoring, Evaluation and Learning
NbS	Nature Based Solution

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Executive Summary

This report presents the design and delivery of the ARCADIA Scorecard - a pioneering self-assessment tool aimed at empowering regions to understand and enhance their readiness for transformative change, with a specific focus on utilising Nature-based Solutions (NbS). Developed within the framework of the EU Mission on Climate Adaptation, the Scorecard has been created to align with ARCADIA's strategic objective of fostering systemic, participatory, and inclusive climate adaptation. By addressing key characteristics of transformative change, the tool provides a structured framework for regions to identify gaps in their approach, measure progress, and design effective pathways toward resilience.

The Scorecard was developed through a collaborative and iterative process. The core principles were shaped by a **desk and literature review** which consolidated knowledge, explored cutting edge concepts and identified critical levers and barriers for transformational change. Existing models, such as the **NetZero Cities Climate Transition Map**, **Dynamic Adaptive Policy Pathways** and **P2R's Regional Resilience Journey** were reviewed to ensure its alignment with proven methodologies. In later phases, the Scorecard was piloted to gather feedback, leading to the creation of a refined version. This process also informed a detailed **guidance document**, providing practical advice for effective implementation and interpretation of the tool.

The Scorecard helps regions systematically identify strengths and areas for improvement across six phases of transformation. The **innovative aspects of the Scorecard** include:

- **Collaborative response:** The tool is designed to be answered by a group of diverse stakeholders to trigger discussion and the sharing of different perspectives.
- **Dynamic adaptability:** Designed as a living tool, the Scorecard encourages periodic use and continuous refinement, making it responsive to the evolving needs of regions.
- **Integration of NbS principles:** The Scorecard explicitly connects the use of NbS with broader transformational change objectives, promoting solutions that are both practical and sustainable.
- **Action-Oriented Insights:** The Scorecard provides clear recommendations for next steps, enabling regions to integrate results into their broader adaptation strategies.

To ensure its effective implementation, ARCADIA will:

- **Support regions** in applying the Scorecard, offering tailored guidance and facilitation to maximize its impact.
- **Promote its regular use**, encouraging regions to view it as a core element of their adaptation planning.
- **Enhance user-friendliness**, incorporating digital tools to make the process as engaging and informative as possible.

In conclusion, the ARCADIA Scorecard represents a groundbreaking step in advancing transformative change at the regional level. By integrating theory, practice, and innovation, it equips regions with the tools to navigate the complexities of climate adaptation and achieve meaningful, lasting resilience.

Introduction

Methodology

This deliverable provides practical guidance and tools to support regions in assessing their readiness for transformative change. It synthesizes existing knowledge and introduces a framework aimed at fostering systemic transformation in diverse regional contexts. The methodology is built around three main components:

- **Desk and Literature Review:** Consolidation of knowledge to identify key levers, barriers, patterns, and conditions for successful transformative change.
- **Framework Development:** Creation of methods and guidance tailored to transformative change and pathways.
- **Scorecard Preparedness Tool:** Design of a self-assessment tool for regions to evaluate their progress on transformative change.

The process began with an extensive review of literature, research papers, case studies, and models related to transformative change and nature-based solutions (NbS). Instead of an exhaustive systematic review, the focus was on curating the most practical and relevant insights for regional application, particularly within the context of EU mission adaptation projects. This phase involved collaboration with expert partners to identify gaps, refine the focus, and ensure the material was actionable and applicable across diverse contexts.

Following the literature review, an initial draft of the Scorecard was developed. This draft was first reviewed with experts from partner organizations, who provided critical feedback to refine its structure, criteria, and usability. This internal review ensured that the Scorecard aligned with the transformative change framework and was conceptually sound.

The iterative process then moved to the regions, where the Scorecard was tested in two stages. In the first stage, a pilot workshop was conducted in one region to gather feedback on the Scorecard's usability, scoring criteria, and applicability. Based on the feedback, a revised version of the Scorecard was developed. In the second stage, this updated version was tested in a second region, allowing further refinement and validation. Feedback from both regions was systematically reviewed and used not only to improve the Scorecard itself but also to develop a **guidance document for its use**. This guidance aimed to ensure clarity in applying the tool, enhance user understanding, and provide practical tips for facilitating Scorecard sessions.

The regions' contributions were pivotal in shaping the guidance document, as it was largely informed by their experiences, challenges, and feedback. For example, the guidance addressed common difficulties such as clarifying scoring criteria, improving stakeholder involvement, and integrating results into broader regional processes. It also emphasized the iterative nature of using the Scorecard as a living document, encouraging periodic reassessment and reflection.

This iterative and collaborative methodology underscores the commitment to co-creation and inclusivity. By incorporating multiple rounds of feedback—from partner organizations to regional stakeholders—and developing complementary resources like the guidance

document, the methodology ensures that the deliverable is both evidence-based and practically relevant to the regions' needs.

The EU Mission on Climate Adaptation

Europe is warming faster than any other continent, leading to more frequent extreme weather events. These events, along with other environmental and social risks, are creating major challenges across Europe. Societal preparedness against these threats, however, is still low with policy implementation lagging substantially behind quickly increasing risk levels (European Environment Agency, 2024).

The EU has acknowledged the climate crisis as an existential threat, declaring that there is a need to act early and in a coordinated way. The EU Mission on Adaptation was created to turn the urgent challenge of adapting to climate change into an opportunity to make Europe more resilient, climate prepared and fair. This vision of the Mission (Figure 1) aims to trigger societal transformations through a systems approach to risk management and resilience building.

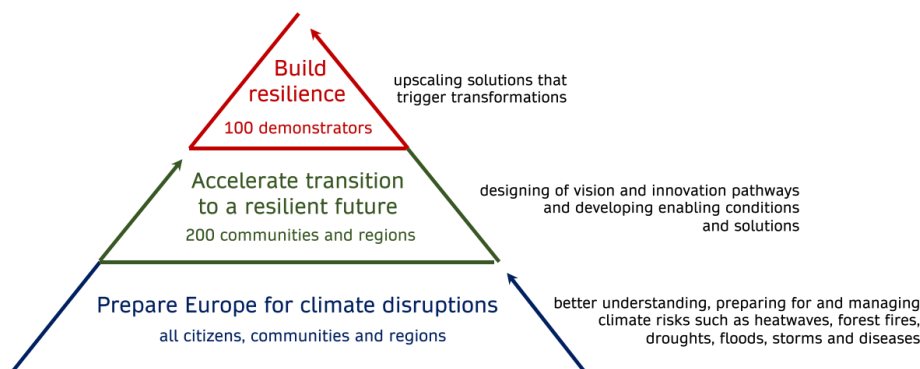


Figure 1 The vision and objectives of the Mission for Adaptation

The Mission aims to support 200 communities and regions to prepare the ground for deep-rooted system innovations and societal transformations through: designing their own vision and objectives; co-creating adaptation pathways; co-designing and testing actionable solutions; and **creating favourable conditions for transformations**. Furthermore, it will build deep resilience by scaling up actionable solutions triggering societal transformations through 100 deep demonstrations (European Commission and Directorate-General for Research and Innovation, 2020).

In the long term, the Mission focuses on social transformations and a transition to a climate resilient Europe. The vision of a climate resilient Europe is understood to include three fundamental and interrelated dimensions that shall guide the Mission as overall principles:

- the resilience of environmental systems with a commitment to sustainability, climate neutrality and to do no harm,

- the resilience of social and economic systems with a commitment to equity, social justice and to leave no one behind,
- the resilience of the political systems, with a commitment to shared values, solidarity and to be united in diversity.

The ARCADIA Project

The ARCADIA project, as a part of the EU's Climate Adaptation Mission, focuses on large-scale system transformations. The project seeks to create resilient and future-proof regions in continental Europe through creating natural solutions to adapt the regions to climate change. The ARCADIA project aims to demonstrate how NbS can effectively and efficiently contribute to climate adaptation. The project will mobilise 8 European regions and communities from Italy, Croatia, Austria, Denmark, Sweden, Bulgaria, Romania, and Slovenia to accelerate nature-based solutions (NbS) adoption.

ARCADIA focuses on customising solutions to local conditions, assessing individual and societal perceptions of risks and solutions to ensure their sustainability and mitigate negative side effects. The project will foster enabling conditions to accelerate regeneration using NbS, by analysing individual and socially determined perceptions of risks and solutions, and experimentally designing incentives and behavioural nudges fostering social acceptance and community actions.

Strategic Objectives of ARCADIA

The strategic objectives of ARCADIA include:

- **Co-design Regional Strategies:** Building upon and mainstreaming innovative, actionable NbS with demonstrated feasibility, effectiveness, and social value.
- **Assist and Empower Communities:** Providing the necessary support to public administrations and businesses to adopt and implement NbS.
- **Stimulate Collaborative Knowledge Building:** Developing capacities and capabilities through collaborative knowledge building and transfer.
- **Promote Coherence and Exploit Synergies:** Ensuring coherence across policy areas and exploiting synergies between value and production chains, and public and private spheres of business innovation.
- **Advance EU Research & Innovation Agenda on NbS:** Contributing to the EU Mission on Adaptation by advancing the research and innovation agenda on NbS.

Work package 7 is essential to achieving ARCADIA's objectives, as it focuses on the values, attitudes and incentives that drive transformational change. This package seeks to understand and influence the socio-cultural dimensions that affect the adoption and success of NbS, ensuring that they are environmentally sustainable, socially acceptable and economically viable. Task 7.1 of work package 7 is designed to consolidate knowledge and develop a comprehensive framework to promote transformative change, especially in the context of post-pandemic recovery and nature regeneration. This task also collaborates with initiatives of the EU Adaptation Mission, developing practical tools and guidelines that help regions to:

- independently assess their progress in the implementation of transformative NbS.

- find directions and solutions for optimising and improving their transformative approaches.

ARCADIA's objective is to support regions in accessing up-to-date, evidence-based actionable knowledge, guidance and knowledge-intensive tools. This document contributes to this objective by collating the best available knowledge on creating an enabling environment for positive transformational change. It seeks to identify the necessary levers, barriers, patterns, and conditions for successful transformative change. Through highlighting and explaining such concepts, this review will feed into the other aspects of the ARCADIA project, to provide the ARCADIA regions with the key knowledge and approaches to enable a transformative agenda.

Background on Transformational Change

The Call for Transformational Change

As the climate and ecological crises escalate and the human response fails to keep pace there are growing calls for transformational change. The 2022 IPCC Working Group II report highlights how observed adaptation in human systems across all sectors and regions is dominated by small incremental, reactive changes to usual practices often after extreme weather events. The report states with high confidence, that if we continue to plan and implement adaptation at the current rate the adaptation gap¹ will continue to grow.

The 2022 IPCC Working Group II report summarises that future transformation could be deliberate, envisioned and intended, by actors who seek to expand the solution space, reduce residual risk to tolerable levels and achieve societal goals. If such a transformation is not pursued or is not successful and risk remains above intolerable levels, a forced transformation may occur that is less consistent with societal goals.

Defining Transformational Change

The IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (Field *et al.*, 2012) defines transformation as “a fundamental qualitative change...that often involves a change in paradigm and may include shifts in perception and meaning, changes in underlying norms and values, reconfiguration of social networks and patterns of interaction, changes in power structures, and the introduction of new institutional arrangements and regulatory frameworks.”

Beyond this definition there is a growing literature on transformational change, transformative change and transformational adaptation with a diverse range of definitions or interpretations across different fields of practice. For example, the three following definitions all appear in the IPCC AR6 Working Group II Glossary:

- **Transformation:** The altering of fundamental attributes of a system (including value systems; regulatory, legislative, or bureaucratic regimes; financial institutions; and technological or biological systems).

¹ The gap between our goals on climate adaptation and what we achieve.

- **Transformative change:** A system-wide change that requires more than technological change through consideration of social and economic factors that, with technology, can bring about rapid change at scale.
- **Transformational adaptation:** Adaptation that changes the fundamental attributes of a social-ecological system in anticipation of climate change and its impacts.

Scoones et al. (2020) discuss that despite the ubiquitousness of the term it is often not clear what should be transformed, by and for whom and through what processes. An additional factor is to what extent (and what types of) human action can lead to and steer transformation. Scoones et al. (2020) describe three distinguishable but complementary approaches to advance transformation:

- **Structural approaches** refer to fundamental changes in the way production and consumption is governed, organised and practiced by societies.
- **Systemic approaches** refer to intentional change targeted at the interdependencies of specific institutions, technologies and constellations of actors.
- **Enabling approaches** focus on fostering the human agency, values and capacities necessary to manage uncertainty, act collectively, identify and enact pathways to desired futures.

Watkiss and Cimato (2020) discuss how the transformational adaptation literature extends beyond climate risks to tackling multiple societal goals or extends to address underlying power imbalances and injustices associated with current political decision making. In addition, some studies focus on climate change (adaptation) only, some include mitigation, and some extend to wider sustainable development. This can lead to transformational adaptation being seen as a cure all mechanism. To avoid unreasonable expectations of it can help to explicitly define the goals and scale of projects promoting transformational change.

“How transformational adaptation is framed affects how it is then tackled, who or what is considered relevant to making improvements, what risks are given priority, what options are considered plausible and what outcomes are seen as desirable.” (Lonsdale, Pringle and Turner, 2015)

Incremental and Transformational Change

The general concept of transformation as a major, fundamental change appears to be widely agreed upon in both research and policy. However, there is less consensus on the features that make changes in human-environment systems transformational and therefore different from incremental shifts (Feola, 2015).

Lonsdale, Pringle and Turner (2015) discuss how some researchers present incremental and transformational adaptation as operating along a spectrum with transformational change as the radical end of more conventional adaptation processes. In other literature, transformational adaptation is presented as requiring a ‘paradigm shift’ in the way the issue is framed because it tends to focus on larger more profound system changes.

Termeer, Dewulf, and Biesbroek (2017) argue that considering transformational and incremental change as a dichotomy is not fruitful conceptually. They advise viewing

transformational change as a continuous process while focusing on enabling and accelerating small in-depth change. Incremental adjustments are not necessarily trivial and can amplify and cumulate into large-scale change, particularly in highly interconnected systems.

Béné et al. (2012) outline different types of resilience to adverse change. They propose an analytical framework, structured around absorptive², adaptive and transformative concepts of resilience, to help clarify what ‘strengthening resilience’ means (Figure 2).

Béné et al. (2012) caution against understanding the framework linearly, e.g., first promoting resistance to change in a period of small disturbance, undergoing adaptation as the disturbance becomes more significant, and transformability when conditions are no longer viable. The linear interpretation ignores how different shocks and stresses can combine, each impacting the system with different relative intensities, at different scales, and each requiring separate or integrated levels of resilience. Following this logic, they recommend interventions that strengthen the three components together, and at multiple levels (individual, households, communities, region, etc).

“the conditions to develop adaptive and transforming capacities are generated (or regenerated) during periods of stability.” (Béné et al., 2012)

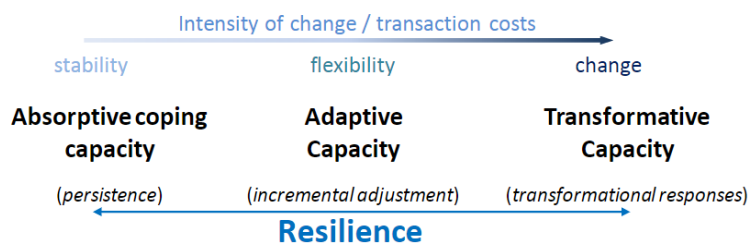


Figure 2 The 3D resilience framework (Béné et al., 2012)

Characteristics of Transformational Change

As there is no clear definition of transformational change we can instead look for characteristics in the literature. Termeer, Dewulf, and Biesbroek (2017) categorises change in three dimensions with descriptions of how that change can be transformational:

- **The depth of change** refers to the level of change.
 - Current practices will be radically changed by altering values, frames, and logics underlying the system.
 - Actors critically reflect on existing assumptions, challenge prevailing norms and interests, and learn to deal differently with climate change adaptation.
- **The scope of change** refers to the scale of that which is to be changed.
 - System-level change (instead of in isolated parts) which is inherently multi-dimensional, multi-component, multi-aspectual, and multi-level.

² The concept of absorptive capacity (or persistence) here describes the various (coping) strategies by which a system buffers the impacts of shocks.

- Change which aims to alter regulatory, legislative, or bureaucratic regimes; financial institutions; and technological or biological systems.
- **The speed of change** refers to the pace of change (which can be experienced differently from different perspectives)
 - Change which is discontinuous or includes revolutionary jumps.

The last dimension (speed) is the most controversial, with many scholars emphasising that transformational change is a slow process. Although, there is great pressure from different spheres (activists, scientists, policy-makers) for rapid responses due to the severity and irreversibility of the current climate and biodiversity crises. Termeer, Dewulf, and Biesbroek (2017) argue that achieving transformational change, which is simultaneously in-depth, large scale and quick is virtually impossible and contend that one can at best, achieve two of the three goals, but only at the expense of the third.

“Quick, in-depth change is only possible at the small scale; ...large-scale, quick changes can only be superficial; and ... in-depth, large-scale changes will take a very long time to materialise.”

Kates, Travis, and Wilbanks (2012) similarly describe three classes of adaptations as transformational those that are adopted at a much larger scale or intensity, are truly new to a particular region or resource system, and those that transform places and shift locations.

Fedele et al. (2019) argue that transformative adaptation, which fundamentally changes systems and addresses root causes of vulnerability, usually has six characteristics:

- **Restructuring:** involves major shifts in fundamental properties, functions, or interactions within the social, ecological, or social-ecological system.
- **Path-shifting:** alters the systems’ current trajectory by pushing it towards an alternative direction.
- **Multiscale:** spans multiple spatial, jurisdictional, sectoral or trophic scales.
- **Systemwide:** occurs at large-scale and leads to systemic changes across whole regions, ecosystems, landscapes, or communities.
- **Innovative:** introduces new functions or states not previously existing in that location thanks to new knowledge, policies, or technologies.
- **Persistent:** leads to long-term impacts, even if not necessarily irreversible.

Lonsdale et al. (2015) built on work by Mustelin and Handmer (2013) and set out the following criteria for transformational adaptation:

- **Framing** as ‘complex’, ‘wicked’³ or ‘super wicked’.
- **Triple loop learning.** Sometimes known as ‘learning how to learn’ (see Figure 3)
- **Scale** of change is system wide or across many systems.
- **Temporal** focus on future, long-term change and uncertainty in the future is acknowledged and built into decision-making.

³ Wicked problems: a class of social problems that are ill-defined and continuously changing; where many actors are involved with conflicting values; and where, because of the high levels of interconnectivity, today’s solutions often turn out to be tomorrow’s problems (Churchman, 1967; Rittel and Webber, 1973; Termeer and Dewulf, 2019)

- **Power** imbalances and the causes of social injustice are addressed to induce a step-change in how the existing system operates.
 - Outcome open ended or uncontrollable (and could be positive or negative).
- **Management of change** is anticipated and planned and includes questioning the effectiveness of existing systems and processes.

Type of Change	Incremental	Reform	Transformation
Type of Learning	Single loop	Double loop	Triple loop
Core question	How can we do more of the same? Are we doing things right?	What rules shall we create? What should the goals be?	How do I make sense of this? What is the purpose? How do we know what is best?
Purpose	To improve performance.	To understand and change the system and its parts.	To innovate and create previously unimagined possibilities.
Power and relationships	Confirms existing rules. Preserves the established power structure and relationships among actors in the system.	Opens rules to revision. Suspends established power relationships; promotes authentic interactions; creates a space for genuine reform of the system.	Opens issue to creation of new ways of thinking and action. Promotes transformation of relationships with whole-system awareness and identity; promotes examining deep structures that sustain the system.

Figure 3 Types of change and learning levels. From Lonsdale, Pringle, and Turner (2015) based on Waddell (2016)

Watkiss and Cimato (2020) surveyed the characteristics of transformational change across the literature and created the summary in Figure 4. They suggest this can applied to assess the impact of adaptation or appraise adaptation options.

Successful transformational adaptation is therefore disruptive, requiring large-scale, long-term and system-wide changes. This means there are numerous and significant barriers to successfully planning and enacting the scale of change required to create or maintain resilient and thriving communities in the face of climate change.

Barriers to transformational change

“To be successful ... transformational changes ... require changes to entrenched systems maintained and protected by powerful interests. There are, consequently, enormous barriers to transformation, rooted in culture and cognition and expressed through economic and social policies, land-use legislation, resource management practices, and other institutions and social practices” (Béné et al., 2012)

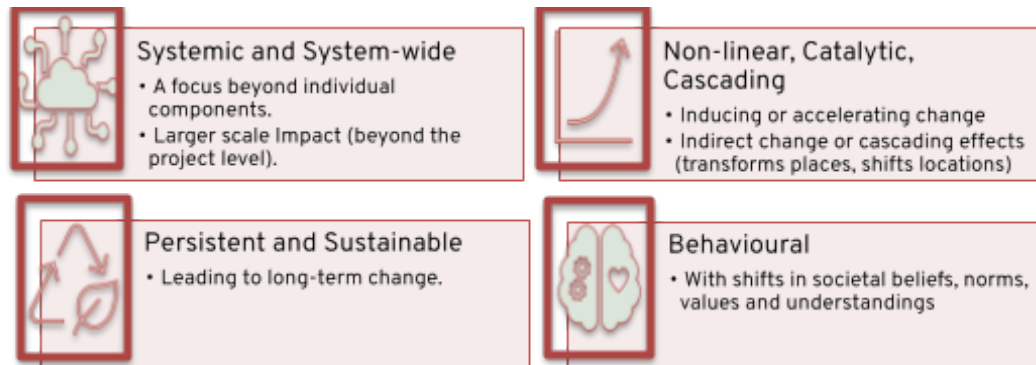
From surveying the literature, Watkiss and Cimato (2020) group barriers to transformational adaptation into four categories: uncertainty; economic and financial; policy, institutional and governance; and social, behavioural and cultural.

Fedele et al. (2019) discuss how coping or business-as-usual strategies, that do not challenge the status-quo, are often favoured over transformational strategies due to:

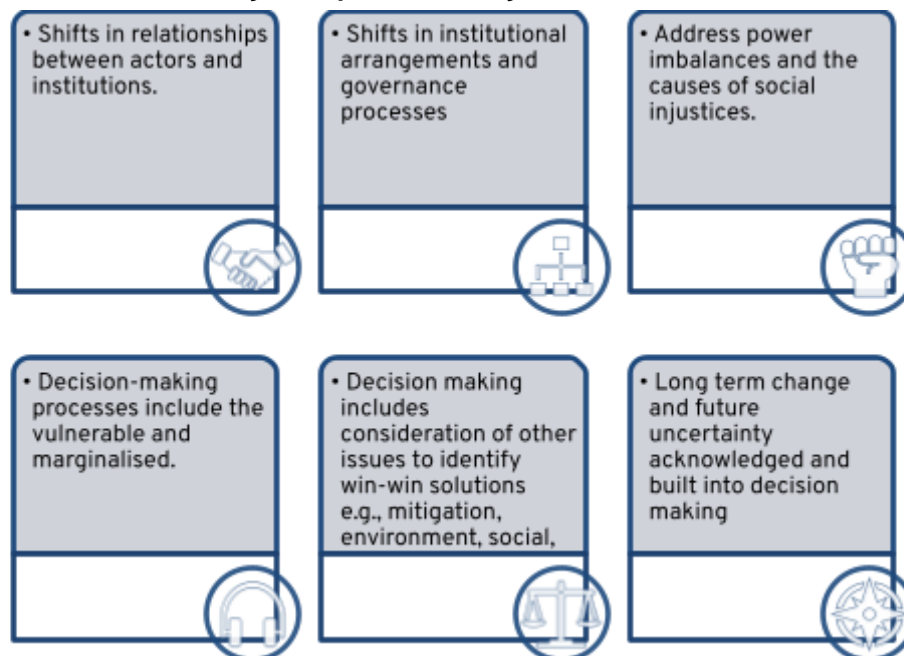
- The particularly high investments that may be required (human, financial, and time)
- The long time needed for the benefits to manifest themselves.
- A lack of familiarity with transformative adaptation, constraining funding structures for such strategies.
- The narrow mandates of the institutions planning these interventions.
- Power imbalances and inequalities mean dominant actors who benefit from the status-quo may be in a position to block such changes.
- The need to involve multiple stakeholders, sectors, and governance levels with potentially different interests.
- The need to reconcile different future visions (e.g. economic growth versus low carbon emissions) and reconnect local service producers with regional or global beneficiaries. (e.g. through fair-trade sustainable food supply chains, water or carbon Payments for Ecosystem Services).
- Complex ethical and distributional questions that need to be clarified prior to its implementation, such as the deliberate choice to support certain values, governance structures and vested interests in particular outcomes.

Deubelli and Venkateswaran (2021) found that many transformative initiatives faced barriers of timelines that were too short to deliver the long-term processes underpinning transformational change or were constrained by tight funding envelopes. Furthermore, many projects that are formally labelled as pilots or experiments are limited in scope (i.e. a squarely practical focus) and embody a passive sense of experimentation rather than embracing iterative processes of experimenting (Bulkeley and Castán Broto, 2013).

Scale, Temporality and Domain of the Change



Characteristics of the Change (Ways of Working)



Impact of the Change

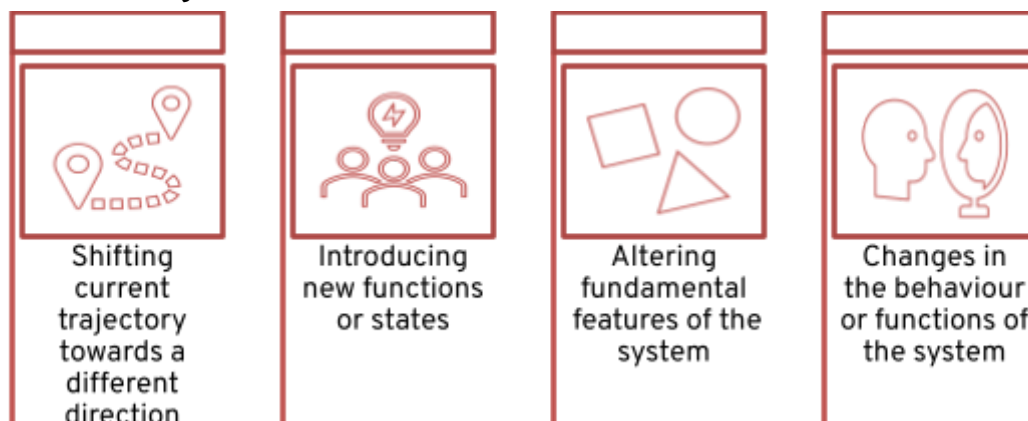


Figure 4 Mapping of the attributes for transformational adaptation (Adapted from Watkiss and Cimato (2020))

Concepts to support transformational change

Missions for Transformational Change

A recent focus in the climate area, including for adaptation, is the use of mission orientated approaches to trigger welcome transformation. Mazzucato, on behalf of the EU, describes missions as a powerful tool to steer economic growth and the European policy agenda by focusing research, innovation and investments on solving critical problems. Critically, she theorises that through spearheading public research and innovation investments in new strategic areas it is possible to awaken private sector investment (Commission et al., 2018).

This approach was adopted by the European Commission in the Interim report of the Mission Board for Adaptation (European Commission and Directorate-General for Research and Innovation, 2020). The ARCADIA project is part of the implementation of this mission.

As the popularity of mission led approaches has grown so have the calls for caution. Larrue (2021) discusses that the effectiveness of such approaches although quite clear in principle (since they correspond to ‘common wisdom’), is still to be proven through evaluations adapted to their systemic nature.

Janssen et al. (2020) discuss shortcomings in the current debate around mission led approaches:

- **A narrow focus on initiating new missions** with a lack of debate or guidance on which mission formulation, mission designs, governance structures and monitoring approaches are appropriate for ensuring missions achieve envisaged results.
- **No consistent view on how missions are conducted or evaluated** which may mean in some cases policy makers may simply be ‘relabelling’ traditional policies.
- **Lack of nuanced views on why and how missions may contribute to transformations**, and how this relates to already present (innovation) policies.
- **What capabilities are needed to deploy missions**, mission orientated approaches imply an emboldened role for the state; there will therefore be tensions between the capacity’s missions demand and the actual competencies which governments have.
- **Structural foundations for missions to succeed may be missing**, as science, technology and innovation systems may not always be prepared, available or aligned with new challenges.
- **Missions may create tensions with the existing rationales and routines of government and industries**, still geared to economic growth and longstanding sectoral imperatives.

Larrue (2021) considered 20 mission-orientated initiative case studies and 4 country case studies and discussed the main opportunities and challenges (see Table 1).

Table 1 Opportunities and Challenges identified by Larrue (2021) for Mission Orientated Innovative Policy

Opportunities	Challenges
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• To assemble and implement consistently diverse ways to engage stakeholders. • To align various policy bodies' plans towards common goals. • To coordinate a wide range of instruments. • To increase and secure commitments of public and private resources. • To manage the interactions between policy instruments, etc. • Provide a coordinated space that is adapted to each challenge and allows for collective decision making on some of the most crucial 'points of tension' in relevant policy.	• Engaging citizens in the mission definition. • The design of an orientation process that is inclusive but without leading to an inflation, broadening or dilution of ambitions. • Leaving some space for non-technological solutions. • The active involvement of sectoral ministries that are directly related to the societal challenges. • The practical articulation of supply-push and demand-led policy instruments. • Pursuing disruptive scenarios while relying on some established institutions and communities. • The development of evaluation procedures and methodologies that are suited for systemic policies.
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Larrue (2021) also breaks mission-orientated approaches into three main dimensions: strategic orientation, policy co-ordination and policy implementation. To support the effective delivery of such approaches, they developed necessary design principles for their success (see Table 2).

Burkett (2023) discusses the value of challenge-led innovation but highlights that there are critical differences between challenges such as the climate crisis, and the often-used example of the Moonshot. The action and innovation required to address an issue like climate change are more than technical or even technological. Wittmann et al. (2022) distinguish 'Accelerator' from 'Transformer' Challenges.

- **Accelerator Challenges:** For technical challenges like the moon landing, we can organise actions like governance, leadership, and project activities in very structured ways. For example, agreeing on the goal, aligning actions to this goal, and measuring progress according to targets and related indicators.
- **Transformer Challenges:** For complex challenges, like plastic in the oceans, where change requires fundamental shifts in human behaviour, values, norms, and culture, we need to organise in ways that are less 'structured' and more 'networked'. Leadership may be distributed, and coherence is more important than coordination.

Larrue (2021) lists key barriers to Mission Orientated Innovation Policy that include how several countries are now struggling with how to scale them up and integrate them in the broader strategic and policy framework. This requires not only a capacity to learn from these experiments and reflect this knowledge into existing or new initiatives (reflexivity), but also a high-level political commitment.

Table 2 Mission Orientated Innovation Policies (MOIP) 'design principles' (adapted from Larrue (2021))

MOIP Dimension (and main task to be achieved)	Definition of MOIP feature
Strategic Orientation <i>Informing and selecting specific societal challenge(s) and strengthening legitimacy of focused policy intervention towards clear and precise objectives</i>	Legitimacy A consensus is found among a wide range of stakeholders (including citizens) regarding the need and relevance of the mission.
	Directionality The policy is guided by clear and well-informed orientations and strategic guidance formalised in a mission
	Intentionality Specific and well-articulated need-based goals, with clear timeline and milestones, are derived from the mission
	Flexibility The targets and means of intervention to meet them can be revised at different stages of the process when needed.
Policy co-ordination <i>Coordinating the strategies and activities of the different institutions involved in the policy</i>	Horizontality The plans and activities of policy bodies covering different policy fields are coordinated to achieve the policy.
	Verticality The plans and activities of policy bodies at different levels of government are coordinated to achieve the mission
	Intensity The decisions regarding the intervention (objectives, modalities, level of resources) are taken collectively by the involved policy bodies and are binding to them
	Novelty The plans and activities of different policy bodies and stakeholders are co-ordinated (e.g., via a portfolio approach) to cover and experiment various alternative solutions to achieve the mission.
Policy implementation <i>Ensuring the consistency and effectiveness of the modes of intervention and resources of the public and private partners which have been mobilised to achieve the policy objectives</i>	Policy mix consistency The policy encompasses a diverse and consistent set of policy interventions (technical, financial, regulatory, etc) to support different disciplines, sectors, areas and markets, across the innovation cycle, as needed to achieve the mission.
	Fundability Public and private stakeholders involved in the different facets of the initiatives (phases of the innovation process, sectors, markets, etc.) are mobilised to commit resources for the achievement of the mission.
	Evaluability The policy is endowed at the outset with input and output indicators as well as evaluation procedures adapted to its systemic nature, in order to assess its results and learn from its implementation in view of continuous improvement.
	Reflexivity Evaluation and monitoring results are used to inform decision-making and reform the initiative (revision of objectives, adaptation of governance and operating procedures, etc.) as needed to achieve the mission.

Spheres of Transformation

To address the complex problems of climate change and the biodiversity crisis, Chan et al. (2020) describe the need to move beyond merely focusing on the direct drivers of change (i.e. processes directly affecting nature, land/sea use change, exploitation etc.) to indirect drivers (including formal and informal institutions, such as norms, values, rules and governance systems). To do this, they argue it is necessary to consider both leverage points

(where to intervene to change social–ecological systems) and levers (the means of realising these changes, such as governance approaches and interventions).

Similarly, O’Brien (2018) discusses the need to consider three spheres of transformational processes (Figure 5):

- **The practical sphere** represents specific actions, interventions, strategies and behaviours that directly contribute to a desired outcome.
- **The political sphere** represents the systems and structures that facilitate or constrain practical responses to climate change.
- **The personal sphere** represents the subjective beliefs, values, worldviews and paradigms that influence how people perceive, define or constitute systems and structures, as well as their behaviours and practices. This sphere represents both individual and shared understandings and assumptions about the world, which influence perceptions, interpretations and constructions of reality.

The practical sphere has been the primary focus of most climate change mitigation and adaptation research, policies and actions. O’Brien (2018) suggests this is due to technical and behavioural interventions producing results that can be measured, monitored, and evaluated. However, transformations in the practical sphere are often easier to identify and develop than to implement at scale, as they face a range of barriers associated with the political and personal spheres.

Wamsler and Osberg (2022) apply these three spheres when assessing why there has been limited success in translating climate mainstreaming (the process of integrating climate change considerations across all sectors and levels) into policy outcomes and radical transformational change. Similarly to O’Brien, they suggest this is due to a focus on isolated, highly tangible successes which constitute essentially weak leverage points.

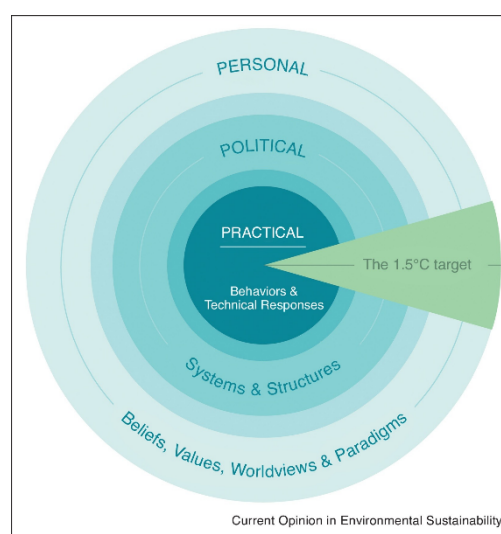


Figure 5: The three spheres of transformation (O’Brien, 2018).

When discussing such leverage points, they refer to the work of Meadows (2015) who identified 12 leverage points for transformation ranging from ‘weak’ or ‘shallow’– where

interventions are relatively easy to implement but bring about little change – to ‘deep’- where interventions are more difficult but can result in transformational change. The former weak points often consider the inputs and outputs of a system. The latter leverage points consider the goals and paradigms which define the system. Much has been built on the leverage points Meadows highlighted, including how they relate to the three spheres of change (Figure 6).

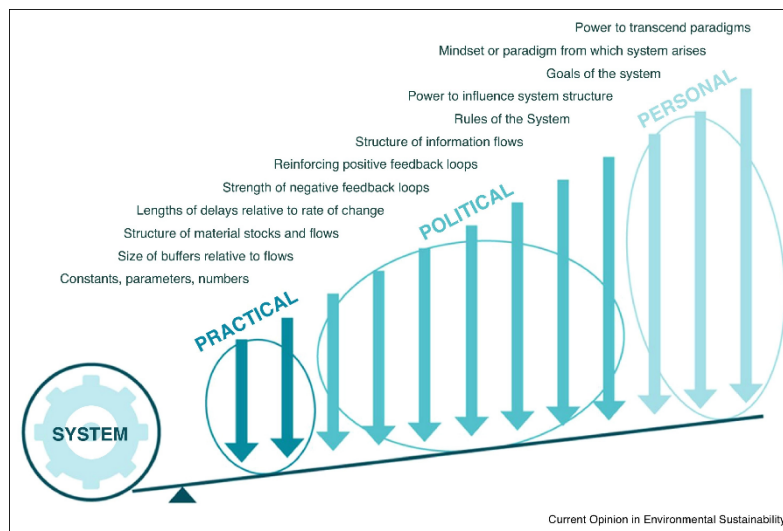


Figure 6 From O'Brien (2018), *Leverage points for systems change based on Meadows (2015)*

To fully utilise NbS to help solve the climate and biodiversity crises, Seddon et al. (2020) also discuss the need to consider deeper leverage points and argue that a paradigm shift in economic thinking is required. From a focus on infinite economic growth to a recognition that the energy and material flows needed for human wellbeing must remain within planetary boundaries.

To achieve change, Wamsler and Osberg (2022) state that the mainstreaming of adaptation must go beyond its traditional focus on the weaker leverage points at the practical level and expand to simultaneously occur at the institutional, collective and personal level. They recommend undertaking six simultaneous strategies:

- Practical Sphere: Local level
 - **Strategy I - Add-on mainstreaming:** Establishment of specific on-the-ground projects outside of the organisations core work to directly address climate change at the local level.
 - **Strategy II - Programmatic mainstreaming:** Integration of climate change considerations into core work to modify existing measures and reduce or avoid exacerbation of climate risk.
- Political Sphere: Systems/structures at institutional level
 - **Strategy III - Organisational mainstreaming:** Modification of the organisation's management, policy, legislation, working structures, internal education and tools to insure the integration and institutionalisation of climate adaptation at the local level.

- **Strategy IV – Internal mainstreaming:** Modification of the organisation’s way of operating and its internal policies to reduce its own risk and ensure its continuous functioning in a context of increasing climate change.
- Political Sphere: Systems/structures at inter-institutional level
 - **Strategy V – Inter-organisational mainstreaming for risk governance:** Promotion of collaboration between the organisation and other stakeholders to generate shared knowledge, develop competence and take joint action.
- Individual and Collective/Cultural Sphere: Internal or personal level
 - **Strategy VI – Educational mainstreaming:** Support for a conceptual shift in the philosophy that drives relevant education and stewardship. The aim is for climate change considerations to be inherent to all sectors, disciplines, and spheres of knowledge.

The Small Wins Concept

Weick (1984) argued that the massive scale on which social problems are conceived often diminishes the quality of thought and hinders innovative action. Decision makers are often paralysed by the complexity of wicked problems and the magnitude of the change that is required. He developed the concept of small wins which are like *“miniature experiments that test implicit theories about resistance and opportunity and uncover both resources and barriers that were invisible before the situation was stirred up”* (Weick, 1984).

Termeer and Dewulf (2019) discuss how the concept of small wins can help us tackle wicked policy problems. They introduce a small wins evaluation framework which is rooted in theories on sensemaking, continuous change and incrementalism.

- **Sensemaking:** a socially interactive process by which actors make their world logical and meaningful through talking and acting (Weick, 1995). *“Sensemaking ... is an active process in which actors enact their environment, isolating elements for closer inspection, probing some activities, seeing what responses that attracts, and seeing how people react, deepening their insights.”* (Termeer and Dewulf, 2019)
- **Continuous change:** builds on the idea that organisations are continuously adapting, learning and improvising through small steps. Suggesting that although change can be relatively small it does not mean that it is trivial in the long term.
- **Incrementalism (or muddling through):** *“continually building out from the current situations, step by step and by small degrees”* (Lindblom, 1989). Lindblom’s method was a response to what he perceived as unrealistic expectations of making rational, comprehensive decisions when dealing with complex problems and widespread conflicts over values.

Termeer and Dewulf (2019) argue that as the risks associated with taking a small step forward are modest, the process allows decision makers to embrace ambiguity, uncertainty, and interconnectedness. This can encourage an experimental approach, a readiness to start acting before analyses is complete and a greater acceptance of failure. There is also less likelihood that small steps will stir up political resistance.

Termeer and Dewulf (2019) developed an evaluation framework to support making progress on wicked problems through the concept of small wins. The framework consists of 3 steps:

1. **Identifying and valuing small wins** (Table 3). It is important to recognise such changes as otherwise they will never become institutionalised.
2. **Analysing whether the right propelling mechanisms⁴ are activated** (Table 4) such that a small win can accumulate and scale up, broadening and deepening its contribution.
3. **Organising that results feed back into the policy process** where they in turn enhance further acceleration of small wins through activating the amplifying mechanisms. If evaluators do not recognise and appreciate small wins, they run a great risk of discarding the most creative innovators and the best innovations.

Table 3 Characteristics and indicators of small wins, adapted from step 1 of Termeer and Dewulf (2019), and the contra-indicators (what should be avoided).

Characteristic (Explanation)	Indicator	Contra-indicator
Concrete Outcomes (Only when people have implemented an activity does it become a lived experience on which they can jointly reflect.)	Visible results	Promises and ideas only
In-depth Changes (In-depth or second-order change aims to radically change these practices by altering values, frames and logics underlying them. Whereas superficial or first-order change means improving current practices within the existing logic.)	- Second- and third-order change - Radical new practices	- More of the same - Quick Wins - Low hanging fruit
Moderate Importance (Acting at the smaller scale allows people to effectively meet complexity and turbulence. In complex non-linear systems change is only small within a short period of time because it can accumulate.)	- Micro or local level - Intermediate (or even the seeds for transformative change)	- Large scale - Best practice (improvement is always possible)
Positive Judgement (This is the most difficult element of small wins because it depends on the values attached to them, which differ from actor to actor and change over time. Not all steps qualify as small wins and could also constitute as small losses.)	- Improvement - Step forwards - Related to shared ambition	Small loss for many actors

⁴ Propelling mechanisms: chains of events that reinforce themselves through feedback loops with an amplifying effect on an initial small change so that it becomes larger and stronger, or intensifies and escalates its consequences (Termeer and Dewulf, 2019)

Table 4 Propelling Mechanisms, adapted from step 2 of Termeer and Dewulf (2019).

Propelling Mechanism	Indicators	Impact
Energising	• Energy and enthusiasm • Empowerment	The concrete outcomes and visible results of a single small win provide actors with a feeling of success, the conviction they can make a difference and encouragement to take the next step. Several small wins can propel positive virtuous cycles of hope, faith, optimism and confidence.
Learning by doing	• More than one experiment • Learning outcomes guide new experiments • Experimenting also continues after disappointing and unexpected outcomes	Each step will result in outcomes that will inherently present and expand notions of what is possible and worth trying. Each attempt to achieve a small win (whether successful or not) might activate learning by doing because the visible outcomes provide quick feedback on the effectiveness of actions, insights into how systems are reacting and encourage reflection on personal and other belief systems. Surprising or disappointing results may propel iterative learning cycles - particularly if people have the capacity and encouragement to reflect-in-action.
Logic of attraction	• Other communities know and value wins • Additional resources	The logic of attraction mechanism means that resources tend to flow towards winners. This results in an accumulation of small wins not only because small wins may attract new allies and new resources, but also because they discourage the usual opponents.
Bandwagon	• Highlighting and celebrating wins	Small wins may inspire others to see more concretely what an alternative way of organising would look like, and they may imitate or adopt it. If small wins occur at the same time in different places, they may become part of a broader movement for transformative change, and there is no way to stop such an infectious pattern. Can be activated if small wins are publicly acknowledged and celebrated.
Coupling	• Connections with problems or aims from other policy domains	Small wins may also accumulate when they combine with other events across boundaries of policy systems and scales. In loosely coupled systems, a seemingly insignificant event in one part of the

	• Connections across scales	system can set off chain reactions and generate cumulative effects in other parts.
Robustness	• Numerous • Non-stoppable • Internalised behavioural change • Examples of resisted opposition	The robustness mechanism means that, when small wins become numerous, they may be more likely to result in sustained change or desired path dependencies. Most small wins start out fairly quiet and so are less prone to premature termination. In due time, people may gain confidence in the positive effects leading to widespread acceptance. The moment they become visible to opponents the point of no-return is reached, meaning they have become too numerous or are already legitimised or institutionalised in new practices.

The Three Horizons Approach

The Three Horizons practice is a hands-on approach which is often facilitated through conversation and sense-making with diverse stakeholders (Sharpe *et al.*, 2016). The Three Horizons framework includes three lines where each line represents a system or pattern in the way things are done (e.g., the use of certain kinds of technology, the values of a society).

- **The first horizon:** This represents the way things are done now, generally called “business as usual”. This is linked to a managerial mindset, which keeps things going in familiar ways. The starting point of a three-horizon discussion is a recognition that this horizon pattern is losing its fit with emerging conditions.
- **The third horizon:** This represents the emerging pattern that will be the long-term successor to the current first horizon. It is appearing and growing on the fringes of the present system. This is linked to an entrepreneurial orientation that seizes opportunity. Although some dominant pattern will eventually emerge, in the process of developing a three-horizon map, many different views of the future will be present and contested.
- **The second horizon:** This is the turbulent domain of transitional activities and innovations that people are trying out in response to the changing landscape between the first and third horizons. This is a visionary outlook that holds an imagined future in mind and steers toward it.

When the Three Horizons framework is applied as a process the following steps are advised:

1. Examine present concerns – why does the current way of doing things no longer seem to fit with emerging conditions?
2. Explore future aspirations – what visions, aspirations and possibilities exist for the new reality which could replace the existing horizon?
3. Exploring inspirational practice in the present – what concrete examples exist of new practices in the current system?
4. Innovations in play – what innovations are occurring in response to failings in the first horizon and possibilities of the third? The outcomes of many of these disruptive innovations are not clear.

5. Essential features to maintain – what will persist or should be kept from the old practices of working?

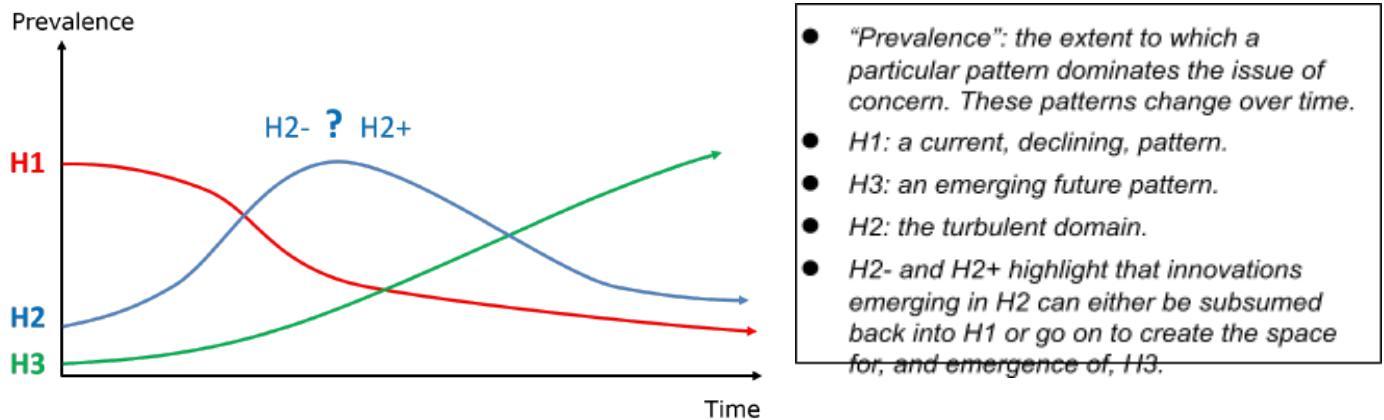


Figure 7 The Three Horizons (Sharpe et al., 2016).

Sharpe et al. (2016) argue that the Three Horizons provides a simple structure for working with complexity while avoiding deep and inhibiting dialogue around concepts like transition, resilience, or transformation. They suggest the approach can support consideration of:

- **Development of future consciousness:** participants are helped to situate the present moment in relation to the future. The approach helps different actors to move away from one mindset to considering the three different perspectives.
- **Distinguishing between incremental and transformative change:** participants begin to recognise that the first horizon is not static, and that dominant pattern(s) of activity are actively maintained and reproduced by social processes. Participants are helped to appreciate how active processes of innovation can often help maintain and reinforce current systems in ways that can limit change.
- **Making power explicit:** discussion can help participants to identify how different actors can most usefully influence change and what other actors they might need to work with. In addition, participants can explore whether or how a society is organised to manage the processes of emerging change.
- **Exploring the management of transitions:** Discussing the 1st horizon brings out the initial scoping of the issue and what is motivating the need for change, discussing the 3rd horizon allows participants to drop assumptions and instead explore a wide range of possibilities. The exploration of the 2nd transition horizon enables discussion to focus on managing the transition. Two methods to explore the transition are:
 - Considering whether innovations will lead to the third horizon (H2+) or prop up the existing structures (H1-).
 - Dilemma thinking – moving from H1 is “bad” and H3 is “good” to viewing them as two competing sets of values that must both be respected e.g., a business needing to optimize current processes while investing in innovation for future revenue. Dilemmas are constantly “resolved” through experimentation, feedback, learning and creative innovation.

- **Framework for dialogue among different actors – the three “horizon” voices:** participants become aware of the value and role of each of the horizons and their associated mindsets, and this greatly reduces many sources of tension and conflict.

Creating an Enabling Environment for Transformational Change

In this section, we have surveyed the literature on what enabling actions can best ensure the success of transformational change to better understand how ARCADIA can support regions transition to resilience.

Taking a systemic, participatory approach

Tackling ‘wicked’ problems means actively promoting change across interconnected activity spheres, landscapes and scales. To do this successfully, actors must understand the systems involved and the dynamic interrelationships and interdependencies between the key elements of the human and natural systems. Supporting transformational adaptation requires the capacity to inquire into a system of interest, to understand the history of that system and challenge the assumptions that underpin existing structures and ways of doing things (Lonsdale, Pringle and Turner, 2015).

The literature has a strong consensus that creating transformational and system-wide change which is likely to succeed and produce positive change requires working in more collaborative ways and employing innovative governing strategies Fedele et al. (2019), , Termeer, Dewulf and Biesbroek (2017)). The methods described in the literature to support this include:

- engaging with multiple levels of governance. Particularly, bottom-up governance that is grounded in local contexts and engages local stakeholders.
- fostering multi-stakeholder and cross-sectoral relationships.
- creating cross-scale partnerships to implement transformative adaptation.
- considering entire commodity chains (from producers to consumers).
- prioritising governance interventions that can encourage learning, questioning of mind-sets, leadership, and co-production.

In the context of innovation, governance is focused specifically on how we engage in, share and make decisions about sense-making, learning and directionality in generating momentum towards some kind of goal (Burkett, 2023).

Effective leadership and sufficient financing

Successfully planning for and implementing change which is transformational often requires securing the political and financial backing that accepts the often-substantial time and resource this will take (Fedele et al., 2019). People in positions of leadership require the capacity to invest time and resources in shorter term planning while maintaining an awareness of the bigger picture and future needs (Lonsdale, Pringle and Turner, 2015)..

Effective Leadership

Burkett (2023) argues that for mission-orientated innovation policy both centralised hierarchical leadership and distributed leadership are required to support effective

transformations. Strong political power and singular charismatic leaders can catalyse momentum while distributed power supports the capacity to grow and share collective learnings and action.

Lonsdale, Pringle and Turner (2015) suggest that effective leaders enable transformation through developing and communicating visions; encouraging followers to think differently and challenge existing practices; legitimising and giving value to new ways of thinking, behaviour and organisation; and mobilising support for change.

Fedele et al. (2019) recommend committing time to identifying leaders and key agents to promote deep social change as well as what power dynamics exist that might prevent its implementation.

Securing Sufficient Financing

Committing sufficient finance and resources to initiatives designed with transformational change in mind is essential (Deubelli and Venkateswaran, 2021). Implementing transformational change requires both mobilising finance and resources at scale and raising, deploying and repaying the associated capital. This includes not only public investment, but also a convergence of finance and investment that can support both top-down and bottom-up innovation at scale (Burkett, 2023).

Path-shifting using an experimental, learning approach

The complexity of the problems we are facing means that there is rarely a clear route forward. A flexible approach that encourages experimentation is therefore required which can help to minimise ineffective adaptation and expand progressively successful strategies. This can be supported by:

- Establishing frameworks for phased, long-term programs that foster learning through monitoring and evaluation throughout the project cycle but also include provisions for long-term evaluations (Deubelli and Venkateswaran (2021), Fedele et al. (2019)).
- Facilitating multi-loop learning approaches that question current world visions (including assumptions on dominant values, rules, practices) and open opportunities for alternative adaptation (Fedele *et al.*, 2019).
- To be present and notice things, to cultivate uncertainty and identify positive change and what has helped to produce it. To magnify such changes as well as learning from those actions and how they can be replicated and institutionalised (Lonsdale, Pringle and Turner, 2015).

Lonsdale, Pringle and Turner (2015) recommend facilitating the learning process to ensure it provides sufficient challenge (through incorporating dissonant information or opposing views) and support (to encourage wide participation to include seldom heard and disparate voices).

Capacity and capability (knowledge, data, skills)

To successfully plan and implement change, regions require the skills and knowledge to undertake the necessary tasks. This can be enabled by the following:

- Investing in research and experimentation on new adaptation options, including transformative adaptation (Fedele *et al.*, 2019).
- Setting up learning and knowledge platforms (Deubelli and Venkateswaran, 2021).
- Developing and honing of a variety of capabilities, but also the institutional infrastructures for cracking open capacities so that these capabilities can be applied and iterated. Such capabilities may be dynamic, emergent and trans-disciplinary and potentially not as valued as traditional skills (Burkett, 2023).

Behavioural Change

Transformational change requires us to think and work in new and different ways. It often involves using novel approaches, collaborating with unfamiliar partners and accepting uncertainty. When successes (or failures) are identified it is important that they be contextualised and communicated to inspire and help others to create (or avoid) similar change. Learnings from pilots and other actions can be scaled-up if meaningful changes can be institutionalised and mainstreamed. This can be supported though:

- Engaging with bridging organisations to facilitate sharing of knowledge that increase awareness on behavioural changes for transformative adaptation.
- Institutionalising new practices and regulatory frameworks (Fedele *et al.*, 2019).
- Seizing windows of opportunities, such as extreme climate hazards, political reforms or new technologies to revise strategies (Deubelli and Venkateswaran, 2021).

The support of others can be gained through creating and communicating compelling narratives, drivers or objectives that:

- align with strategic government priorities to harness and foster political will and moment (Deubelli and Venkateswaran, 2021).
- engage stakeholders whilst also cutting across political and sectoral divides (Burkett, 2023).

Designing Nature-based Solutions to be Transformational

Defining Nature-based solutions

Nature-based solutions (NbS) are defined by the European Commission (EC) as “solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions”(European Commission, 2022).

In their review of NbS literature, Sarabi *et al.* (2019) discuss how the EC definition is one of two common categorisations of NbS:

1. **NbS are solutions to major societal challenges while improving natural capital and biodiversity.** This group conceptualises NbS as actions that are designed to conserve and restore nature, placing biodiversity at the heart of the NbS concept.

2. **NbS are solutions which meet environmental, economic and social objectives simultaneously.** This group (including the EC definition) is broader, conceptualising NbS as solutions that provide benefits to the environment and humans simultaneously rather than focusing on nature conservation and restoration.

NbS encompass a wide range of actions such as the protection and management of natural and semi-natural ecosystems, the incorporation of green and blue infrastructure in urban areas, and the application of ecosystem-based principles to agricultural systems. NbS vary in three important ways, which influence the range of benefits that they provide for people (Seddon *et al.*, 2020):

1. They cover a spectrum of interventions from protecting or restoring diverse natural ecosystems to creating new managed or hybrid ‘grey-green’ approaches.
2. They vary in the extent to which they support biodiversity, which in turn affects their resilience, i.e. their capacity to resist and recover from perturbation and maintain the flow of ecosystem services.
3. They differ in how much they are designed and implemented by local communities.

The Use of NbS in Climate Adaptation

In 2022, NbS were for the first time included in the United Nations Conference of the Parties (COP 27) decision text that “encourages Parties to consider, as appropriate, nature-based solutions or ecosystem-based approaches, taking into consideration United Nations Environment Assembly resolution 5/5,31 for their mitigation and adaptation action while ensuring relevant social and environmental safeguards” (United Nations Environment Assembly, 2022).

In addition, the EU Strategy on Adaptation to Climate Change, issued in February 2021, specifically highlights NbS as a cross-cutting priority area to support the further development and implementation of climate adaptation strategies at all levels of governance (EC, 2021).

Scolobig *et al.* (2023) identified that while often, explicitly or implicitly, NbS are presented as enabling transformative adaptation it is not clear how they support this. In their paper, they propose a framework for assessing transformative change through four key elements of government-financed adaptation investments: vision, planning, interventions, and institutions.

Their assessment of different NbS case-studies found that none of the cases fulfilled all the characteristics identified in the literature as being key to obtaining transformative gains. In particular, the cases revealed little intent to scale the NbS, for instance, through duplication, enabling legislation and more permanent institutions. However, transformative visions, planning, and interventions emerged throughout the NbS policy deliberations, and some characteristics are present in all the NbS projects included in the study.

Seddon et al. (2020) argue that NbS benefits will not be realised unless they are implemented within a systems-thinking framework that accounts for multiple ecosystem services and recognises trade-offs among them from the perspectives of different stakeholders. Notably, “NbS will only deliver these benefits if they are specifically designed to do so.”

Palomo et al. (2021) provide a conceptual framework to assess NbS under a transformative change lens and apply it to 93 NbS from mountain social-ecological systems (Figure 8). The majority of NbS they assessed contained four elements linked to transformative change: nature’s values, knowledge types, community engagement, and nature management practices.

Egusquiza, Cortese and Perfido (2019) discuss how the complexity and novelty of NbS allows the deployment of innovative approaches and new ways to address old problems as well as more inclusive practices.

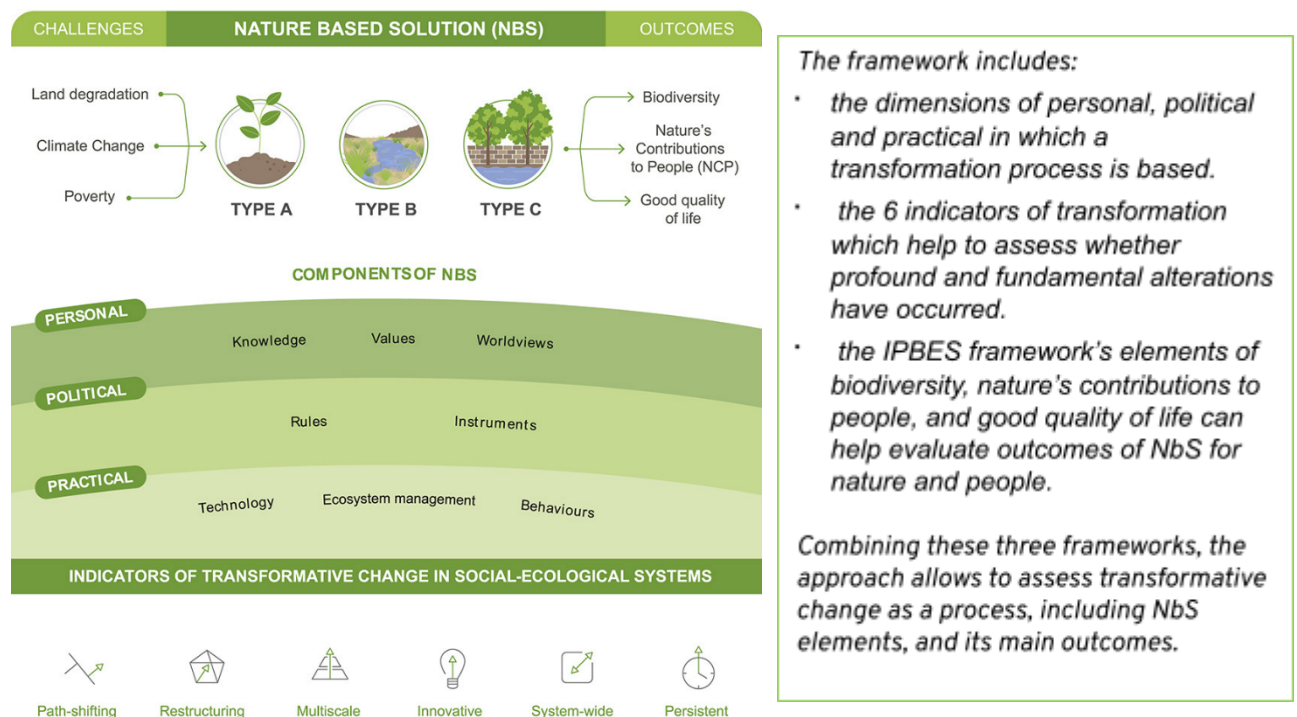


Figure 8 From Palomo et al. (2021), the ‘three spheres of transformation’ framework,

From reviewing literature on NbS, Sarabi et al. (2019) analysed and summarised six major barriers to the successful development and uptake of NbS:

1. **Uncertainty regarding implementation process and effectiveness of the solutions.**
 - a. There is a lack of comprehensive information regarding the creation, implementation and management of NbS.
 - b. There is a dearth of evidence regarding NbS effectiveness across spatial and temporal scales.

- c. The body of knowledge on NbS remains largely academic with limited diffusion which has negatively affected acceptance by the public.
- 2. **Inadequate financial resources.** Specific funding opportunities to facilitate the implementation of NbS are limited.
 - a. Many of the co-benefits associated with NbS can be realized only in the long-term whereas funding schemes tend to be short-term.
 - b. Municipalities have limited resources and sole reliance on governmental resources places a great deal of pressure on these institutions.
 - c. Poor financial models and flawed approaches to economic appraisal have led to under-investment in NbS. A key problem is that many of the benefits cannot be capitalised by any one party or organisation (Seddon *et al.*, 2020).
- 3. **Path Dependency.** Decision makers are confined by past experiences and beliefs and are accustomed to using grey infrastructure for addressing challenges and enhancing the built-up areas for the purpose of economic growth. Changing mindsets therefore depends on changing individual and societal behaviour.
- 4. **Institutional fragmentation ('sectoral silos').** Different departments usually work in line with their own vision, legal frameworks and procedures, and use their own sectoral language. Departments also have defined fields of duty and restricted responsibilities. NbS may not fit easily into these existing decision-making structures and the split among responsibilities can cause confusion about who is the owner, and who should operate and maintain the NbS in the long-term.
- 5. **Inadequate Regulations.** Existing regulation has often been developed for grey infrastructure without considering the principles of ecosystem protection.
- 6. **Limited space (land) and time.** NbS often require more land and time to provide the expected benefits than conventional grey infrastructure approaches.

Kabisch et al. (2016) discuss the last point on the clashes of short-term action and longer-term goals in more detail:

- **Disconnect** - the short-term decision-making and policy cycles of city administrations do not accommodate the planning, implementation and maintenance processes of NbS which can take many years. New political cycles also bring new policy objectives which may challenge the long-term goals of NbS.
- **Discontinuity** - research projects often only last for a few years. This can lead to a lack of focus on implementation and maintenance after the project and related funding end and little monitoring of the impacts NbS have over time.

Egusquiza, Cortese and Perfido (2019) surveyed different governance models and found collaborative, multisector, polycentric and adaptive governance models addressed a significant number of previously identified cross-domain barriers when implementing NbS.

Models supporting transformational change

The climate or biodiversity crises are often described as 'wicked' problems requiring novel, often insufficiently tested, multi-disciplinary approaches. Difficult decisions must be made based on incomplete data both in the here and now (e.g., inadequate vulnerability

assessments, untested solutions) as well as uncertain predictions of how the climate but also society and our natural world will change in the future.

To support policy makers in responding to the climate crisis there are an expanding number of process guidance tools. Such tools generally provide a guide to first understanding the problem and relevant systems and then include recommended steps to design and implement meaningful solutions. The tools are often based on a mixture or all the following concepts: inclusion of diverse perspectives through participatory processes; clearly defined goals obtained through visioning; iterative approaches that improve through evaluation and learning; flexible adaptive pathway approaches that account for adaptation limits; assessment of the barriers (or limits) to adaptation; the use of systems thinking; and an emphasis on social transformation and governance. Due to the complexity in realising such concepts, a concern is to what extent the tools embody such principles rather than include them as an add on.

In this section, several of these tools are discussed and their processes are compared to aid in understanding their approaches, synergies and differences. Where available we have included reviews and perceptions from other sources. Unfortunately, due to how recently many of these tools have been developed and the delay until impact is seen and understood there is relatively little literature on their effectiveness.

The comparison of such tools is made difficult by a lack of clear academic methodology justifying their approach. They have often been created through the experience of practitioners as part of adaptation projects. In addition, they are also likely to be updated as new evidence or experience comes to light.

Dynamic Adaptive Policy Pathways

Dynamic Adaptive Policy Pathways are designed to help policy makers develop adaptive strategies under deep uncertainty (Haasnoot, Warren and Kwakkel, 2019). The approach merges two overlapping and complimentary concepts: adaptation pathways (Haasnoot et al., 2012 and Dynamic Adaptive Approaches (Walker, Rahman and Cave, 2001). The resulting approach aims to effectively anticipate and respond to a changing climate by combining low-regret short-term actions with long-term options to adapt if or when the risk magnifies. Due to its age, this method has been trialled and so more thoroughly evaluated than other methods. The Annex (Section 8.4.4) contains more detailed information on this model.

A UK Environment Agency Report from 2021 includes a review of the literature on adaptation pathways and analysis of case studies where the methodology has been used. They discuss challenges in developing adaptation pathways:

- Understanding uncertainty around future projections.
- Navigating the complexity in designing adaptation pathways which requires:
 - o clear objectives that are often set by a variety of stakeholders.
 - o expertise in the field of studied impacts including how to identify tipping and trigger points.

- Overcoming a traditional short-term focus around decision-making
- The lack of human and institutional capacity for flexibility. Current planning frameworks are often designed to promote static and time-bound planning and legal instruments. There is limited possibility for enforcing future action in adaptation pathway plans.
- Securing wider institutional commitment and support

The UK Environment Agency, 2021 recommends that policy makers provide “a clear, long-term strategic vision that supports adaptive planning, including governance procedures and financial backing”.

The DAPP process (Figure 9) includes involving a participatory approach in framing the problem. Clearly highlighting the importance of stakeholder engagement. However, the approach does not detail on how or to what extent stakeholders should be involved.

The methodology for adaptation pathways is more developed for slow onset hazards (for example, sea level rise). Further research is needed on applying this approach to rapid onset or stochastic (random) hazards such as surface water or pluvial flooding. This is because flexible decisions are challenged under rapidly changing prevailing conditions (both frequency and severity).

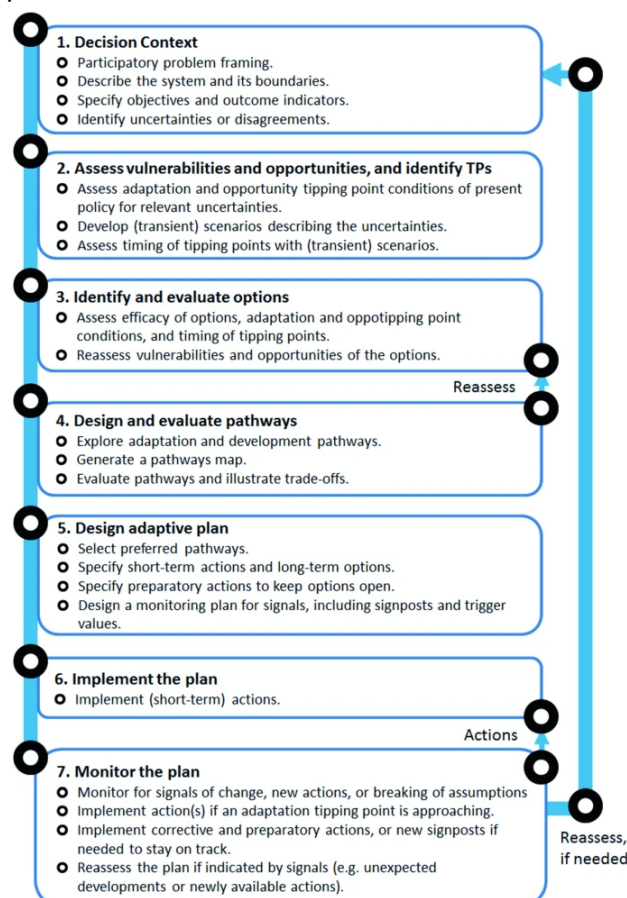


Figure 9 DAPP approach (Haasnoot et al. 2019)

The Regional Adaptation Support Tool

[The Regional Adaptation Support Tool \(RAST\)](#) was designed by Climate ADAPT and released in June 2023 to help local and regional authorities with climate change adaptation strategies and plans. RAST provides practical guidance in 6 steps (Figure 10) aligned with the key features of climate adaptation policy processes. The tool provides case studies and examples to support users.

The RAST tool aims to support regions ensure their climate adaptation plans are: i) sustainable, ii) evidence-based, iii) place-based, iv) inclusive and socially just, v) monitored, evaluated and continuously improved and vi) flexible and iterative.

The RAST tool does not include explicit enabling conditions and as such has less focus on the levers of change in the personal category. The tool advocates a learning and iterative approach, however due to the step-by-step nature struggles to embrace this fully. The Annex (Section 8.4.2) includes the detailed steps of this model.



Figure 10 The 6-steps of Regional Adaptation Support Tool

NetZero Cities is part of the H2020 program, supporting the EU Mission “100 Climate-Neutral and Smart Cities by 2030”. [The Climate Transition Map](#) (Figure 11) is designed to support city regions accelerate decarbonisation through a transformational, systemic and iterative approach. The Climate Transition Map includes a focus on creating an ecosystem which will encourage change and prioritises building a strong mandate at different levels of government. Annex 2 (Section 8.4.3) includes the detailed steps of this model.

The journey includes six stages from building a strong mandate for change to making that change the new normal. Regions can join the journey at any point and the map is designed

circularly to indicate that the stages should be regularly revisited, and plans revised. NetZero Cities advocates for an experimental approach due to the novelty of what is being attempted. The framework of the journey (by including the ecosystem activation and other circles) provides a conceptual improvement on tools which contain simply a step-by-step guide.

The NetZero Cities Climate Transition Map

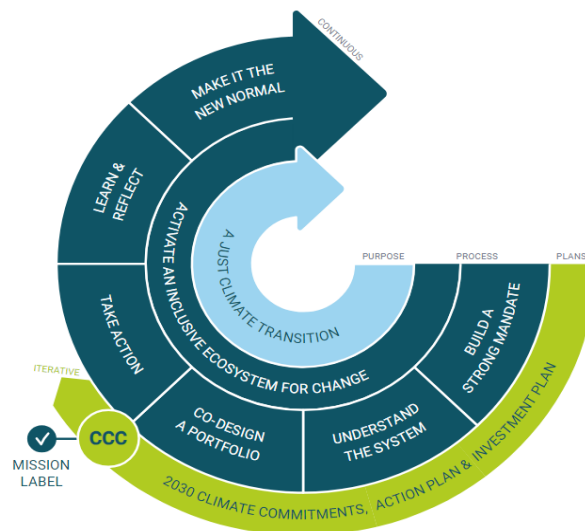


Figure 11 NetZero Cities Climate Transition Map (interactive map)

The model is designed with transformational change as a central concept but has a focus on mitigation which makes some steps inappropriate. It also means that activities vital to adaptation are missing or less pronounced e.g., monitoring and evaluation is often more difficult for adaptation as overarching goals can be harder to identify. The Climate Transition Map includes enabling conditions for the change required (see Figure 12) which focus on triggering the personal change required to support the political and practical steps that are part of the journey.



Figure 12 NetZero Cities Climate Transition Map: Way to Activate an Inclusive Ecosystem for Change

Pathways2Resilience - Regional Resilience Journey

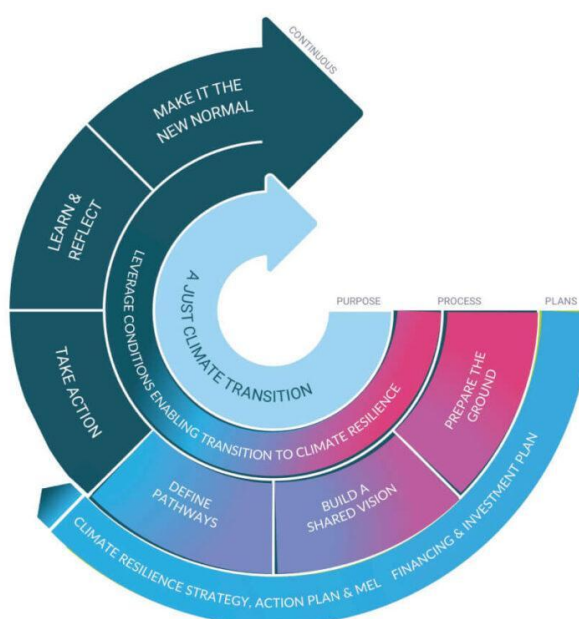


Figure 13 The Pathways2Resilience Regional Resilience Journey Map

[The Regional Resilience Journey \(RRJ\)](#) is an adaptable framework for regions and communities that wish to transition to climate resilience through a transformational adaptation approach. Annex (Section 8.4.1) includes the detailed steps of this model.

The RRJ (Figure 13) was developed with close consideration of the RAST (but with a focus on enabling transformation) and the Climate Transition Map (although with a focus on climate adaptation). It therefore has a focus on supporting a just transition to climate resilience and so prioritises participatory processes.

The RRJ is a product of the Pathways2Resilience Project which will support over 100 regions across Europe to identify climate resilience solutions. The project is ongoing and currently focused on the initial stages of the climate resilience journey and so the RRJ is only partially developed after the Define Pathways component. Like many such tools, the RRJ is designed as a circular journey implying all steps should be revisited. The extent to which the tool supports this due to its step-by-step instructions must be tested.

The RRJ has dedicated space throughout on how to include diverse perspectives and approach complex issues through a systems approach. The tool includes taking an experimental learning approach as a key leveraging condition and highlights the need to pivot and adjust as new information comes to light. The use of a theory of change to expose underlying assumptions should also enable regions to challenge those assumptions throughout the resilience journey.

It also includes a series of leveraging conditions (see Figure 14). The conditions have a good coverage of the enablers discussed in the previous section and include all 3 spheres (political, practical, personal). Developing plans through a theory of change approach also forces an assessment of the beliefs that underpin strategies and so encourages scrutiny of plans (and their limits).

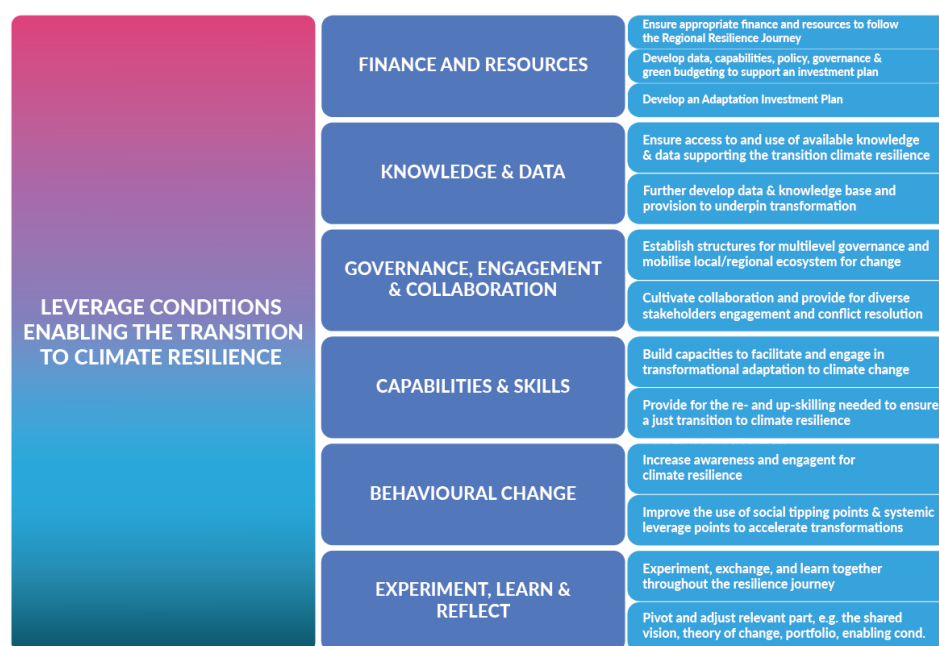


Figure 14 The Regional Resilience Journey's Leverage Conditions Enabling the Transition to Climate Resilience

Comparison of Models

Steps and characteristics of the four models compared in the previous section have been extracted and compared in Table 5. Overarching conclusions include:

- Compared to the RAST and RRJ, the Dynamic Adaptive Policy Pathways methodology is a more technical approach to adaptation.

- Although describing the benefits of stakeholder engagement. It lacks some of the detailed steps required or support provided by the other tools
- It contains a greater focus on supporting decision-makers deal with the inherent uncertainty of climate change. It could be used as an additional tool for support when developing adaptation pathways.
- Through the inclusion of levers to enable change the RRJ and Climate Transition Map have attempted to move beyond a simple step-by-step linear guide. Both are built with systemic and transformational change in mind. However, the Climate Transition Map is focused on climate mitigation and the RRJ is not yet complete.
- The RAST is a completed tool for adaptation with a useful monitoring, evaluation and learning step which details how to develop an approach for adaptation. It does not include enabling conditions and lacks satisfactory consideration of the personal and political aspects of the levers of transformational change. In addition, it does not include a step focused entirely on the mainstreaming and institutionalisation of successful change.
- The RRJ is a framework which guides to and explains available tools and resources on adaptation including but not limited to those on Dynamic Adaptive Policy Pathways, the Three Horizon Approach, stakeholder mapping and the theory of change.

Table 5 Comparison of the characteristics and steps of different transformative change and adaptation models

The Regional Resilience Journey, the Climate Transition Map, the Regional Adaptation Support Tool and the Dynamic Adaptive Policy Pathways approach have been assessed against different characteristics (e.g., approaches, steps, principles). Green indicates there is explicit inclusion of this characteristic, yellow there is some mention and blank that there is no mention.

Characteristic	Regional Resilience Journey	Climate Transition Map	Regional Adaptation Support Tool	Dynamic Adaptive Policy Pathways
Overarching				
Adaptation Focused				
Support tools included	For the first 3 stages.			
Explicit focus on enabling conditions				
Case studies and examples included			Adaptation Options (Step 3.2)	
Finance and Capabilities				
Ensure sufficient finance	Enabling Conditions		Step 1.4	
Set up/strengthen internal team	Enabling Conditions	Build a Strong Mandate	Step 1.3	
Access to and use of knowledge and data	Enabling Conditions	Build a Strong Mandate	Step 1.1	

Assess human resources	Enabling Conditions	Understand the System	Step 1.4	
Build capacities	Enabling Conditions	Build a Strong Mandate		
Re- and up-skilling	Enabling Conditions			
Set up structures for coordination and collaboration	Enabling Conditions	Activate an inclusive ecosystem for change	Step 1.3	
Create shared, safe spaces	Build a Shared Vision	Activate an inclusive ecosystem for change	Step 1.3	
Establish consultative and participatory mechanisms	Enabling Conditions	Activate an inclusive ecosystem for change	Step 1.5, Step 5.2	
Coherence across Governance Levels	Enabling Conditions	Build a Strong Mandate	Step 1.3	
Communication to support Behavioural Change				
Develop a communication strategy	Enabling Conditions	Activate an inclusive ecosystem for change	Step 1.5	
Advocate vision/goals	Build a Shared Vision	Activate an inclusive ecosystem for change		
Advocate new rules/standards	Make it the New Normal	Make it the New Normal		
Understanding the system (Baseline)				
Define climate risk assessment methodology	Prepare the Ground		Step 2.1	Step 1
Systems Mapping	Prepare the Ground	Understand the System	Step 2.2, Step 2.3	Step 1
Assess risks including vulnerabilities	Prepare the Ground	Not adaptation specific model	Step 2.2, Step 2.3	Step 2
Consider trans-regional and cascading impacts	Prepare the Ground		Step 2.2	
Consider uncertainties			Step 2.3	Step 1
Identify stakeholders	Prepare the Ground	Understand the System	Step 1.3	
Identify key barriers	Prepare the Ground	Understand the System		Step 1
Identify levers of change	Build a Shared Vision	Understand the System		Step 5
Includes focus on building relationships	Build a Shared Vision	Activate an inclusive ecosystem for change	Step 1.3	

Assess adaptive capacity	Prepare the Ground		Implicitly through step 1.4	
Build a Shared Vision				
Co-create a vision	Build a Shared Vision	Activate an inclusive ecosystem for change		Step 1
Secure High-level support	Build a Shared Vision	Build a Strong Mandate	Step 1.2	
Ensure stakeholders are multi-actor/multi-level	Prepare the Ground	Build a Strong Mandate	Step 1.3	
Ensure coherence and alignment with other initiatives	Prepare the Ground	Co-create a portfolio	Step 3.1	
Cultivate and nurture collaboration	Build a Shared Vision	Activate an inclusive ecosystem for change		
Co-creation of process	Build a Shared Vision	Co-create a portfolio	Engagement rather than co-creation	
Create a fertile environment for new ideas	Prepare the Ground	Activate an inclusive ecosystem for change		
Build new collaborative governance structures and networks	Enabling Conditions	Build a Strong Mandate	Step 1.3	
Address conflict		Activate an inclusive ecosystem for change		
Define pathways				
Logic models e.g., Theory of Change	Build a Shared Vision	Refers to "impact logic" in Co-create a portfolio		
Scrutinise underlying assumptions	Build a Shared Vision			
Stakeholder agreed adaptation option criteria	Build a Shared Vision		Task 4.1	
Identify adaptation options	Define Pathways		Task 3.1	Step 3
Take inspiration from good adaptation practice	Define Pathways		Step 3.2	

Identify financing/funding options	Define Pathways	Co-create a portfolio	Implicit through other stages	
Assess effectiveness of options	Define Pathways	Co-create a portfolio	Step 4.1	Step 3
Estimate co-benefits and impact	Define Pathways	Co-create a portfolio	Step 4.2	
Develop pathways (with stakeholders)	Define Pathways	Co-create a portfolio	Step 4.2	Step 4
Dynamic pathways with trigger points				Step 5
Innovative roadmap	Define Pathways			Step 5
Act				
Attract diverse resources	Enabling Conditions	Take Action		
Operational Planning		Take Action		
Financial Planning		Take Action	Step 5.3	
Communicate regularly to track progress		Take Action	Step 6.3	
Mainstream adaptation		Take Action	Step 5.2	
Iterative Approach				
Develop MEL approach and framework	Define Pathways	Learn and Reflect	Step 6.1, Step 6.2	Step 5
Sense make as a group		Learn and Reflect		
Experimental and learning approach	Enabling Conditions	Learn and Reflect	Step 6.2	
Pivot and adjust (goals, pathways, portfolio)	Enabling Conditions	Learn and Reflect	Step 6.3	Step 6
Prioritise Learning	Enabling Conditions	Learn and Reflect	Step 6.3	
Make it new normal				
Enable replication		Make it the New Normal		
Create new rules and standards		Make it the New Normal		
Create trainings and professional practice		Make it the New Normal		

Change guidance		Make it the New Normal		
Change policy		Make it the New Normal		

Preliminary conclusion

The comparison of approaches in Table 5 highlights several essential elements for achieving transformative change, particularly in adaptation contexts. The **Regional Resilience Journey (RRJ)** stands out as a flexible, integrative model that encompasses many of these common elements, especially in areas like structuring of finance and capability, systems mapping, collaborative governance, and defining pathways. As a foundational model, the RRJ provides a structured framework for the initial stages by building enabling conditions, fostering a shared vision, securing stakeholder buy-in, and integrating pathway development.

While the RRJ can serve as a primary framework, other models can also contribute valuable elements at different stages of the adaptation journey. For instance, the **Climate Transition Map** and the **Regional Adaptation Support Tool** provide practical insights on taking action and engaging stakeholders, complementing the RRJ's approach in phases such as operational planning, iterative learning, and mainstreaming adaptation. Similarly, the **Dynamic Adaptive Policy Pathways** offers a structured method to incorporate dynamic pathways and trigger points, which can be especially useful in developing a responsive adaptation framework.

By anchoring our approach in the RRJ while drawing on other models to strengthen the phases of taking action, learning, and establishing new norms, we can leverage the flexibility and inclusivity of RRJ as a comprehensive tool. This hybrid approach allows for a robust, adaptable pathway that maximizes transformative impact through shared insights and practical action, leading to resilient and sustainable adaptation outcomes.

Applying a Transformational Change Framework in ARCADIA

In addressing the complex challenges posed by climate change, transformative approaches are required to move beyond reactive or incremental adaptations. This section builds on the literature review from Section 2, which examined various transformational change frameworks, their methodologies, and essential conditions. Here, we present an adaptable framework for regional resilience that integrates Nature-Based Solutions (NbS) within the overarching Regional Resilient Journey (RRJ) approach. Recognizing the unique needs and goals of the ARCADIA project, this framework incorporates elements from other transformational approaches to ensure a comprehensive fit that supports ARCADIA's mission of fostering robust, climate-resilient regions.

The RRJ serves as the central structure guiding this transformation framework, as it promotes systemic, inclusive, and forward-thinking change. It provides regions with a

structured pathway for not only developing their first climate resilience plans but also enhancing existing ones through systemic adaptation principles and just transition goals. Yet, to fully address ARCADIA's objectives—specifically, the implementation of NbS in regional contexts—the framework also draws on other transformation models, this ensures that while the RRJ is the foundation, the framework remains flexible and inclusive of approaches that enrich ARCADIA's emphasis on NbS.

Throughout this section, the RRJ-based framework is outlined in six distinct phases, each reflecting an iterative process that encourages adaptive planning and transformative change. Each phase, supported by insights from transformational frameworks, contributes to a holistic strategy for regional climate adaptation. This includes preparing the groundwork by engaging stakeholders, developing shared visions, defining actionable pathways, and implementing resilient interventions—all with an emphasis on co-learning and adaptive governance to the ultimate goal of embedding climate resilience as a “new normal”. By embedding NBS within each of these steps, this framework ensures that the solutions not only address climate adaptation needs but also align with ecological preservation, social equity, and economic resilience.

Ultimately, this framework enables regions to systematically implement, monitor, and refine NbS in alignment with both the RRJ's transformational approach and ARCADIA's regional adaptation objectives. By combining the RRJ's structured, phased approach with adaptable principles from the literature, this framework provides the comprehensive support needed to transition to resilient, sustainable regional systems capable of thriving in the face of climate change.

A Transformational Framework for Implementing NbS in European Regions

Nature-Based Solutions (NbS) are essential components in creating a transformational framework that embeds natural processes into the core of community systems across European regions. By integrating NbS within key community systems—such as critical infrastructure, health and well-being, water management, and land use & food systems—regions can foster resilience and promote sustainability. NbS offer more than environmental restoration; they provide a strategic approach to enhancing resilience within these systems by leveraging natural capital and ecosystem services to fundamentally transform both urban and rural areas.

The effective implementation of NbS in transformational pathways requires addressing these interconnected community systems at multiple levels. For instance, applying NbS in water management—through measures like wetlands restoration or green infrastructure—improves flood resilience and water quality. In land use and food systems, practices like agroforestry and soil conservation enhance agricultural productivity, promote biodiversity, and improve water retention. These interconnected applications of NbS allow for comprehensive, systemic change that supports the long-term resilience and sustainability of European regions.

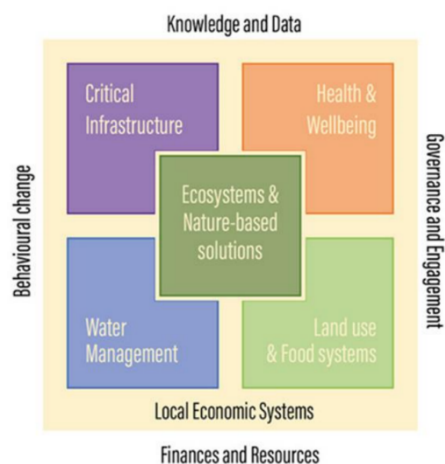


Figure 15 Key community systems and enabling conditions addressed by the EU Mission on Adaptation

A critical component of this framework is the Quadruple Helix model, which calls for active collaboration among four key stakeholder groups: academia, government, industry, and civil society. Each group brings distinct expertise and resources that collectively strengthen the implementation of NbS. Academia provides research and innovation, government sets enabling policies and governance structures, industry offers resources and practical applications, and civil society contributes local insights and community engagement. This collaborative model ensures that NbS initiatives align with local needs and priorities while maximizing their benefits across key community systems.

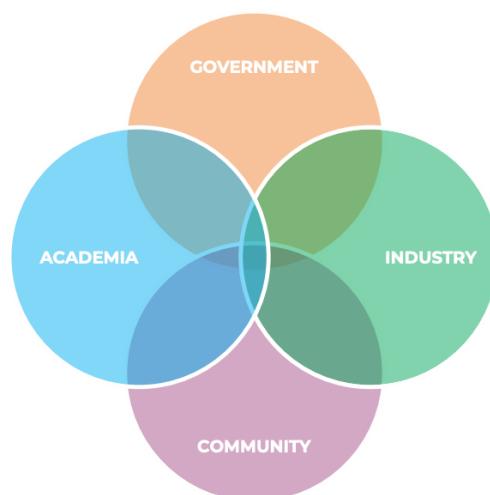


Figure 16 The Quadruple Helix

By embedding the Quadruple Helix model into the transformational framework, European regions can implement NbS that address critical infrastructure, health and well-being, water management, and land use and food systems. This comprehensive, collaborative approach creates a resilient foundation for regional adaptation, enhances environmental stewardship, and supports the well-being of communities across Europe.

Framework Structure

This section will elaborate on how the ARCADIA Transformation framework, can facilitate the implementation of NbS to enhance regional climate resilience. Similar to both the RRJ and Climate Transition Map, this framework consists of six separate phases that should be iterated through:

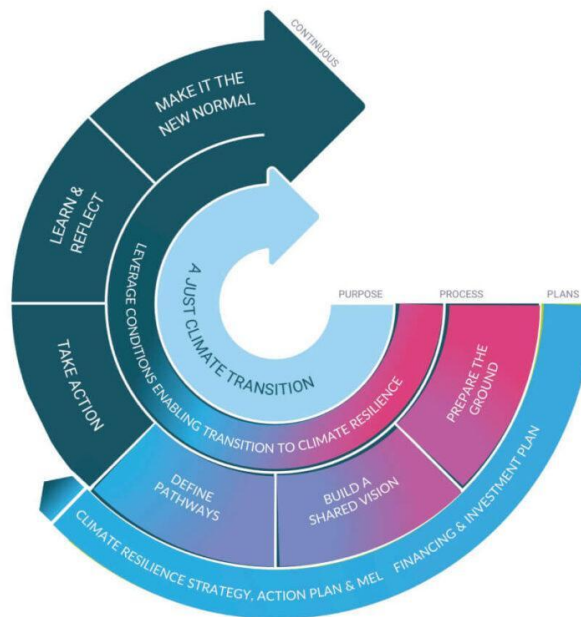


Figure 17 The Pathways2Resilience Regional Resilience Journey Map

Phase 1: Prepare the Ground

This first phase focuses on situating adaptation planning within the broader political, social, environmental, economic, and fiscal context, to frame the region's initial scope, challenges, and opportunities. This includes reviewing available knowledge on climate impacts, existing political commitments, regional policies, plans and strategies

This phase also focuses on developing the foundations to support a transformational approach which is systemic and just. A systems approach includes reframing our thinking to help us grasp the interconnectedness and interdependencies of the world around us through mapping key community systems and the organisations, communities and individuals who act and live across them. Understanding relevant actors and stakeholders, their roles, vulnerabilities, and capacities can better inform how we engage them meaningfully.

Within the ARCADIA project, this phase also involves analysing individual and socially determined perceptions of risks and solutions. This helps in creating a strong foundation for the adoption of NbS by addressing any misconceptions and promoting a clear understanding of the benefits of NbS among stakeholders.

Phase 2: Build a Shared Vision

This phase involves developing a shared vision of the climate-resilient future the region aspires to achieve. This is done through a participatory process that involves a wide range of stakeholders across the quadruple helix, ensuring that the vision reflects the aspirations and needs of all community segments, including the most vulnerable.

In the ARCADIA context, the vision-building process is complemented by the engagement in co-innovation labs. These labs engage communities and societal partners in the co-design of regional strategies to accelerate transformative adaptation. The collaborative nature of these labs ensures that the strategies developed are innovative, actionable, and have demonstrated feasibility, effectiveness, and social value.

Phase 3: Define Pathways

Once the shared vision is established, the next phase is to define the pathways to achieve that vision. This involves identifying and prioritizing necessary interventions, designing a coherent portfolio of actions, and establishing how each intervention contributes to progress along the desired pathway.

In ARCADIA, this phase also includes experimentally designing incentives and behavioural nudges to foster social acceptance and community actions. By doing so, the project ensures that the pathways to climate resilience are not only well-defined but also widely supported and actively pursued by the communities involved.

Phase 4: Take Action

Implementing a portfolio of transformative actions for the transition towards climate resilience is not a linear path. Practical application can be confronted with many operational or financial uncertainties. In addition, the implementation of the action portfolio requires the active participation of diverse organisations and actors across scales and sectors. Operational and financial planning must mobilize ecosystem actors, organize responsibilities and timelines, and allocate capital while adapting to changing needs. Difficulties can be eased if a region experiments with new collaborative ways of working.

Ongoing communication is critical to combine efforts across the local ecosystem and attract a wide range of resources from the public, private and civic sector. Taking action also requires great strategic commitment and detailed planning, including investment planning. Action involves a high degree of tactical flexibility and experimentation, where needed.

Experimentation makes it possible to explore new technological solutions, new partnerships and ways of resourcing and investing, as well as behavioural and cultural changes (values, attitudes, perceptions, assumptions). Understanding and tracking why some approaches and alternatives work, and others do not, contributes to determining the portfolio's ongoing feasibility, impact and social acceptability.

Phase 5: Learn, Reflect and Revise

Implementing a portfolio of actions requires a thoughtful approach of testing, learning, iterating and adapting. This avoids the risk of investing in non-viable solutions and builds confidence in the impact pathways. Facilitating and sharing learning among ecosystem actors not only transfers knowledge, but also builds mutual trust and a culture of course correction based on practical knowledge. Engaging all actors in discussions to identify changes and challenge assumptions fosters good governance and adaptive management. Strategic learning strengthens new partnerships, aligns actions with a long-term vision and generates evidence on scalability and transferability of actions.

It is crucial to constantly adapt portfolio actions to changing contexts and new knowledge to ensure progress towards decarbonisation. Reassessing trajectories of action and revising original assumptions allows adjusting efforts and avoiding slippage. Creating a culture that responds nimbly to emerging challenges and maintains constant alignment with city goals increases the likelihood of achieving significant impacts. Monitoring, evaluation and learning (MEL) activities should focus on generating evidence and adjusting strategies to changing conditions, ensuring adaptive governance and flexible portfolio management.

Phase 6: Generation of a “new normal”

To accelerate the transition to climate resilience, regions need to embed practices which speed-up and improve inclusive decision making, improved multi-scale collaboration and effective implementation. This can include anything from new budgeting and procurement practices to new ways of combining solutions or forming diverse, effective teams.

It is important to work towards a new culture of embedded practices by identifying new processes that make notable differences, fostering leadership, nurturing networks and trustful relationships. This may require creating new guidance and training to make these new ways of working a joint capability and shared value of all involved actors. In the long run, new standards and processes need to be formalised and embedded in practice so that the local stakeholders can recognise how they can benefit from them. This supports a long-lasting resilient approach that can persist over time. Innovative regulations and policy contribute to establishing this new norm, sometimes enabling replication in other or larger urban contexts when involving multiple governance levels.

- [DEVELOPING REGIONAL CLIMATE RESILIENCE STRATEGIES AND ACTION PLANS](#)
- [DEVELOPING REGIONAL CLIMATE RESILIENCE INVESTMENT PLAN](#)
- [PATHWAYS2RESILIENCE CLIMATE TOOLBOX](#)

Scorecard Readiness Assessment of Transformative Change

Introduction to the Scorecard

ARCADIA's primary objective is to support regions in accessing up-to-date, evidence-based, actionable knowledge, guidance, and knowledge-intensive tools. In line with this objective, the ARCADIA Scorecard serves as a vital tool to assist regions in navigating their transformative change journey. By providing a structured framework, the Scorecard helps regions systematically track their progress, identify areas for improvement, and align their efforts with the principles of transformative change. This tool draws on the available knowledge and approaches for creating an enabling environment for positive transformation, identifying key levers, barriers, patterns, and conditions necessary for successful change.

Rather than offering a comprehensive review of the transformative change, the ARCADIA Scorecard focuses on the most applicable and useful strategies for regions, translating these insights into actionable steps. The Scorecard is a practical mechanism through which regions can engage with these insights and apply them in their context, supporting them in moving towards a resilient, sustainable future.

The ARCADIA Scorecard is designed as a self-assessment tool that provides regions with the means to discuss and analyse their progress on the journey to resilience. Through a step-by-step series of questions, regions can assess their current position on the transformational change pathway, identify necessary next steps, and recognize areas where further improvements are needed. The tool is grounded in the framework outlined in the previous section, ensuring that nature-based solutions (NbS) are understood within a broader context of systemic change and long-term sustainability.

The Scorecard has been trialled with two regions from ARCADIA: Funen in Denmark and Lower Austria. Stakeholder groups from each region were tasked with completing the Scorecard and providing feedback on its usefulness and usability. Their feedback has been incorporated into the tool, and more detailed information can be found in **Annex 3** (Section 7.3), which includes reflections from the regions on how their comments have shaped the Scorecard.

How to Use and Interpret the Results of the Scorecard

A key feature of this tool is its iterative nature. It is not a one-time assessment but an ongoing process. Regions should track their scores over time to monitor progress in policy implementation and community-building practices. Periodically comparing

these scores will allow regions to observe improvements, setbacks, and identify critical areas for further attention.

Importantly, the Scorecard does not produce a single aggregated final score across all stages. Each stage represents a distinct process and combining them into a single score would fail to capture the complexity and unique aspects of the overall journey.

This chapter is supported by three annexes, which form an integral part of the main deliverable:

- **Annex 1:** Scorecard
- **Annex 2:** Guidance for the Scorecard
- **Annex 3:** Reflections from Regions after testing the Scorecard

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Annexes

Annex 1 - Scorecard

The ARCADIA Transformational Change Self-Assessment Tool (download the file to use it):
https://docs.google.com/spreadsheets/d/1c2kY-d7Vvc_2V9FljjviTecD3mIAslSU/edit?usp=drive_link&ouid=105094074673444336647&rtpof=true&sd=true

Annex 2 – Scorecard Guidance

Guidance: Using the Transformational Change Self-Assessment Scorecard

Introduction to the Scorecard

The Transformational Change Self-Assessment Scorecard is designed to guide regions in a transformative journey toward resilience through nature-based solutions (NbS). By fostering open dialogue among key stakeholders, the Scorecard serves as a platform to bring together diverse perspectives, encouraging shared understanding and consensus-building despite differences in viewpoints. This Scorecard consolidates existing knowledge and provides a structured framework to assess readiness, monitor progress, and chart actionable pathways for systemic change.

Aligned with the Regional Resilience Journey (RRJ) framework, the Regional Adaptation Support Tool, and the NetZero Cities Climate Transition Map, the Scorecard helps regions position NbS within a broader context of long-term sustainability and adaptive governance. Its design offers regions tailored insights into their strengths, areas for growth, and the resources needed to advance and sustain their transformative change efforts.

Purpose of the Scorecard

The Scorecard has multiple goals:

1. **Consolidate Knowledge:** Synthesizes insights from transformative change and NbS, creating a strong foundation for regional action.
 2. **Framework Development:** Provides a structured assessment framework to initiate and sustain transformative change by identifying readiness levels, highlighting gaps, and suggesting improvement pathways.
 3. **Long-term Support:** Serves as an ongoing self-assessment tool that regions can use beyond the ARCADIA project's lifecycle to maintain alignment with broader climate adaptation and resilience goals.
 4. **Broader Support for NbS and Transformative Change:** It helps identify enablers and barriers, guiding regions in formulating resilient, adaptive, and transformative strategies for sustainable NbS impacts. Supports regions in considering the wider impact of NbS across regional and national contexts.
-

The Regional Resilience Journey



Structure of the Tool

The Transformational Change Self-Assessment Scorecard is organized around the six stages of the RRJ, each representing a critical step in the transformative process. These stages offer a

The Six Stages of the RRJ

Stage 1 - Prepare the Ground: helps regions situate their adaptation planning within the wider policy, social, environmental, economic and fiscal context.

- ☐ Establish a Baseline
- ☐ Understand the System
- ☐ Assess Risks and Vulnerabilities

Stage 2 - Build a Shared Vision: supports meaningful and active engagement of relevant actors.

- ☐ Ensure Ownership and Commitment
- ☐ Explore Possible Futures
- ☐ Agree on a Destination

Stage 3 - Define Pathways: brings together interventions in a coherent portfolio of actions, outlining how each intervention contributes to progress towards the desired pathway.

- ☐ Identify and Assess Options
- ☐ Co-design a Portfolio of Interventions
- ☐ Preparing for Implementation

Stage 4 - Take Action: supports the implementation of a portfolio of transformative actions.

- ☐ Mainstream
- ☐ Implement

Stage 5 - Learn and Reflect: crucial for ensuring continuous improvement and adaptation of the climate resilience efforts.

- ☐ Develop Approach
- ☐ Make Sense Collectively
- ☐ Adapt and Pivot

Stage 6 - Make it the New Normal: accelerating, advocating, scaling amplifying and institutionalising.

- ☐ Enable Replication
- ☐ Formalise and Embed New Practices

structured approach to understand the current status, identify gaps, create actionable plans, implement change, and revisit the Scorecard to evaluate progress, allowing regions to iterate through a process of continuous improvement.

Each stage receives an average score (out of 7), providing a snapshot of progress and enabling regions to identify areas of strength and those needing further attention.

The Scorecard serves as both a reflection tool and a roadmap, guiding regions through an iterative process where they can continually assess the current situation, identify gaps, plan and implement changes, and then revisit the Scorecard to evaluate progress in the next cycle. Through these stages, the Scorecard facilitates the transformative journey, fostering resilience, collaboration, and adaptive governance every step of the way.

Connection to Regional Work Packages

The Scorecard is integral to supporting regions across various tasks within the ARCADIA project:

- **Vision and Strategy for NbS Transformation (Tasks 1-5.1)**
 - **How the Scorecard Supports:** Helps regions evaluate their readiness to implement NbS strategies through a collaborative process with partners. This assessment reveals gaps in readiness, enabling regional teams to refine their NbS strategies for transformational

outcomes. It also guides regions in evaluating existing capacities to support validation, implementation, replication, or upscaling of NbS.

- **Experimental Co-Innovation Labs (Tasks 1-5.2)**

- **How the Scorecard Supports:** During this phase, the Scorecard provides operational support for co-innovation labs, helping regions track and measure progress in real-time. Its feedback mechanisms foster continuous improvement, aligning innovations with the broader goals of NbS transformation.

- **Regional Impact-to-Scale Strategy and Plan (Tasks 1-5.3)**

- **How the Scorecard Supports:** Assists regions in developing scalable strategies for NbS while emphasizing the need for adaptive governance mechanisms. This helps regions scale impact, ensuring sustained transformational change.
-

Who Should Use This Tool?

The Scorecard is intended for **multi-stakeholder engagement** within regions. Ideally, it should involve representatives from public authorities, the private sector, civil society, and academia. Having

this range of perspectives helps create a complete assessment and builds shared commitment to improving regional resilience. By working together, stakeholders can find gaps, set goals, and agree on key changes needed to achieve meaningful progress.

- **Sector-Specific Introductions:** Consider how to introduce the Scorecard to each group involved. Tailor the introduction to highlight how the Scorecard aligns with each sector's roles and responsibilities, making it relevant and engaging.
- **Representative Roles:** Each representative on the scoring team should communicate key messages and outcomes from Scorecard discussions back to their respective sectors and any groups they represent. This step will ensure that insights gained from the assessment are disseminated and acted upon within each sector.

Steps for Using the Scorecard

1. **Assemble a Stakeholder Group.** Convene a group of stakeholders representing diverse perspectives across sectors to ensure a thorough, multi-dimensional assessment. This group should ideally include individuals familiar with current regional strategies.

2. **Define the “region”.** Specify what area in both geographical and political terms you are answering questions for as well as which individuals are involved in answering those questions.
 3. **Review the Regional Resilience Journey (RRJ).** Begin by reviewing the RRJ framework, especially its focus on transformational adaptation and systems change. Identify any relevant strategies that align with or could be adapted to the RRJ.
 4. **Complete the Scorecard Questions** Progress through each question in the Scorecard step-by-step. Encourage open dialogue among stakeholders to explore the reality of the current situation, identify potential gaps, and determine areas for action.
 5. **Analyze Results and Set Priorities** Use responses to prioritize areas for improvement and determine actionable next steps. Each step should enhance NbS integration, address readiness gaps, and further the region's journey toward transformation.
 6. **Document and Monitor Progress** Keep a record of findings and decisions for future reference. Schedule periodic reviews to assess progress and adjust strategies as new insights and evidence arise.
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Using the Scorecard Throughout the Project and Beyond

The Scorecard is designed as a dynamic tool to guide regions through the various stages of the ARCADIA project and beyond.

1) The Scorecard can support continuous monitoring

- **Regular Assessments (Years 2–5):** Scheduling assessments (e.g., annually) supports regions to monitor their progress, identify areas that require improvement and proactively adjust plans to keep regions on track to achieve resilience goals.
- **Long-term Vision Alignment (Post-Project):** Regions can continue using the Scorecard for self-assessment and strategy adjustments beyond the ARCADIA project. Ongoing use can promote continuous learning and so help regions to stay aligned with climate adaptation goals and leverage new opportunities.

2) The Scorecard can support reflection at key points in the project

- **Mid-Project Adjustments (Years 2–3):** During the Experimental Co-Innovation Labs phase, the Scorecard can support the refinement of innovation processes, ensuring alignment with NbS transformation goals and enhancing scalability.
- **Strategic Planning for Upscaling (Years 3–4):** As regions near the Impact-to-Scale phase, the Scorecard can aid in finalizing upscaling plans, reinforcing adaptive governance and aligning strategies for large-scale NbS implementation.

Tips for Effective Use

Complete the Scorecard Collaboratively

- **Foster Open Communication:** Encourage all stakeholders to share their perspectives openly to build a shared understanding and foster collaborative problem-solving.
- **Emphasize Collaboration:** Explain that the scorecard is a collaborative exercise led by project leadership and serves as an initial step in building cooperation within the project.
- **Encourage Further Investigation:** If the answer is unknown by participants, reach out to others as needed to arrive at more informed responses, improve scores and improve collaboration in the region.
- **Defining the Scoring Team:** Specify the composition of the scoring team to ensure transparency. Clarifying who is responsible for scoring will foster trust among stakeholders and establish accountability.
- **Foster Inclusive Planning:** Clarify that the Scorecard is a tool for joint reflection and planning. Frame scoring as an opportunity to engage stakeholders in meaningful dialogue, where differing perspectives enrich the assessment and pave the way for more informed, inclusive planning.

- **View Scoring as a Means of Interaction:** Use the scoring process to create an interactive setting where stakeholders can understand each other's viewpoints, recognize differing needs, and discuss their individual roles in advancing regional resilience.
- **Facilitate Joint Planning:** Treat the Scorecard discussion as a foundation for joint planning, where stakeholders identify gaps together, set priorities, and outline next steps based on shared insights. This process strengthens a sense of ownership and commitment among all participants.

Answering the Questions

- **Clarify the Question First:** Discuss whether the meaning is clear, and everyone has the same understanding.
- **Examine the Situation:** Consider the answer as a group. Sharing experience and identifying points of dispute or which add useful context or information.
- **Accept there may be disagreement:** Different stakeholders will have varied experience and perspectives on the different questions. Agreement on an individual score is less important than understanding each other's perspectives.

The below table explores one of the Scorecard questions, creating example situations which illustrate what would be expected from scores 0 to 7. Importantly, these are only examples and so do not

capture the full range of potential scenarios for each score category.

Qu 1.2.2: "Has a stakeholder report been produced which maps and prioritises stakeholders based on their level of interest and influence?"	
Score	Example Situation
00 - Task not started.	"We have not previously considered this task and have no activity related to it."
01 - Unknown. Discussion with others required.	"There was some stakeholder mapping completed a couple of years ago, but we don't know to what extent. We will need to discuss with them."
02 - Decision made and currently planning how task will be approached.	"We have decided there is a need to systematically map stakeholders and will undertake it through online workshops. We are currently deciding on who should be involved and designing the workshops."
03 - Plan completed and ready to start.	"We will have a workshop next month to identify stakeholders and map them across the relevant systems and whether they are academia, civil society etc. There will be a follow up workshop to discuss their engagement and support of the project."
04 - Partially. Activities exist but without a systemic approach.	"We have several lists of useful stakeholders but have not mapped them. We often individually reach out based on the needs of the project at the time."

05 - Partially. Task ongoing based on a plan.	<i>"We have completed an initial mapping of stakeholders but have not discussed their relative interest in the project. It is being planned to take place in 3 months."</i>
06 - Yes. Task fully completed.	<i>"Yes, we've completed all aspects of the task"</i>
07 - Yes. Task fully completed, reviewed and revised where necessary.	<i>"Task complete, but when discussing the regional vision with stakeholders we realised we did not have anyone with a good knowledge of the tourist industry. We've updated our approach to assess for other similar gaps."</i>

Linking the Scorecard to Ongoing Project Activities

- **Integrating with Current Work:** Clarify how the Scorecard links to ongoing activities within the project, ensuring that it complements existing initiatives. This alignment will help embed the Scorecard's insights into current efforts, facilitating progress tracking and strategic adjustments in real time.

- **Linking to Project Tasks and Resources:** Clearly connect Scorecard use to specific project tasks, particularly those related to resources, budget allocations, and support mechanisms. Provide guidance on how the Scorecard can inform budgeting decisions or highlight areas requiring additional support from regional resources.
 - [DEVELOPING REGIONAL CLIMATE RESILIENCE STRATEGIES AND ACTION PLANS](#)
 - [DEVELOPING REGIONAL CLIMATE RESILIENCE INVESTMENT PLAN](#)
 - [PATHWAYS2RESILIENCE CLIMATE TOOLBOX](#)
- **Focus on Continuous Improvement:** Use the Scorecard not as a final evaluation but as a tool for ongoing assessment, reflection, and action.
- **Leverage Existing Strategies:** Build on current regional plans and projects, integrating the RRJ framework to enhance alignment and impact.

Dealing with jargon

- **Be self-aware:** Minimise the jargon and acronyms that you use and check with others if terminology is common.
- **Explanation of potential jargon in the tool itself:** The tool has been created to minimise scientific or technical terminology. However, there may still be words or approaches that are uncommon. Discuss with colleagues

and use the glossary of the Scorecard or above link to documents to gain clarity.

Clarifying Scope of Work

- **Defining the Scope of the Answer:** It is essential to clarify whether your answer to each Scorecard question pertains specifically to NbS initiatives or the region's broader issues. This distinction will help add context and clarity and ensure that the focus aligns with both the project's goals and the region's priorities.
 - **Aligning with Regional Priorities:** For regions heavily focused on specific issues or sectors (e.g., water management), the scorecard can be used to strengthen existing action while also helping create a broader, integrated approach to resilience.
 - **Adding monitoring and Each Score:** This will provide context for the scores, support future monitoring, and clarify the reasoning for other partners and stakeholders.
-

Version Control

- If the Scorecard is completed in separate groups, make a copy for each group.

- When all groups have completed the Scorecard, scores should be reviewed together to ensure that the final assessment reflects a collective analysis.
 - Significant score differences can be a point of discussion among stakeholders to identify action items and determine next steps.
 - We recommend maintaining all copies in a central location (e.g., a shared drive or spreadsheet) and comparing results at scheduled intervals to facilitate ongoing dialogue and alignment among stakeholders.
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Purpose and Mindset

- **Focus on Reflection, Not Scores:** The scorecard is not about achieving a high score (like a school grade); instead, it encourages meaningful reflection and actionable insights.
 - **Inspiration Over Perfection:** Treat the scorecard as a living document and a source of inspiration rather than a rigid checklist. Use it to identify opportunities for improvement and foster a culture of continuous learning and collaboration.
-

Engagement and Collaboration

- **Stakeholder Involvement:** Effective stakeholder mapping feeds directly into an engagement strategy. Use the tool to discuss and enhance reporting mechanisms for all stakeholders, including how different departments of government are involved.
- **Common Understanding:** Promote a shared understanding of NBS and clarify concepts such as "vision" to ensure alignment across diverse stakeholders.
- **Audience-Specific Design:** Tailor the tool's application based on its audience, recommending technical experts who can adapt insights for diverse settings and stakeholders.

Reflection and Interpretation

- **Expertise-Driven Insights:** Frame questions for different key stakeholders while providing guidance to mitigate subjective interpretations. Acknowledge that answers may vary based on recent experiences, such as natural hazards, or the respondent's background.
- **Encourage Dialogue:** Use the scorecard as a tool for discussion, not just assessment. Encourage comments on

overall scores and specific aspects to deepen the reflection process.

- **Fun and Engaging Experience:** Ensure the process of using the scorecard is enjoyable, fostering enthusiasm and participation among users.
- **Scalability:** Adapt the questions and methods to suit smaller municipalities and less-resourced settings, recognizing that not all questions may apply universally.

Purposeful Questions

- **Avoid Common Agreement Bias:** The tool doesn't require unanimous agreement but aims to spark constructive dialogue and insights.
- **Vision and Strategy Definition:** Include clear definitions of critical concepts like "vision" to align understanding and ensure consistency.
- **Data Completeness:** Emphasize that while more data can always enhance insights, the tool's value lies in fostering action and inspiration with available information.

Outcome Orientation

- **Coalition of the Willing:** Use the tool to build momentum among motivated stakeholders, fostering a shared commitment to transformative change.
- **Contextual Adaptation:** Recognize the variability of the tool's application based on organizational size, geographic region, and recent experiences, ensuring relevance and adaptability.

Defining Regional Scope and Context

- Regions should start by clearly defining their geographical, administrative, and thematic scope (e.g., NUTS2/3 level). Guidance should provide tools for mapping both natural systems (soil, water, landscapes) and social systems (demographics, infrastructure, governance). Including hybrid solutions that integrate digital, social, and nature-based approaches will help regions understand their unique context and foster better coordination among stakeholders.

Clarifying Transformative Change Concepts

- Understanding transformative change requires clear explanations of key terms like “vision,” “strategy,” and “roadmap.” A glossary, supported by examples and visual aids, can help demystify these concepts. Partnering with knowledge organizations can provide regions with targeted

materials, such as how to explore adaptation pathways—essential for long-term resilience but often overlooked in favour of immediate measures.

Facilitating Inclusive Scorecard Sessions

- Effective Scorecard sessions need diverse participants, including core team members, experts, and motivated stakeholders. Facilitators should explain scoring criteria with examples and guide participants through the phases of the RRJ to ensure completeness. Emphasizing the iterative nature of the Scorecard helps participants view it as a tool to assess readiness and uncover areas for improvement.

Building Capacity and Collaboration

- Regional coordinators play a key role and should have a good understanding of transformative change and the RRJ and stakeholder engagement and if needed training needs to be provided. Stakeholder mapping is essential to ensure comprehensive involvement and identify missing voices. Balancing technical implementation with collaborative exploration ensures strategies reflect each region's unique characteristics while fostering long-term transformation.

Building on Existing Practices and Structures

- The Scorecard should encourage regions to recognize and leverage their existing processes, practices, and structures

as starting points for transformation. Rather than discarding these frameworks, regions can integrate them into a broader systemic approach, aligning ongoing efforts with transformative goals. This ensures a smoother transition by building on established capacities while fostering collaboration and innovation within familiar context

Annex 3 – Reflections from Regions after testing the Scorecard

The Scorecard has been trialled with two regions from ARCADIA: Funen in Denmark and Lower Austria through a workshop session. The primary aim of the workshop was to evaluate the usefulness and usability of the scorecard as a tool for regional assessments. At the same time, it provided a valuable platform for the region to engage in a meaningful discussion and reflect on their current situation. These discussions offered critical, practical insights into how the scorecard could be refined to better meet the needs of regions in diverse contexts. The reflections gathered during the workshop highlighted areas for improvement and informed a gradual, iterative revision process, ensuring the tool becomes more aligned with real-world applications and the practical experiences of regional stakeholders. This collaborative approach strengthened the tool's relevance and usability, fostering greater engagement of project demonstration regions in the process of designing the Scorecard.

The general agenda for both one day workshops was organised as follows:

- Introduction round
- Introduction to Transformative Change (in the context of the ARCADIA project)
- Introduction to the Scorecard tool
- Group discussions and reflections on the Scorecard content, focusing on its user-friendliness and potential application.
- Presentation and discussion of group findings
- Practicing the Scorecard—Participants will use it to assess their region as a test round.
- Group presentations on the results and feedback from the test
- Closing - Wrap-up and next steps discussion

Funen, Denmark

The first workshop took place in Funen in Denmark on 9th Oct 2024. Comments were collated and changes were made to the Scorecard before being reassessed in Lower Austria.

Table 6 Attendees of the Funen Workshop

Organization	Role
Vandcenter	Policy Maker
SDU Biology	Practitioner/Expert
RSYD	Policy Maker
SDU Biology	Researcher
SDU Biology	Researcher/Consultant
SDU Biology	Researcher
SDU Biology	Practitioner/Expert
Odense Kommune	Policy Maker

Table 7 Comments and Responses from the Funen Workshop

COMMENT FROM REGION			RESPONSE		
SECTION	QUESTION	TEXT	COMMENT	GUIDANCE UPDATE	SCORECARD UPDATED
General		Good explanation of the scores.	NULL		
General		Scorecard with Regional Language would help with connection with regional partners	Request for Scorecard to be translated. Useful recommendation for longer term.		

General		Possibility to add different result to each question so different SH can give their own score	It is intended that the Scorecard be completed with participation of key SH. This may require multiple groups. If so, make a copy and then compare in later stage but the final score and analysis should be the result of considering all the scores in different copies and preferably with the presence of key SH representative. The differences of scores could be an item for discussion among the representatives.	We will update guidance to include recommendation to complete in a different spreadsheet.	
General		Score explanation is difficult to fit to some of the questions	Review of questions to ensure they fit with scores.	This also need to be reflected and addressed in the guidance. The guidance needs a section explaining the scores and possible questions around it. Example scenario table for one question has been included.	Scoring updated.
General		Add a score option to say "Not aware at this moment" Where doesn't count in the average	Score option for unknown	Guidance encourages finding the status of each question which could be a mean of	Added a don't know options that is 1 point

				communication among SH and key actors.	
General		We like the introduction video.	NULL		
General		The graphic illustration of steps is great!	NULL		
Preparing Ground		What do you mean by 'region'? Region is also a stakeholder in DK.		This needs to be clarified in the guidance, what is the region geographically and politically and how does it work here	New sheet included to define region and who is answering questions
Preparing Ground	1.1.1	Baseline report with all included factors seems like a huge work	True - some of the actions in the Scorecard are extensive pieces of work.	Guidance reiterates that this is an iterative journey where activities are revisited and improved.	
Preparing Ground	1.1.1	Can be very subjective on what baseline includes.		Guidance includes links to P2R documents with what is viewed as essential for baselines etc.	Question now updated to be clearer on what should be included.
Preparing Ground		Confusing about what is baseline and what is the purpose of the following subtask	A revision is needed on the questions to clarify them and also preventing overlaps		Questions reviewed and glossary included with definition of systems mapping
Preparing Ground	1,1,2	Who are the relevant actors?			Relevant actors' - terminology removed

Preparing Ground		Good explanation at the end but should be more visual - may be at the top	Unfortunately, cannot be moved to top.		
Preparing Ground	1.2.2	Misunderstanding on the systems Is not it already part of the Baseline report?			Glossary included with explanation of system mapping and mapping of stakeholders.
Shared Vision	2.1.1a	2.1.1a: Better to have stakeholders at the meeting than sending out meeting minutes to read	Change text in 2.1.1b from meeting minutes to attendance and active participation at meetings		Question updated to refer to a stakeholder engagement strategy
Shared Vision	2.1.1a	2.1.1a: For signed agreements and official endorsement, is it ALL stakeholders or project partners like in ARCADIA?	question can be made clearer		Question altered to focus on securing high-level support through the stakeholder engagement strategy.
Shared Vision	2.2.2	2.2.2: Confusion about what is meant by "Possible future."	May be a bit of clarification in the Scorecard	This also needs to be explained in the guidance	Have different options for the future been explored (e.g., smooth or abrupt transitions)? Including exposing trade-offs and what value decisions must be made.

Shared Vision	2	This stage is good but seems huge for a region should may be on a smaller level realistically	Stage very important - will review and make simpler when possible.		Questions have been reviewed and some removed or merged to simplify while maintaining key activities.
Shared Vision	2.2.1a	2.2.1a: very good idea but better with an assigned budget		Linked in the guidance with related project task to provide enough budget or some other regional resources	
Pathway		Unclear about the purpose of this stage.		Guidance should make the reasoning behind each stage clear	
Pathway	3.2.2	3.2.2: What does that mean?	Clarify question in scorecard	Guidance needed on what a roadmap is/what it should include.	Question removed to simplify steps
Action		Missing questions about qualitative insights.			Questions have been updated so that they are more quantitative.
Action		Clarify is understood, understand the question or understood how to move forward with the task/action			Scoring updated for clarity
Action		Good to ask about monitoring!	NULL		
Action	4.2.2	4.2.2: Ecosystem? What does it mean in this context?	Use different word than ecosystem		Ecosystem removed and question rephrased

Action	4.3.1	"ecosystem of actors"?	Use different word than ecosystem		Ecosystem removed and question rephrased
Learn & Reflect		Completed but missing key components - confusing language . The clarification of the scores do not work with every section	Need to work on jargon across this section. Also don't understand 'missing key components'		Scoring updated for clarity
Learn & Reflect		May be one category understood but not chose to move forward with survey assumes that there is a positive motivation do each task	Don't understand		
Learn & Reflect		4.3.1 "effectiveness" can be very subject, may be should be broken down!	Can add clarity on what effective co-ordination/ engagement is in Scorecard	Should also be clarified further in guidance	Question updated to remove qualitative 'effective'.
New Normal	7.1	7: plan being implemented How to answer question when does not involve plans does not fit!	Review of questions to ensure they fit with scores.		Reviewed and Updated
Introduction		Clarification. What is the purpose of the tool? Academia or "real world"		Guidance needs to make this clear	Intro updated
Introduction		Intro: Overall introduction written to politicians/citizens/NGOs with a "low entrance point" of information		Clarified who users should be e.g., with some technical knowledge	Clarified who users should be e.g., with some technical knowledge
Introduction		Intro: The Tool try to bring climate resilience theory to something "useful" handy	NULL		

General		Evaluate in smaller groups. Very difficult to involve citizens, NGOs/politicians	NULL	Clarified who users should be e.g., with some technical knowledge	Clarified who users should be e.g., with some technical knowledge
General		Tool not for citizen involvement		Clarified who users should be e.g., with some technical knowledge	Clarified who users should be e.g., with some technical knowledge
General		Interesting power dynamics in using this tool theory/ideal world vs real world			
General		Reflection. Who is a "good representative" to join a session with the tool? Entrance level/management/politicians "power"	NULL	Clarified who users should be e.g., with some technical knowledge	
General		If I want to work with politicians I'll have to explain every buzz word	Check through tool on jargon and potentially include glossary in tool itself		Glossary included
General		Project management tool. How does it work at management level? Politicians etc.	Don't understand	Clarified who users should be e.g., with some technical knowledge	
General		Work with the facilitation of using the scorecard with a group - entry levels - new colleagues	NULL		
General		How do you compare scores when you do the scorecard several times?	NULL	Explanation in guidance	
Prepare the Ground	1.3.2	I can't understand 1.3.2. Does it exist yes/no. How do you score?	Review of questions to ensure they fit with scores.		Questions/scores reviewed

Prepare the Ground		Does the step need us to write/revise status in relation to the baseline			Questions/scores reviewed
Prepare the Ground		What kind of data is relevant? - only climate adaptation or only regional development			Baseline question made clearer
Prepare the Ground		Arcadia baseline of NBS on Fyren region. 1. Climate adaptation has many nuances - flooding from sea - rain events. 2 NO overall prioritisation	Prioritisation will occur either explicitly or as circumstances/demands arise and reduce possibilities of action. Better to be explicit to minimise unintended consequences.	We need to better clarify and explain in guidance what prioritisation means.	
Prepare the Ground		Add new column to explain the reason behind the score	Edit Scorecard on this recommendation		Comments added
Shared Vision		"Co-design" design with who	Clarify in Scorecard	Potentially can add explanation in the guidance	Question updated to include "representative group of stakeholders"
Shared Vision	2.1	New agreement/ministry established	NULL		
Define Pathways	3.1.2	How do you score on several pathways		Explanation in guidance	
Define Pathways		Denmark. We have a pathway but fail to have a allocated budget for transformation	NULL		
Define Pathways		Define transformative innovation policy. A lot of questions sound similar	Review this section in the Scorecard	Clarify how steps are different	Questions have been reviewed and some removed or merged to simplify

					while maintaining key activities.
Take Action		The test don't distinguish between existing and monitored change	This comment is unclear.		
Take Action	4.2.2	first time: "ecosystem". Until now only climate risk not connectivity or nature	Review use of ecosystem		Ecosystem removed
Take Action	4.2.2	"ecosystem of actors" partnerships? Voluntary?	Review use of ecosystem		Ecosystem removed
Take Action	4.3.2.a	Financial plan at what level? Municipal - some funded, Regional - some	Clarity required on what the boundaries are of the area/region the questions are being answered for.	Explanation of region/municipality	Sheet added which requests definition of region.
Take Action	4.3.1	Ambiguous question	Clarify this question so it makes more sense		Questions reviewed
Learn & Reflect	5.1.1	Abbreviation MEL - don't understand	Need to explain jargon of MEL	Need to explain jargon of MEL	Acronym expanded and glossary included
Learn & Reflect	5.1.3	Ambiguous. ??? In the thought behind the plans or a guideline.	Comment is unclear		
Learn & Reflect	5.1.3	Is it municipality learning on goal/approach or teaching sustainability to stakeholders/society?		Clarify in guidance	Questions reviewed
Learn & Reflect	5.3.3	Need to merge the two questions	Combine questions		Merged
Learn & Reflect	5.4.2	Don't know how to answer this question. Danish legislation is very old. They will put things on top but not revise the laws	Clarify that portfolio does not need to mean legislation	Clarify in guidance	Questions reviewed

General feedback		We need to clarify whether the data discussed pertains specifically to Nature-Based Solutions (NbS) or the broader region.		Clarify in guidance	
General feedback		The first question regarding the baseline seems to encompass everything, even overlapping with later questions in the scorecard. We need more precision here to avoid redundancy.		More precision in guidance on baseline	Questions have been made more precise
General feedback		While the baseline information exists, it is dispersed across different departments and not compiled into a synthesized report.	Update Guidance and potentially scoring to reflect an option for info exists but is not collated or easily accessible		Scoring updated
General feedback		Our region is currently heavily focused on water-related issues, but the scorecard calls for a broader, more comprehensive perspective. Given that water is the main focus of our region and this project, we may need to ensure this alignment is reflected.		Explain systemic/transformativ e approach in guidance	Glossary included
General feedback		A useful addition could be a column at the end of the scorecard, briefly explaining why each score was given. This would	Include comment column		Column added

		help with future monitoring and provide clarity to other partners.			
General feedback		A glossary is essential to ensure all terminology is clearly understood across sectors.	Include glossary		Glossary included
General feedback		It's important to consider how we introduce the scorecard to each sector.		Considered in guidance	
General feedback		We also need to specify who is on the scoring team to ensure transparency.	Could include a new sheet which details who's filling out the Scorecard		New sheet added
General feedback		Each sector representative should take the key messages and outcomes from the scorecard discussions back to their respective sectors and the groups they represent.		Include support in guidance	
General feedback		Finally, we need to clarify how the scorecard links to our ongoing activities within the project, ensuring integration and alignment with current work.		Included in guidance	

Lower Austria

The Lower Austria workshop took place on 26th Nov 2024 after the first workshop in Funen. Stakeholders from the following organisations were included to support securing diverse input and understanding of the region.

Table 8 Attendees of the Lower Austria Workshop

Organisation	Role
Energy and Environmental Agency of Lower Austria (eNu)	Practitioner
Office of the Lower Austrian Government (LNOE)	Policy maker
Lower Austrian Agricultural District Authority (ABB)	Policy maker
Ecological Gardening (NiG)	Practitioner
Lower Austrian Business Agency (ecoplus)	Practitioner
Office of the Lower Austrian Government (LNOE)	Policy maker
Ecological Gardening (NiG)	Practitioner
Energy and Environmental Agency of Lower Austria (eNu)	Practitioner
University of Natural Resources and Life Sciences (BOKU)	Researcher
Office of the Lower Austrian Government (LNOE)	Policy maker
Geosphere Austria (GSA)	Researcher
AlpS	Consultant & Researcher
Office of the Lower Austrian Government (LNOE)	Policy maker

Table 9 Comments and Response from the Lower Austria Workshop

COMMENT FROM REGION			RESPONSE		
SECTION	QUESTION	TEXT	COMMENT	GUIDANCE UPDATE	SCORECARD CHANGE
General		Purpose is not to score well (school grade)		Explained in guidance	
General		Not necessarily common agreement		Include that this could be the means for starting discussion.	

General		From excel to a dashboard/website	Suggestion to move tool from excel to a more interactive platform – good suggestion.		
General		Using should be fun	Good suggestion		
General		Purpose = inspiration. To-do list Living document		These are terminologies could be used in guidance	
General		Coalition of the willing		I like this one better than common understanding but can lead to a binding agreement in further steps	
General		Scoring: 02: Decision made, but planning not started			Scoring updated to include this.
General		Overall objective of ARCADIA and Scorecard		Objective included in Guidance	Context of ARCADIA added to the intro worksheet
General		Region: Agree on Territory. Scope/ Joint agreement	Make even more clear in Scorecard	Important point needs to be addressed in guidance	Clarified in Scorecard
General		How is the scorecard connected to the labs		Important point needs to be addressed in guidance	
General		More scores to make progress visible	Add more score options.		Scores now from 1-7
General		Easy name only one (not mentioning all concepts)	Reduce jargon in questions	We need to check both guidance and Scorecard to prevent jargons	Jargon has been reduced but as this is difficult to ensure

					a glossary has been added.
General		Split comments in 2 columns: 1) documents etc we have 2) documents plans we want to supplement			Column added so there are two comment boxes for each question.
General		Why is partly implemented (and probably tested) 3 but completed but not tested 4			Scoring updated
Prepare the Ground	1.1.1	Check box would be helpful e.g., example	Not sure we can do it with items in Scorecard		Separated into 2 questions to make simpler and included bullet points of what should be included.
Prepare the Ground		Splitting Questions many reports			
Prepare the Ground		Summary needs for the baseline			
Prepare the Ground		Common understanding of NBS			Glossary added to Scorecard
Prepare the Ground		Comments for overall score are missing			Cell added
Prepare the Ground		more data is always possible		Addressed in the Guidance	

Prepare the Ground		Discussion about stakeholder report		Addressed in the Guidance	
Prepare the Ground		stakeholder mapping feeds into stakeholder engagement strategy		Addressed in the Guidance	
Prepare the Ground		not tested is wrong to less-everything achieved is too much			Scoring updated
Shared Vision	2.1.2	Are diff departments of gov involved			This has been clarified in the question.
Shared Vision		What is a vision? Definition		Addressed in the Guidance	A glossary has been included.
Shared Vision	2.1.1	Avoid yes or no questions. Maybe add to 2.1.1: "to which extent the stakeholder engagement is"	Needs to be reflected in Scorecard		Reviewed all score-card questions to make them more suitable
General		Reformulate yes/no question in a way that the answer with 0-5 are appropriate	Needs to be reflected in Scorecard		Reviewed all score-card questions to make them more suitable
Shared Vision	2.1.2	this → stakeholder engagement strategy + key departments	Needs to be reflected in Scorecard		Securing support of departments clearer in question.

Shared Vision	2.1	Possible to answer just on regional basis - not lower Austria			Have included extra information on defining
Define Pathways		Challenging Questions			Have reviewed questions and made clearer where possible.
Define Pathways		Scores should fit better to questions			Reviewed all score-card questions to make them more suitable
Define Pathways	3.1.1	We need agreed action plan	NULL		
Define Pathways		forces/rules behind agreed docs	This is supported with greater clarity in question 2.1.2		
Take Action		"regional plan" is not clear	Comment unclear		
Take Action	4.2.1	Include 'action'			Updated to 'action plan'
Learn & Reflect	5.2.2	no gaps are good?	Needs to be reflected in Scorecard		Question updated to be a process of identifying gaps
General		When discussing on NbS, we need to focus on specific issues, e.g., greening urban space.	This is unavoidable - discussion should occur and consensus reached.		

		Otherwise answers to the Qu's will differ			
General		Audience of the tool has to be thought about and made clear. Recommend people who are technical who can then translate these concepts to other stakeholders in appropriate settings.	Clarify audience of the tool and the need for some technical expertise	Guidance includes clarification on who should fill out this tool e.g., led by regional co-ordinators and supported by representatives with some experience of adaptation, NbS techniques	Context added to identification tab
General		People don't want to score badly		Will be explained in guidance	
General		Recommend not using excel as the format for discussion (and only in the background). Rather discussion around what strategies exist. Facilitator makes decision in the end	Thought (longer-term) will be put into how engagement with Scorecard can be supported in a more engaging way	Recommendation not to answer all questions in one day.	
General		Scoring. Option for "Some initiatives exist but there is no systemic approach"	Add more scores including "Partially. Some activities exist but without a systemic approach.		Scoring Updated.
Prepare the Ground		Expert level questions		Clarification that some expertise is needed in guidance	

Prepare the Ground		Questions dependent on interpretation		Make clear in guidance that we include several people when answering to reduce variability depending on interpretation	
Prepare the Ground		Questions not suitable for smaller municipalities		Clarification that some expertise is needed in guidance	
General		Answers will be very dependent on experience e.g., recent catastrophic floods.		Include some info in guidance on how answers may depend on recent events and that that is expected.	
Prepare the Ground	1.2.2	Unclear what a stakeholder map is	Can we include intros to stakeholder mapping		Included in glossary
Prepare the Ground	1.3.2	Make clear it is human capacities/capabilities	Make clear it is human capacities/capabilities		Included 'human in question 1.3.2
Prepare the Ground	1.1.1	Potentially use word baseline - people spoke about strategies	Include report which 'collects available information on ...'		Have adapted text to make it clearer this is 'collecting available relevant information'
Shared vision		These are regional/national level questions. Although Tulln had engagement strategy so some municipalities can respond	NULL		

Shared vision		More clarification of vision	Can we include intro to concept of vision		Included in glossary
Shared vision		Multi-scale alignment of regions (how to align visions)	Does there seem to be some acknowledgement of dealing with multiple overlapping visions in a region		Question added at beginning to review existing structures e.g., visions
Shared vision		Good visions take time!	NULL		
Shared vision		Austria has a lot of visions/goals/strategies that regions signed up to			Questions added at beginning to review existing structures
Shared vision		No more visions → take action			
Shared vision	2.2.1	Difficult to generalise 0 done in some places/areas		Have added text that there may be disagreements on score and the discussion is the most important part.	
Define Pathways		Legal obligations	Can we include the importance of gaining legal backing to regions signing up to visions/strategies?		Clarified Qu 2.1.2 on securing high level support.
Define Pathways		from theory to practice - large gap theory - vision practice - concrete	NULL		

		measures that the vision contains			
Define Pathways	3.1.2b	repetition	Remove question as repetitive		This question is an important part of the cycle.
Define Pathways	3.2.1	Scope is not clear			Question further clarified "Have the identified solutions been assembled into a portfolio of interventions as a pathway? i.e., where options have been prioritised based on their urgency, relevance, effectiveness, and feasibility within the regional context."
Define Pathways		the power of strategies is overestimated	NULL		
Take action		Should include a question on whether co-benefits of consideration climate or NbS have been	Include new question on whether co-benefits have been communicated.		New question added in Take Action on communicating co-benefits

		communicated successfully to other departments			
Take action	4.1.1	This qu needs to be answered by someone with enough knowledge	Include grading with "Unknown - discussion with others required."		Scoring updated
Take action		spatial planning highly political issue	NULL		
Take action		The strategy in region/city is in line but not inform	NULL		
Take action		The scoping is very important	NULL		
Learn & Reflect		Data is often available but not considered when taking decisions e.g. flooding software Hora 3D available → not considered when homes were built	NULL		

Annex 4 – Models Supporting Transformational Change

The Regional Resilience Journey

Section 4.4 discusses the Pathways2Resilience Regional Resilience Journey. The currently available steps are included here.

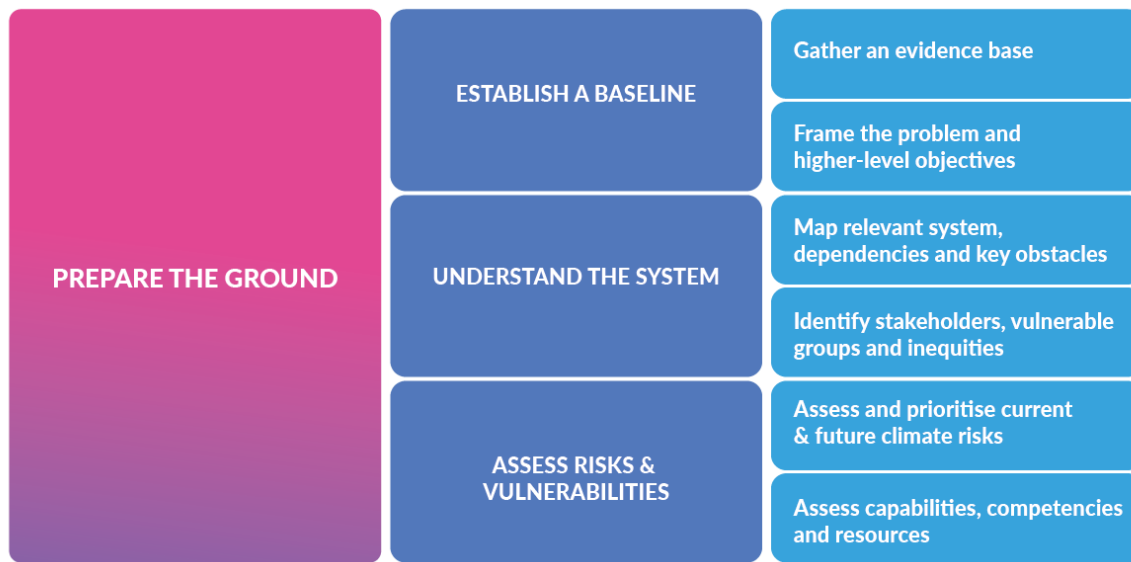


Figure 18 RRJ Prepare the Ground

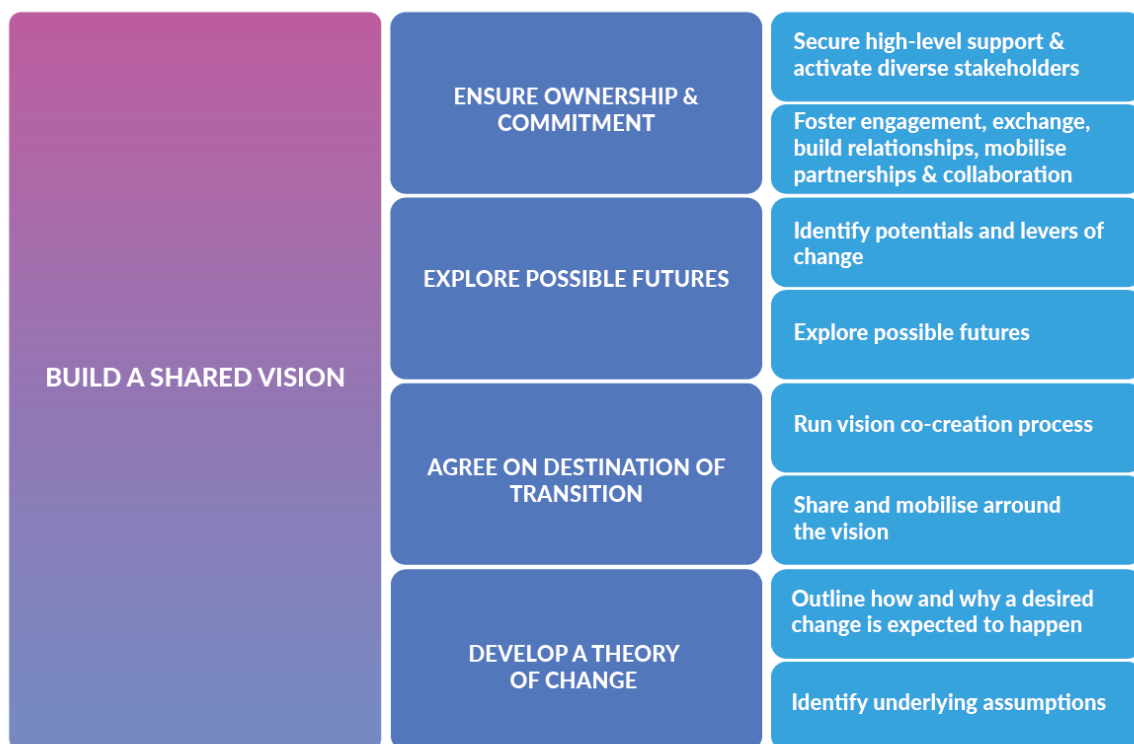


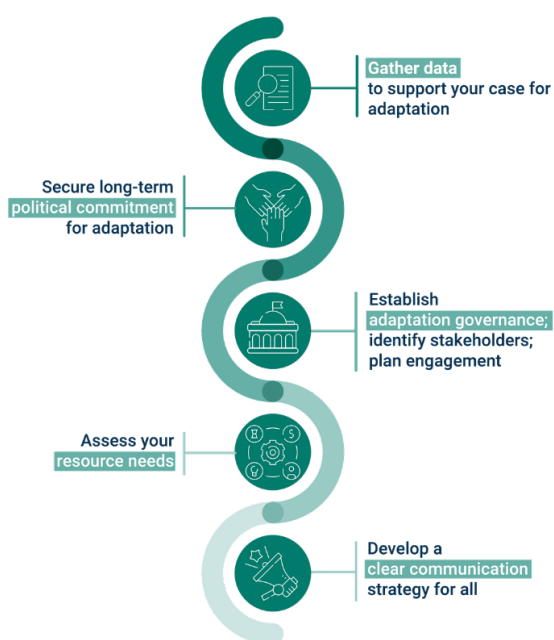
Figure 19 RRJ Build a Shared Vision Stage



Figure 20 RRJ Define Pathways

Regional Adaptation Support Tool

Section 4.2 discusses the Regional Adaptation Support Tool. The images available on the website for the first two steps are included here:



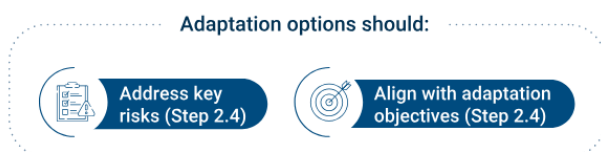
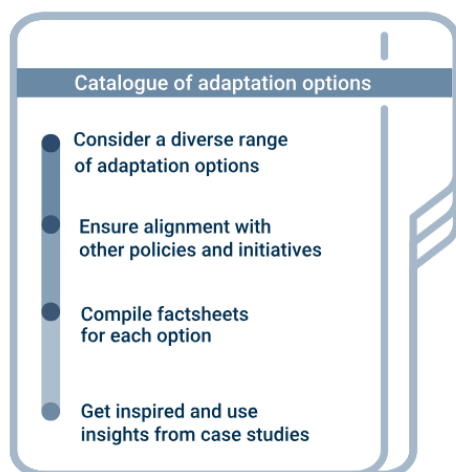
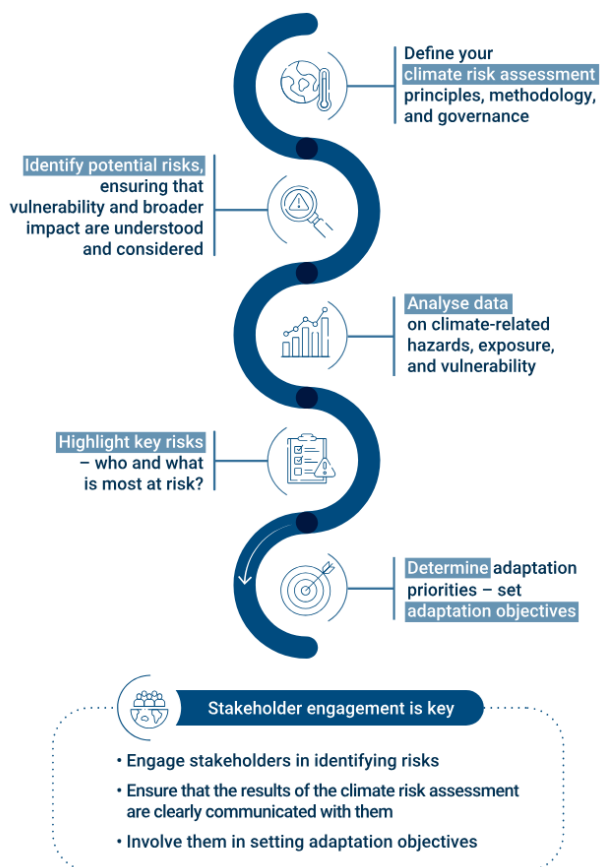


Figure 23 RAST Step 3 Identifying Adaptation Options

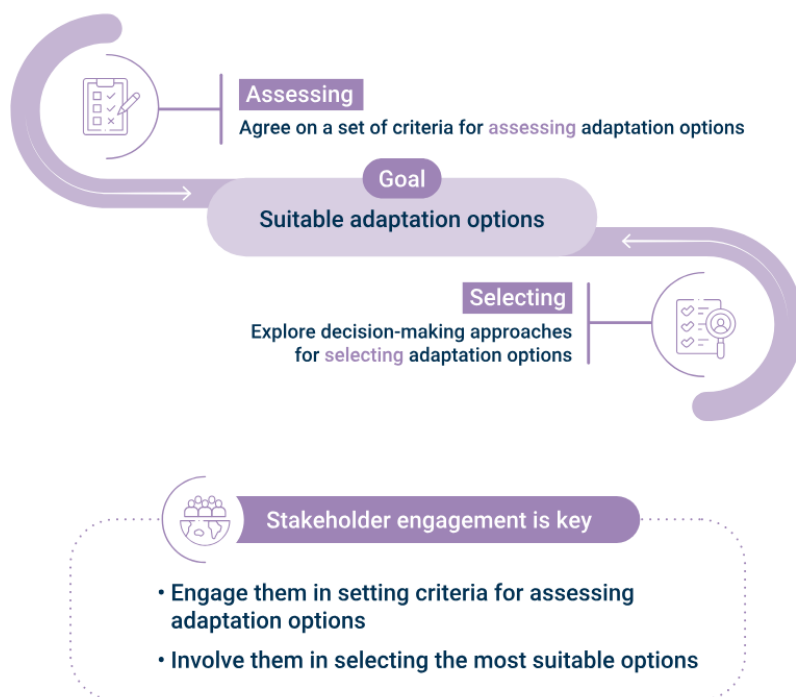


Figure 24 RAST Step 4 Assessing and Selecting Adaptation Options

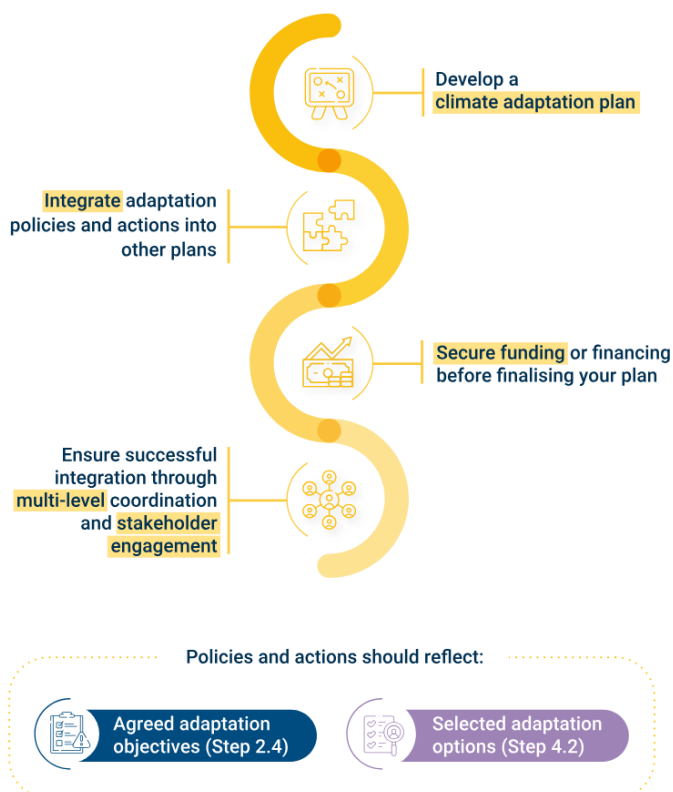


Figure 25 RAST Step 5 Implementing Adaptation Policies and Actions

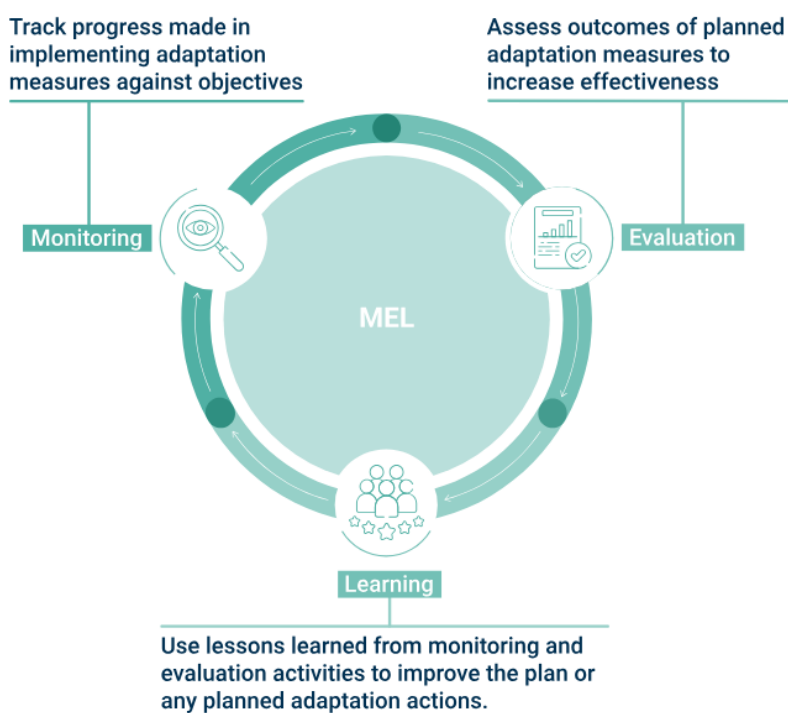


Figure 26 RAST Step 6 Monitoring, Evaluation and Learning

NetZero Cities Climate Resilient Map

Section 4.3 describes the NetZero Cities Climate Resilient Map. The available stages are shown here.

Build a strong mandate

Build a strong mandate	Within city government	Set up / strengthen the internal team
		Mobilise resources and capacity
	Within the local ecosystem	Develop a multi-actor Transition team
		Build new collaborative governance structures and networks
	With the other government levels	Strengthen buy-in
		Clarify mutual commitments

Understand the system through

Understand the system through	Data	GHG emissions inventory
		Analyse actions and gaps needs
	Connections, relationships	Map the system and resources flows
		Identify key obstacles
	Future scenarios	Identify levers of change
		Model options, capital formation, funding strategies

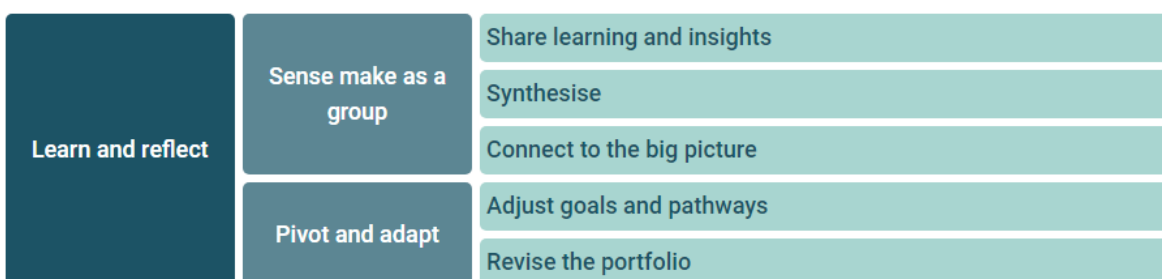
Co-create a portfolio

Co-create a portfolio	Explore actionable pathways	Clarify possible actions and financing / funding options
		Estimate co-benefits and impact
		Select impact indicators
	Connect interventions across...	Actions with quantified impact
		Policy
		Finance

Take action



Learn and reflect



Make it the new normal



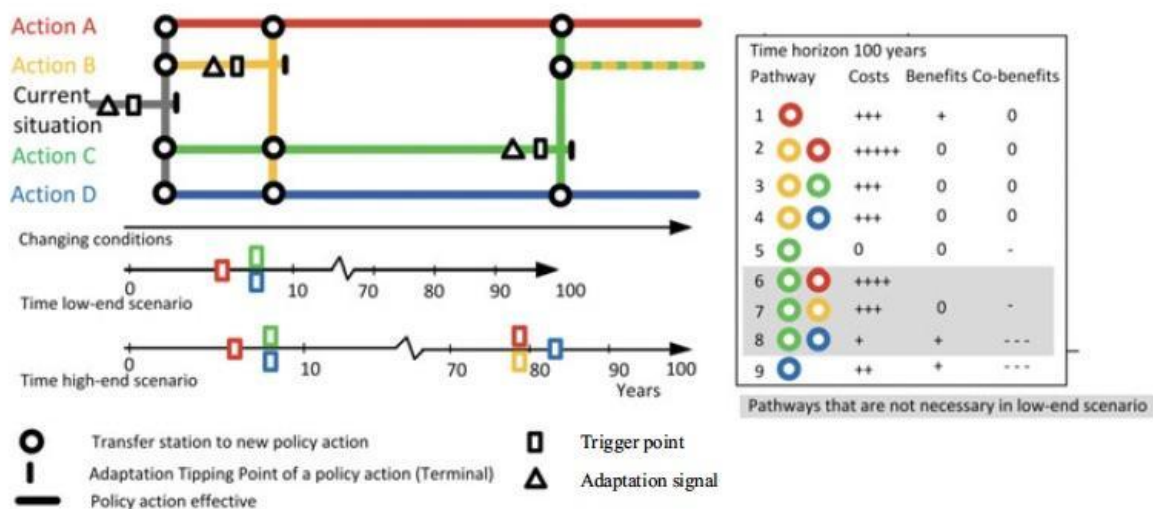
Figure 27 The Six Stages of the Climate Transition Map

Dynamic Adaptation Policy Pathways

Section 4.1 discusses the DAPP model. Here we include the detailed steps of involved in creating the pathways.

1. Participatory problem framing, defining:
 - o boundaries of a system of interest
 - o performance objectives, including conditions of success for the system used to evaluate performance of policy options

- o current and future vulnerabilities (i.e., conditions/risk factors for which the system (will) fail to achieve acceptable objectives). Vulnerabilities may be:
 - o intended to be managed by actions or policy options, e.g., reservoir development to support water users and associated uses, education to support the adoption of best practices, micro irrigation systems to improve water efficient uses at the field level
 - o non-manageable factors with uncertainty as to how they may evolve, to be described within narratives ([scenarios](#)), e.g., climate change, national legislation, global markets, population growth.
 - 2. Identification of adaptation [tipping points](#) (ATPs), i.e. conditions and timing of failure for the current system when facing different future scenarios. Approaches to identify ATPs (i.e., threshold values) include:
 - o 'bottom-up' approaches: [stress tests](#) through sensitivity analyses, [scenario discovery](#), expert judgement, and/or stakeholder consultation
 - o 'top-down' approaches: model-based assessment using static or transient [scenarios](#)
 - 3. Identification of alternative actions based on step 1 and 2, to address identified vulnerabilities or opportunities, followed by determination of their ATPs
 - 4. Design and assessment of the [adaptive pathways](#). This stage leads to the design of a pathway map (see figure below), also referred to as a "metro map", with different pathways evaluated in terms of performance objectives for the system.
- Opportunities, no-regret actions, lock-ins and their associated timing of implementation under changing conditions can be inferred from the map.



Methods to develop and explore adaptive pathways include:

- o drawing them manually
- o using a dedicated application such as the [Pathways Generator](#)
- o based on models such as agent-based models, using multi-objective robust optimisation, serious games
- o during stakeholder focus group discussions

- using a combination of model-based assessment and group discussions
- 2. The performance of each pathway is then evaluated and recorded in a scorecard.
Methods of evaluation include:
 - cost-benefit analysis
 - multi-criteria analysis
 - real options analysis
- 3. Design of the adaptive strategy in terms of:
 - Selection of near term and alternative (long-term) actions from the map
 - Contingency actions to support the achievement of the selected pathways
 - A [monitoring plan](#), describing signposts (indicators) and [triggers](#) (threshold values) for implementing or not actions according to future conditions
- 4. Implementation of the adaptive plan
- 5. Monitoring of the strategy and re-evaluation of the plan, if necessary