NBRACER
Nature Based Solutions
for Atlantic Regional Climate Resilience

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Report on concepts and approaches for regional transformative capacity

Deliverable 6.1

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About NBRACER

The impacts of climate change on people, planet and prosperity are intensifying. Many regions and communities are struggling to avoid losses and need to step up the effort to increase their climate resilience. Ongoing natural capital degradation leads to growing costs, increased vulnerability, and decreased stability of key systems. Whilst there has been noticeable progress and inspiring examples of adaptation solutions in Europe, the pressure to make rapid and visible progress has often led to a focus on stand-alone, easy-to-measure projects that tackle issues through either direct or existing policy levers, or sector-by-sector mainstreaming. But the dire trends of climate change challenge Europe, and its regions, needs exploration of new routes towards more ambitious and large-scale systemic adaptation. The European Mission on Adaptation to Climate Change (MACC) recognizes the need to adopt a systemic approach to enhance climate adaptation in EU regions, cities, and local authorities by 2030 by working across sectors and disciplines, experimenting, and involving local communities.

NBRACER contributes to the MACC by addressing this challenge with an innovative and practical approach to accelerating the transformation towards climate adaptation. Transformation journeys will be based on the smart, replicable, scalable, and transferable packaging of Nature-Based Solutions (NbS) rooted in the resources supplied by biogeographic landscapes while closing the NbS implementation gap. Regions are key players of this innovative action approach aiming at developing, testing, and implementing NbS at systemic level and building adaptation pathways supported by detailed and quantitative analysis of place-specific multi-risks, governance, socio-economic contexts, and (regional) specific needs.

NBRACER works with 'Demonstrating' and 'Replicating' regions across three different Landscapes (Marine & Coastal, Urban, Rural) in the European Atlantic biogeographical area to vision and co-design place based sustainable and innovative NbS that are tailor-made within the regional landscapes and aligned with their climate resilience plans and strategies. The solutions are upscaled into coherent regional packages that support the development of time and place specific adaptation pathways combining both technological and social innovations. The project is supporting, stimulating, and mainstreaming the deployment of Nature-Based Solutions beyond the NBRACER regions and across biogeographical areas.

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Summary

Objective The NBRACER Process-Supporting Framework for Regional Transformative Capacity, developed under WP6, is designed to guide regions[1] through the various steps of their transformative journey toward climate resilience through the strategic use of Nature-based Solutions (NbS).

Understanding the need for transformation Fragmented, short-term NbS pilots cannot meet the pending climate challenges in the regions. To build regional resilience, NbS must scale from isolated projects to systemic, integrated strategies – which means reframing how we think, govern, and collaborate. That shift requires inclusive governance, strong stakeholder engagement, coherent policies, and sustainable financing - core focuses of WP6.

What the framework is The NBRACER Process-Supporting Framework equips regions to strategically coordinate actions and build regional transformative capacity to enable scaling of NbS. It uses clear concepts and approaches to make complex transformation for climate resilience more communicable and solvable. Grounded in scientific disciplines from biodiversity, climate adaptation, psychology, and regional innovation sciences, it provides a practical, interdisciplinary guide for WP6 support.

The NBRACER Process-Supporting Framework (Figure 1**)** builds on scientifically validated and internationally recognised concepts for supporting regional transformation towards climate resilience. The selected concepts serve as foundations to guide the strategic and operational transformations in the regions towards climate resilience via NbS. The concepts support NBRACER regions by clarifying who needs to be involved (Quadruple Helix), which underlying principles should guide the collaboration processes (Guiding Principles of Transformative Governance), what kind of processes are driving transformation (Regional Transformative Capacities) and where change needs to occur (Three Spheres of Transformation) (Carayannis & Campbell, 2009; Hölscher, Frantzeskaki, & Loorbach, 2019; Karen O'Brien & Sygna, 2013; Visseren-Hamakers et al., 2021). Carayannis and Campbell (2009); Hölscher et al. (2019); Karen O'Brien and Sygna (2013); (O'Brien, 2018); Visseren-Hamakers et al. (2021)

[1] A region is any subnational territory with a defined governance structure and the capacity to act on climate adaptation, which can include provinces, counties, municipalities, intermunicipal entities, or functional territories such as river basins or metropolitan areas. *(Source: Horizon Europe Mission on Adaptation Work Programme, and Mission Implementation Plan, 2021–2023)*

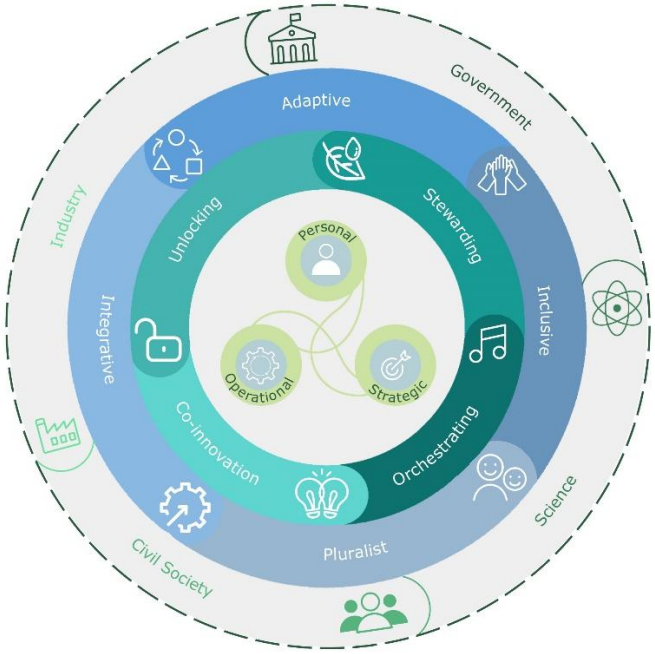

Figure 1: NBRACER Process-Supporting Framework for Regional Transformative Capacity: Quadruple helix (outer ring), Principles of Transformative Governance (blue ring), Interconnected Transformative Processes (green ring) and Integrated Spheres of transformation (inner circle with three spheres). Inspired by Ipbes (2024a)

This report introduces key concepts and approaches for building regional transformative capacity and discusses their relevance for NbS implementation. It further provides practical tools to operationalise the framework in the regions. Finally, the report presents a living resource of the regional transformative assessments and highlights potential opportunities for NBRACER demonstrating and replicator regions to deploy over the next two years to support their regional climate resilience.

Key words

Transformation, nature-based solutions, governance, processes, principles, scaling, networks, adaptation, resilience, Mission, capacity, region.

Abbreviations and acronyms

Acronym	Description
CINEA	European Climate, Infrastructure and Environment Executive Agency
EU	European Union
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
KCS	Key Community Systems (e.g., health & wellbeing; land use & food systems; water management & critical infrastructure)
KPI / KPIs	Key Performance Indicator(s)
MACC	Mission on Adaptation to Climate Change
MIS	Mission-oriented Innovation System
NBIS	Nature-Based Innovation Systems
NBRACER	Nature-Based Solutions for Resilient and Climate-just European Regions (project title)
NbS	Nature-based Solutions
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Co-operation and Development
P2R	Pathways2Resilience
PES	Payments for Ecosystem Services
RRJ	Regional Resilience Journey
SDG	Sustainable Development Goal
SoS	System-of-Systems (framework used to integrate landscape archetypes across bio-physical, social, governance domains)
TIS	Technological Innovation Systems
WP	Work Package

1 Introduction to the NBRACER Process-Supporting Framework

1.1 The NBRACER approach

The NBRACER project has adopted a holistic operational approach to enhance climate resilience at the regional level, considering multiple and overlapping climate hazards. The NBRACER approach builds upon existing frameworks like the adaptation cycle and the Pathways2Resilience (P2R) Regional Resilience Journey (RRJ). The NBRACER approach consists of eight steps that helps regions to accomplish their regional resilience. Each step demonstrates how the specific tasks and outputs across the NBRACER Work Packages (WPs) supports the regions. However, rather than following a strictly linear process, the approach embeds a degree of non-linearity, as interactions across the steps are influenced by feedback loops and interdependencies. This is particularly evident in the integration of landscape archetypes within a conceptualized System of Systems (SoS) framework, which operates across three interconnected domains: bio-physical, social, and governance. These dynamic relationships introduce emergent properties, reinforcing the complexity of the process. The integration of these frameworks is illustrated in Figure 2. This report focuses specifically on the NBRACER Process-Supporting Framework developed under WP6, which is designed to guide regional stakeholders to strengthen their regional transformation capacity through the various steps of their transformative journey. It offers guiding concepts to structure transformative processes in regions, identify transformation opportunities and governance gaps, and support the effective introduction of activities to accelerate transformation. The WP6 framework works in close collaboration with the technical framework developed by WP5, ensuring that regions receive comprehensive support-both in process facilitation and in applying technical content-throughout their transformation toward nature-based climate resilience.

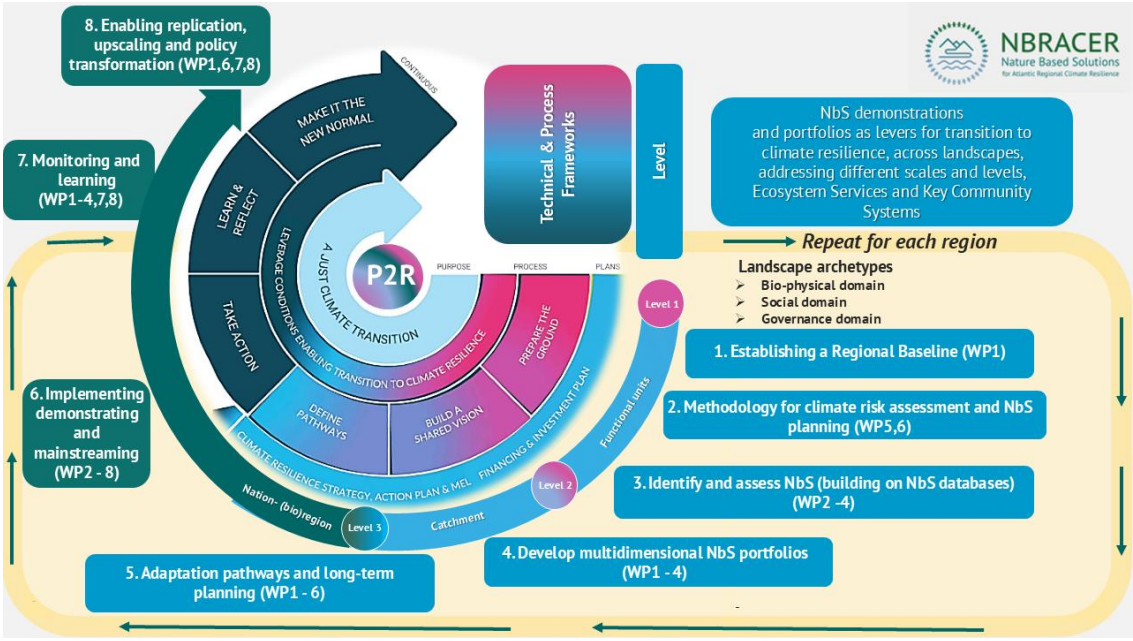

Figure 2: Overview of the NBRACER Approach with 8 steps, elaborating an iterative process for achieving a just climate transition through multi-level, multi-scale and multi-domain planning.

1.2 Accelerating transformation: the role of the NBRACER Process-Supporting Framework in identifying and enabling transformation opportunities

The NBRACER Process-Supporting Framework is grounded in the understanding that fragmented, short-term NbS approaches are insufficient to address the complex challenges posed by climate change. However, to move from localized pilot projects to systemic approaches, scaling and transformation of governance are needed. This means not just doing things differently, but changing the way we think, govern, and collaborate.

Therefore, NBRACER regions will get support to enhance their transformative capacity by the guidance of concepts and approaches in this document. These concepts and approaches help to structure and enhance the understanding about the transformative processes in the regions. The analysis will lead to the identification of so-called 'transformative governance opportunities and gaps'. These opportunities and gaps will then be used to co-design strategic activities and interventions with the regions, aimed at leveraging the opportunities to accelerate transformation. To scale and to transform, regions will be supported by inclusive governance, strong stakeholder engagement, coherent policies, and sustainable financing. These components align with the core tasks of WP6.

In NBRACER regions are facing several governance challenges in scaling NbS to build climate resilience - challenges that are widely acknowledged in the scientific literature on climate resilience, NbS, and systems transformation (Arbau, 2024; Béné, Godfrey Wood, Newsham, & Davies, 2012; Biesbroek, Klostermann, Termeer, & Kabat, 2013; Chappin et al., 2024; ClimateReadyClyde – Resilient Regions: Clyde Rebuilt, 2020; Dorst et al., 2022; Ipbes, 2024a; Moser, Ekstrom, & Kasperson, 2010; Seddon et al., 2020; Vermunt et al., 2022)

These barriers can be defined as the difficulties people face when planning, designing, deciding on, or implementing NbS. While the way these challenges are framed or categorized may differ depending on context and perspective, a consistent set of barriers tends to emerge across different analyses.

- Institutional and governance barriers – Lack of policy integration, weak national support, strategies, and priorities missing, unclear mandates, aversion of politicians, too generic plans, conflicting policies, bureaucratic competition for resources and priorities, lack of coordination among actors and fragmented decision-making processes.
- Financial and economic barriers – Limited funding, potentially high upfront and maintenance costs, undervaluation of NbS benefits, leading to low revenues, market failures, misaligned incentives, limited adaptation finance, financial mechanisms and arrangements lacking.
- Social barriers – Lack of public awareness, resistance to change, raising concerns is challenging, group think, community pressure, lack of community support, risks perceptions and conflicting stakeholder interests.
- Cultural barriers – Existing underlying narratives, unsustainable paradigms (such as urban densification), working cultures, societal role of science, social perceptions of the role of

nature and grey infrastructure in development, the influence of media, cultural biases, business as usual inertia.

- **Technical and knowledge barriers** – Gaps in expertise, insufficient data, complex knowledge, risks are not perceived, asymmetric information, and uncertainty, competing techniques and not compatible with surroundings.
- **Legal and regulatory barriers** – Inconsistent laws, permitting challenges, and regulatory constraints and unsupportive legislation that limit decision-making and hinder large-scale implementation.

The following overview in Table 1 illustrates a range of barriers experienced in West Flanders that hinder the effective planning, implementation, and scaling of NbS for climate resilience.

Table 1: Examples of transformation barriers from West-Flanders

Institutional and governance barriers	• Lack of a unified climate resilience vision & NbS integration in long-term regional transformation and scaling strategies. • Lack of framework for monitoring, performance assessment and maintenance of NbS • Weak cross-departmental coordination for adaptation planning
Financial and economic barriers	• High maintenance and operational costs of collective NbS • Unclear financial roles among partners in funding models • Disconnection between costs & benefits with few incentives to invest for citizens & municipalities • Long-term uncertainty for private and collective investors
Social barriers	• Lack of knowledge & trust in NbS performance among local farmers and citizens • Limited NbS collaboration among farmers • Missing sense of urgency, competing societal priorities and "not in my backyard" mentality • Insufficient alternative workshop formats and integration of inclusive participation and effective stakeholder engagement into existing activities
Legal and regulatory barriers	• Lack of regulatory support for supporting, enforcing, and scaling solutions • Policy/legal barriers restricting flood-prone land transformation

These barriers are often perceived as isolated constraints, but as Biesbroek et al. (2013) emphasize, "barriers should not be seen as insurmountable limits. Instead, they are socially and institutionally constructed challenges that can be navigated and transformed through targeted interventions." As Biesbroek (2013) argues, addressing these barriers requires shifting the focus from fixing isolated obstacles to enabling systemic change through strategic multifaceted interventions. Such interventions are then aimed to strengthen the transformative capacity in a region by fostering a number of enabling conditions (Biesbroek et al., 2013; Hölscher et al., 2019).

In line with this finding, the NBRACER Process-Supporting Framework does not treat barriers as isolated problems but embeds them within a multi-level, process-based transformation logic. This finding is reflected in the selection of key concepts.

1.3 Creating and using the NBRACER Process-Supporting Framework

The NBRACER Process-Supporting Framework is meant as a guidance document supporting regional transformation to resilience. It is built on and integrates interdisciplinary concepts, drawn from recent scientific literature on transformation processes. These concepts can constitute powerful tools for policymaking, with strong practical applications. They provide important complementary insights from different perspectives, which are valuable when navigating complex regional transformation processes (Gatley, 2023). The NBRACER Process-Supporting Framework is intended to help regional partners navigate complexity more effectively, enhance collaboration, and drive meaningful change in order to strengthen the regional transformative capacity.

The framework emerged from an exploratory and iterative review of relevant scientific literature. Rather than following a fixed or systematic review protocol, we began with broad search terms such as "transformation processes," "just transition," "regional innovation," and "governance of change." From there, a snowballing method was used to follow key citations, authors, and recurring themes across disciplines. This approach allowed us to gradually build a cross-cutting understanding of the most relevant and applicable concepts that were coming from different scientific disciplines like:

- Biodiversity and transformational change research, informed by the work of IPBES.
- Climate adaptation research, aligned with findings of the IPCC and related bodies.
- Regional innovation ecosystem research, including co-creation and place-based innovation theories.

While not exhaustive, this literature screening method was well suited to the interdisciplinary and dynamic nature of the topic of transformation. By exploring literature from these three main research domains, we were able to identify the most relevant elements that would help the NBRACER regions to accelerate transformation-although often labelled and framed differently across disciplines. This comparison of the concepts across the research domains to the identification of four key concepts that underpin the NBRACER Process-Supporting Framework, reflecting both responsiveness to emerging insights and relevance to policy and practice.

Yet no framework can be entirely comprehensive. Regional processes are inherently complex and context-dependent and will always include elements that lie beyond the scope of any structured guidance. This is an inherent characteristic of any Process-Supporting Framework.

The NBRACER Process-Supporting Framework builds on scientifically validated and internationally recognised concepts for supporting regional transformation towards climate resilience. namely: the Quadruple Helix Collaborations by Carayannis and Campbell (2009), the Four Guiding Principles for Transformative Governance by Visseren-Hamakers et al. (2021), the Transformative Climate Governance Capacities by Hölscher et al. (2019) and three Spheres of

Transformation by Karen O'Brien and Sygna (2013). The NBRACER Process-Supporting Framework integrates and adapts these concepts to the context and purpose of fostering regional climate resilience and wellbeing using NbS. Each of the integrated concepts provides an important aspect for NbS implementation.

The selected concepts serve as foundations to guide the strategic and operational approaches in the regions towards climate resilience. The concepts support NBRACER regions by clarifying *where change* needs to occur (Three Spheres of Transformation), *who* needs to be involved (Quadruple Helix), *what kind of processes* should be fostered (Transformative Climate Governance Capacities) and the *which underlying principles* should guide these processes (Guiding Principles of Transformative Governance).

2 Key concepts of the NBRACER Process-Supporting Framework

2.1 Framing Nature-based Solutions from a systemic perspective

2.1.1 Defining Nature-based Solutions

According to the European Union's definition, NbS are 'solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience' (Faivre, Fritz, Freitas, de Boissezon, & Vandewoestijne, 2017) . Such solutions can bring more, and more diverse nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions (Faivre et al., 2017).

In the NBRACER project, NbS are central because they contribute to climate resilience while also generating a range of other socio-economic benefits for the regions. This definition aligns with an instrumental approach to using of nature, more specifically that nature has the potential to support human flourishing and wellbeing (IPBES, 2022b).

2.1.2 From a systemic perspective

In NBRACER the aim is to foster transformative change by scaling up NbS into ambitious, systemic, and large-scale climate resilience strategies that integrate multiple sectors, disciplines, and actors across the EU. This approach is anchored in a systemic perspective that focuses on increasing climate resilience in the key community systems (KCS) (European Commission, 2021), being (Figure 3)

- Ecosystems and nature-based solutions
- Land use and food system
- Water management
- Health and human wellbeing
- Critical infrastructure
- Local economic systems

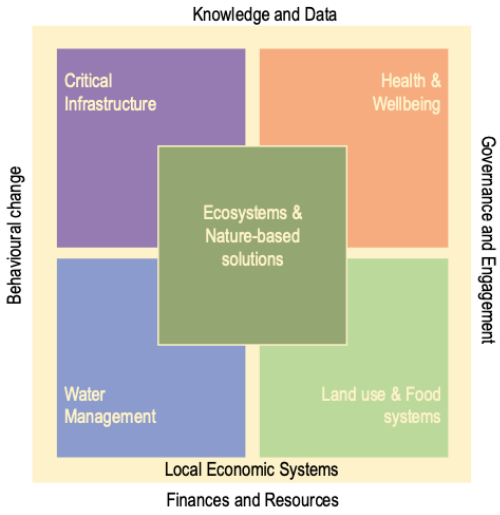

Figure 3: Key Community Systems for Climate Adaptation

The KCS are in one or another way impacted by climate change and their interrelationship affects how vulnerable these systems are to climate change. Nature is being seen as an underlying system that is able to build the resilience of these KCS. While NbS have already been embraced in ecosystem management to enhance biodiversity, prevent disasters, and support climate change mitigation and adaptation, (like wetland restoration at the Danube River in Austria, or Peatland restoration in Finland) review on NbS indicated that the investment in - and highly likely also the realisation of - NbS addressing human health, food security, and water security remain limited (Balzan et al., 2022; Dunlop et al., 2024).

In order to design natural systems that support regional climate resilience, it can be necessary to rethink and reframe our approach to natural systems and NbS. A powerful paradigm (or worldview) deeply entrenched in most Western societies suggests dualities and distinct boundaries between humans and nature, between economy and ecology, between specific groups within society, and between disciplines. As a result, NbS and the natural systems are not fully integrated into the existing governance and policy frameworks that shape economic and social development processes. More specific, NbS are rarely integrated in governance and policy frameworks that support the design, planning, decision-making, and implementation of developments in or across all key community systems (Chausson, 2024).

NBRACER's approach seeks to overcome this dichotomy by promoting a more holistic perception of social-ecological challenges that integrate the natural systems with the social and economic systems through NbS. A more holistic perspective can be visualized by the Sustainable Development Goals' Wedding Cake model developed by the Stockholm Resilience Centre (Stockholm Resilience Centre, 2016). Figure 4 illustrates the change over time in how nature is positioned in society and economy from a Western cultural perspective and how it could evolve towards the SDG Wedding Cake model that illustrates that:

- The biosphere (natural system) forms the foundation, supporting both societal well-being and economic prosperity.
- Economic and social systems are understood as dependent on and embedded within healthy ecosystems.

- NbS is a way to reconnect social and economic systems with nature to increase regional climate resilience.

These systemic and integrated NbS strategies can be seen as ways to approach climate change in a holistic way. Framing NbS from such a holistic and systemic perspective therefore requires a transformation in the way we govern. This means that to develop such NbS strategies, NBRACER will unite different forms of knowledge and the unique strengths they may bring to identifying and solving problems. Integrative approaches driven by the growing awareness that single disciplinary approaches to climate change are insufficient and do not attend to the needs of diverse actors, thus limiting their local significance and capacity for sustained impact (Bentz, O'Brien, & Scoville-Simonds, 2022; Rau, Goggins, & Fahy, 2018).

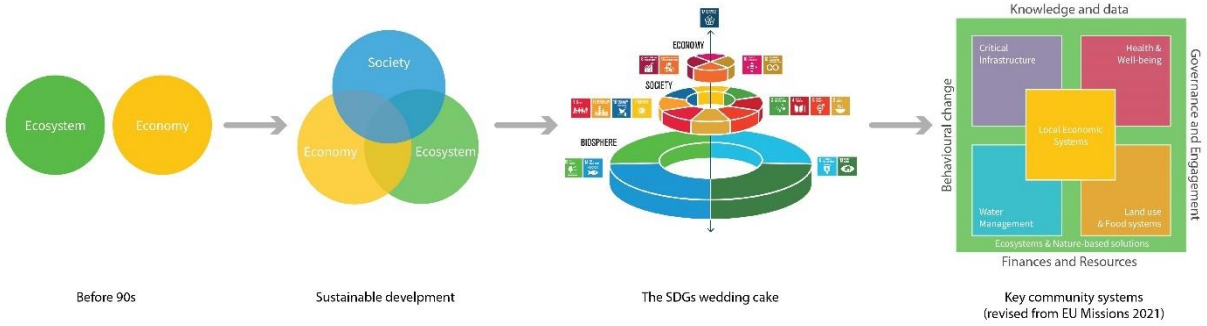

Figure 4: NBRACER approach to transform key community systems

2.2 Transformation and transformative change

Looking at NbS from a systemic perspective requires transformation. Transformation has become an important keyword in discourses around climate change and sustainability. It is referred to the United Nations Sustainable Development Goals (SDGs) (UN General Assembly, 2015) and in science-policy forums, such as the Intergovernmental Panel on Climate Change (Ipcc et al., 2018) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (Ipbes, 2019, 2024a)Transformation can be defined as 'changes in form, structure, or meaning-making' (Karen O'Brien & Sygna, 2013), or as 'the altering of fundamental attributes of a system (including value systems; regulatory, legislative, or bureaucratic regimes; financial institutions; and technological or biological systems)' (IPCC, 2012). According to the recent IPBES Assessment Report, 'Transformative change is defined as fundamental, system-wide shifts in views, structures, and practices. Deliberate transformative change for a just and sustainable world shifts views, structures and practices in ways that address the underlying causes of biodiversity loss and nature's decline.' (Ipbes, 2024b).

The NBRACER Process-Supporting Framework is designed to build regional capacity for accelerating transformative change. The following sections introduce a set of core concepts that guide regions in their *operationalisation* of this ambition (accelerating transformation)- clarifying what kind of changes, which actors and what kind of processes needs to be in place to foster transformative change.

2.2.3 Three interconnected spheres where change must occur

Transformation at any scale involves profound change. More specifically, there is a need for change in three different, but interconnected, spheres of action. Based on the '**Three Spheres of Transformation'** framework (Karen O'Brien & Sygna, 2013; O'Brien, 2018; Sharma, 2007) these spheres are the operational (or practical) sphere, the strategic (or political, systemic) sphere, and the personal sphere of transformation.

The operational sphere includes technical, managerial, and behavioural responses that can be observed and measured and are often associated with specific goals or targets.

The strategic sphere represents the norms, rules, regulations, and incentives that facilitate or impede changes in the practical sphere. Action and inaction in the operational and strategic spheres are influenced by subjective views and perceptions of the world.

The personal sphere acknowledges the significant role of individual and collective beliefs, values, worldviews, and paradigms in change processes. They influence how systems are viewed, which theories, relationships and goals are considered legitimate or desirable, and which interventions are prioritized.

The 'Three Spheres of Transformation' framework recognizes that behaviours, systems, culture, and experience are interdependent, thus all three spheres are significant to sustainability transformations, particularly in relation to climate change responses (O'Brien, 2018). It suggests that even small-scale initiatives can contribute to transformation and climate resilience when they address the underlying causes and overcome barriers. Transformative efforts at different scales can reinforce and amplify each other when aligned with universal values and principles. Connecting individual and collective initiatives and "big" or "small" solutions is important while recognizing the relationships between individuals, collectives, and systems as co-arising through entangled patterns that replicate and interact across scales (K. O'Brien, Bethell, & Bjordam, 2021).

'Three Spheres of Transformation' aligns well with other frameworks and concepts such as scaling. The literature indicates that scaling is an important aspect of transformative change drawing attention to the processes how transformative initiatives are implemented and replicated via diverse types of scaling. The literature on scaling sustainability solutions points to the need for structural and systemic changes based on new ways of thinking, doing, being, and organizing. Particularly Moore, Riddell, and Vocisano (2015) **conceptual framework of scaling out, scaling up and of scaling deep** has found widespread application in different contexts and areas of research and practice (Salafsky et al., 2021). It expands Westley, Antadze, Riddell, Robinson, and Geobey (2014) concept of scaling out and scaling up with the idea of scaling deep (Salafsky et al., 2021):

- **Scaling out** involves replication and dissemination of innovations to other geographical contexts. Strategies for scaling out include taking into account the scaling conditions in the beginning of the process, deliberate replication and spreading the principle geographically and to greater numbers while protecting the integrity of the innovation. Spreading principles means disseminating principles, but with an adaptation to new contexts via co-creation of knowledge. This is the type of scaling that has been largely studied. It connects to **changes in the operational sphere**, of the 'Three Spheres of Transformation.'

- **Scaling up** involves impacting laws and policy. It aims at changing institutions at the level of policy, rules, and laws to institutionalise innovations. It addresses law and policy based on the recognition that the roots of social problems transcend places, and innovative approaches must be codified in law, policy, and institutions. Strategies for scaling up include policy or legal change efforts. This involves new policy development, partnering and advocacy. **Scaling up relates to the strategic/systemic sphere** of the Three Spheres of Transformation**.**
- **Scaling deep** involves impacting cultural roots, changing relationships, cultural values, and beliefs, in other words affecting hearts and minds. Scaling deep aims to address cultural roots based on the recognition that culture plays a powerful role in shifting problem-domains and attempts of change must be deeply rooted in people, relationships, communities, and cultures. Strategies for scaling deep include spreading cultural ideas and reframing stories to change beliefs and norms. Scaling deep also involves sharing knowledge and new practices via learning communities, and participatory approaches and investing in transformative learning and communities of practice. We can state that this is **scaling in the personal sphere.**

Transformation occurs when scaling takes place in all levels, namely scaling out, scaling up and scaling deep. The three types of scaling and their strategies can interact in powerful ways to advance transformation. The diverse types of scaling reveal the dimensions that need to be engaged in large-scale change efforts: the quantifiable numbers of people and systems, the institutional shifts in law, policy and resource flows that are necessary; and the subjective and inter-subjective transformations in values, relationships and cultural practices that support durable system-wide change. Change in all spheres is required to foster transformative change towards climate resilience. This may involve unfamiliar ways of working to tap into the personal dimensions of change, hence activities in NBRACER Task 6.3 and Task 6.4 (Wilber, 2000).

2.2.4 Four interlinked processes to build regional transformative capacity

Overcoming these barriers to transformation is a key focus of the NBRACER Process-Supporting Framework. These barriers are commonly not isolated but are deeply embedded in broader governance dynamics. Addressing them requires changing the underlying dynamics of these barriers. A crucial but often underexplored element in many frameworks that look at overcoming barriers is the aspect of *agency* -- the ability of actors to take initiative, influence change, and co-shape new governance arrangements. Strengthening agency is central to building *regional transformative capacity* (Hölscher et al., 2019), which refers to a region's ability to enable, coordinate, and sustain change across systems. The NBRACER Process-Supporting Framework uses this concept of regional transformative capacity to help regions understand the processes that can potentially shape and support transformation in their region. By analysing processes via this framework, they can identify gaps that can be turned into opportunities to accelerate transformation. These insights guide strategic and practical interventions that regions can do in NBRACER to enhance agency and to accelerate transformation. Hölscher et al. (2019); Matti, Bontoux, and Jensen (2025) Based on Hölscher et al. (2019) there are four key processes (or capacities Hölscher et al. (2019)) that jointly strengthen regional transformative capacity:

Unlocking processes, co-innovating (or co-creating) processes, stewarding processes and orchestrating processes.

- Unlocking processes: jointly reflecting and sense-making of system dynamics, unsustainable regimes, and related issues via open reflective conversations

Unlocking is the foundational process for transformative adaptation: it recognises and challenges unsustainable regimes and opens space for change by creating energy, alignment, and willingness to act. It convenes diverse stakeholders -into open, inclusive conversations to surface values, interests, and perceptions, and that build shared understanding of system dynamics, vulnerabilities, and drivers of risk (Coninx, 2017; Nalau & Cobb, 2022; Stern, 2000)

These conversations can build social capital and trust over time and help re-shape social imaginaries, the widely shared ideas through which people envision present and future thereby shifting norms and possibly strengthening human–nature connectedness (Ipbes, 2022a, 2024a). When done well, unlocking processes accelerate personal-level change (mindsets, narratives, social norms) that underpins system-level transformation. By reshaping dominant societal values and perspectives, alongside transforming cultural narratives and social norms around development, societies can progress toward a more just and sustainable future (Ipbes, 2024a).

Typical unlocking activities and outputs:

- Joint system mapping of regional dynamics and unsustainable feedbacks.
- Shared problem definition and first-cut vision for NbS and climate resilience.
- Prioritised barriers & opportunities with early ownership and next steps.

Unlocking processes are not always institutionalised; sometimes they are catalysed by civic initiatives that raise awareness, create counter-networks, or withdraw support from harmful practices-actions often seen as disruptive but which play an unlocking role (Hölscher et al., 2019).

Regions can introduce or reinforce unlocking processes at the pilot level (Tasks 2.2/3.2/4.2) and regional level (Tasks 2.3/3.3/4.3), using open dialogues to connect the natural system with social and economic systems and to shape shared visions for scaling NbS (Ipbes, 2024a).

- Co-innovating processes: advancing place based NbS together

Transformational change requires inclusive co-innovating and includes actions such as:

- Joint future visioning and scenario development to inspire innovative action.
- Developing joint innovation needs/agendas to raise the visibility of innovation opportunities and build support for change; this visibility helps forge alliances and advocacy networks among organisations, as well as internal support within organisations.
- Fostering innovation through co-design (joint ideation, pilot testing, and prototyping of NbS). This may require protected and informal spaces to nurture innovation, and the development of informal, heterogeneous networks to enable testing and experimentation.

Co-innovating is a collaborative, co-creative process that blends curiosity, joint inquiry, and imagination to shape NbS from problem framing through design, implementation, and maintenance. Co-innovating also strengthens a region's transformative capacity by aligning

actors, knowledge, and decisions across scales. It is both a process and a learnable skill. Its core principles are integrative (benefits across sectors and levels; policy-aligned), inclusive (bring in diverse and often marginalised voices), adaptive/iterative (learn and adjust over time), and pluralist (value scientific, local, and traditional knowledge). Practically, this means engaging the right stakeholders at the right time, distinguishing a circle of designers from a circle of reviewers, creating room for exploration, and working toward a clear moment of alignment when solutions are validated, and stakeholders commit to implementation. The process typically includes issue framing, option generation, participatory evaluation (e.g., multi-criteria or cost–benefit), and validation in the field-guided by reciprocity, trusted local communication, and criteria rooted in user needs.

A structured co-innovating process (WP2–3–4) helps ensure that solutions are developed collaboratively, are just and inclusive, and have the potential for long-term impact and scalability. Co-innovating moves through a clear sequence: it starts with issue framing, then knowledge gathering and diagnosis to understand systems, needs, and constraints. From there, teams co-design options in a funnel (diverge to generate possibilities, then converge on viable ones). These options go to stakeholder validation to test fit, feasibility, and equity. Finally, the process culminates in decision-making and agreement, so actors commit to implementation (Beier, Hansen, Helbrecht, & Behar, 2017; ClimateReadyClyde – Resilient Regions: Clyde Rebuilt, 2020; Harvey, Cochrane, Van Epp, Cranston, & Pirani, 2017; Hegger & Dieperink, 2014) Once co-designed, innovations need to be showcased, and future visions communicated to expand the network of actors within the innovation ecosystem. These activities are linked to orchestrating processes, as they embed innovative ideas within the regional context-by anticipating opportunities or crises, aligning structures and processes with the innovation, and mobilising resources for broader implementation. At the same time, tested experiments are strongly connected to stewarding processes, given the importance of learning from results, and using those insights to guide future actions.

- Stewarding processes: generating knowledge via monitoring of existing NbS and learning how to adjust

As regions begin implementing NbS, there is much to learn, making regular, iterative monitoring essential. Monitoring is a systematic process to collect, analyse, and use evidence to report on the performance, impacts, and progress of projects, programmes, or policy. It is key to understanding success against agreed goals and to informing timely adjustments.

Stewarding focuses on the ability to anticipate and respond to disturbances and uncertainties. It sustains resilience by enabling proactive course corrections based on ongoing monitoring. A core element is strengthening self-organisation-decentralised institutions and social networks that not only participate in monitoring and learning but also use results to adjust NbS practices and broader approaches to nature management. Stewarding also builds collective social memory, connecting past, present, and future experience to guide long-term decisions. Inclusive dialogue is central, clarifying what monitoring results imply for roles, responsibilities, and power dynamics.

Assessing NbS performance is crucial for mainstreaming NbS into regulations, norms, and plans (Breil, 2021). Monitoring, evaluation, and learning (MEL) data can inform policies for land management and urban development. Monitoring results then feed collaborative learning and

sense-making. Over time, social learning builds a common knowledge base and can foster shared identity (Lave & Wenger, 1991): initial in-group trust grows into shared purposes, which is essential for scaling and mainstreaming.

- Orchestrating processes: aligning, institutionalising, and mainstreaming

Orchestrating processes are about coordinating multi-actor efforts to align actions across sectors, governance levels, and spatial scales. These processes are essential for ensuring the long-term continuation and coherence of transformative change. Orchestration helps bringing diverse actors together around a common direction and ensures that their efforts reinforce rather than contradict one another.

Key elements of orchestrating processes include:

- Engaging diverse actor groups, embracing pluralism and inclusion.
- Defining a shared, long-term, and integrative direction, through co-creation of goals, visions, and narratives.
- Aligning strategies, actions, and stakeholders across sectors and governance levels in support of the collective vision.
- Creating formal and informal spaces for dialogue, knowledge exchange, and trust-building.
- Embedding successful practices into policies and structures by establishing enabling conditions and supportive institutions.
- Building coalitions and partnerships across the quadruple helix-government, academia, industry, and civil society-to foster ownership, accountability, and joint implementation.
- Integrating long-term and cross-scale thinking into decision-making processes to support future-oriented governance.
- Designing institutional arrangements that enable synergy, coordination, and action aligned with transformation goals.

Orchestrating processes play a crucial role in navigating complexity, ensuring consistency across efforts, and anchoring transformative change in the regional context.

The different strategic collaboration between relevant internal and external stakeholders (in triple or quadruple helix) are also documented in NBRACER T1.3. Here it is referred to as: Intra- and inter-organizational mainstreaming. It promotes collaboration between individual sections or departments and other stakeholders, e.g., other departments, committees, organizations, governmental bodies and civil society, to generate shared knowledge, develop competence, and take joint actions to advance adaptation (Holden, 2004; Pelling, High, Dearing, & Smith, 2008; Roberts & O'Donoghue, 2013; Sitas, Prozesky, Esler, & Reyers, 2014; Wamsler, Luederitz, & Brink, 2014).

Connecting the four transformative processes with the barriers

Creating impact at a systemic level demands that activities and interventions be multi-faceted and simultaneous, acknowledging that transformation is a complex, dynamic, and multilevel process (Senge, 2007). To help the reader understand how these four processes can contribute to overcoming barriers to transformation, NbS implementation, and climate adaptation, we explicitly link each process to the relevant barriers. This linkage supports a more structured, context-sensitive, and transformative response to the challenges faced. It also clarifies how NBRACER activities enhance these four processes and, in doing so, strengthen the regional capacity for transformative change.

Barrier category	Institutional and governance	Financial and economic	Social	Cultural	Technical and knowledge	Legal and regulatory
Examples	Lack of policy integration; weak national support; unclear mandates; fragmented decision-making; conflicting policies	High upfront costs; undervaluation of NbS; lack of mechanisms; unclear responsibilities	Low awareness: resistance to change; stakeholder conflict; community pressure	Deep-rooted paradigms; dominant narratives; inertia in ways of working; public perceptions	Data gaps; uncertainty; incompatible techniques; limited expertise	Inconsistent laws; unsupportive legislation; permitting challenges
Unlocking processes	Surface dynamics sustaining inertia/conflict; bring overlooked actors in		Shared narratives, trust-building; empower communities, address power imbalances	Reflect on values/beliefs/assumptions; challenge dominant narratives, embrace multiple worldviews	Recognise local/experiential knowledge	Expose misalignments/legacy barriers
Co-innovating processes		New business models, collaborative funding, PPP pilots	Participatory design, prototyping for ownership	Experiment with new symbols/stories via community-led pilots	Bridge expertise across sectors	Engage legal stakeholders in co-design
Stewarding processes		Experiment with risk-sharing/incentives; embed NbS in economic strategies to show co-benefits)	Reinforce positive narratives with visible progress over time	Embrace uncertainty, feedback loops, iterative learning; monitoring, co-production, learning from small wins		
Orchestrating processes	Align strategies and sectors, embed change institutionally, reduce fragmentation	Build supportive financial structures, coalitions, long-term funding plans		Policy alignment, institutional reform, supportive frameworks; coherence of legal structures with development & environmental goals		

Funded by the European Union

2.2.5 Four guiding principles for transformative governance

Governance, in the context of NBRACER, refers to the interactive decision-making processes through which public and private actors collaborate to address collective challenges within their structural contexts. Transformative governance involves creating a desired shift in a system by altering the structures and processes that define the system (Bosomworth, 2018; Clements, Alizadeh, Kamruzzaman, Searle, & Legacy, 2023; Korhonen-Kurki et al., 2025; Visseren-Hamakers et al., 2021). Key for a transformative governance is the incorporation of four guiding principles as identified by (Visseren-Hamakers et al., 2021):

- Integrative, refers to solutions that work across scales, sectors, and regions. It also involves smart governance mixes, coordination across governance levels, and integrating NbS into policies. Inclusive refers to broad participation, involving marginalized groups and recognizing diverse worldviews. It addresses power imbalances. Adaptive refers to enhancing climate resilience through continuous learning, feedback loops, and networked actors.
- Pluralist refers to acknowledging multiple knowledge systems beyond traditional science, incorporating alternative perspectives on nature, climate change and development. This requires changing knowledge production processes, fostering collaboration, and overcoming resistance to diverse worldviews.

For regional partners, it is important to pursue governance processes that acknowledge and integrate these 4 principles that are key to transformative governance.

2.2.6 Collaborative networks of quadruple helix partners to drive transformation

In the literature there is a strong consensus that creating transformational and system-wide change requires different kind of actors working in more collaborative ways and employing innovative governing strategies collaborations (Biesbroek et al., 2013; Fedele, Donatti, Harvey, Hannah, & Hole, 2019), which is in line with the recommendations above and which also connects with the following relevant studies (Chappin et al., 2024; Engwall, Kaulio, Karakaya, Miterev, & Berlin, 2021; Kampelmann, Van Hollebeke, & Vandergert, 2016; Loorbach, Frantzeskaki, & Avelino, 2017; Tozer et al., 2022) It is clear that we must move beyond isolated efforts and embrace people-centred, adaptive, and collaborative approaches. The success of transformation depends on cross-sector collaboration, continuous learning, and adaptive governance by actors, preferably in quadruple helix configurations.

Stakeholder engagement is a broad concept with diverse processes and various intentions, that can refer to basic communication and consultation with stakeholders, as well as participation, representation, partnerships with co-decisions, co-production, and knowledge co-creation as the most ambitious form of stakeholder engagement (see Figure 5) (OECD, 2015).

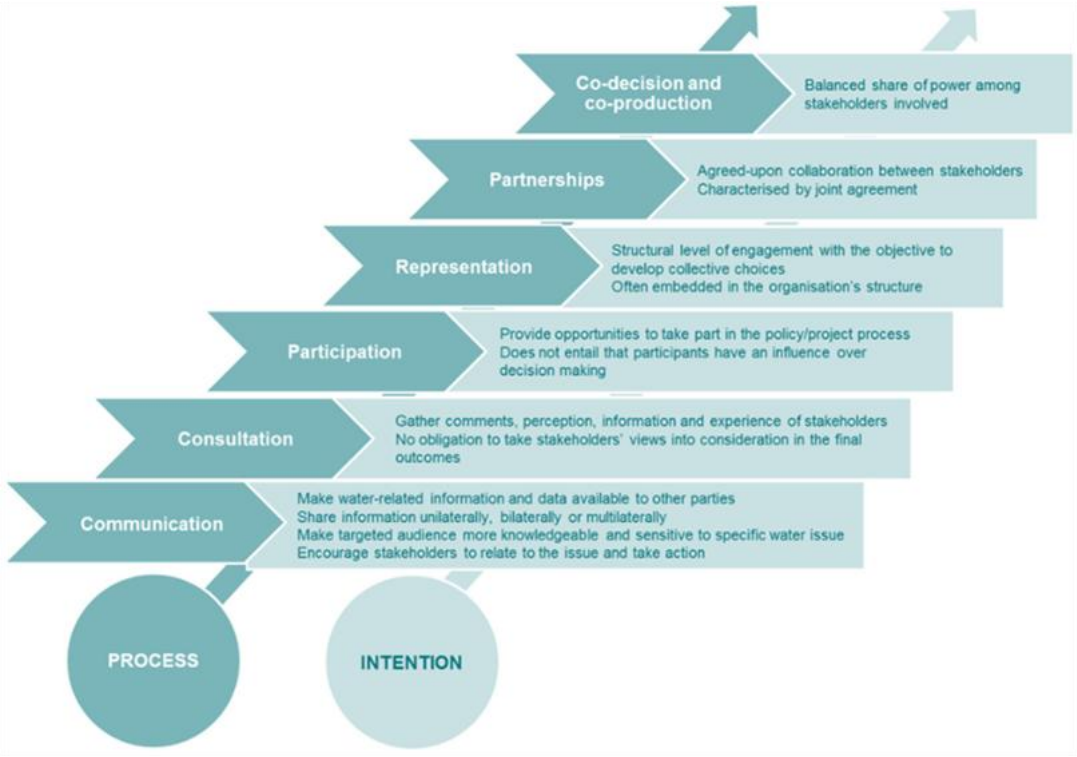

Figure 5: Levels of stakeholder engagement from the OECD framework (OECD, 2015)

In NBRACER, WP6 is mainly supporting engagement that is aligned with the four principles of transformative governance and by engaging stakeholders in one of more of the four transformative processes. WP6 is aiming for engagement at the upper part of the ladder, basically aspiring to achieve the level of co-production and co-decision. The next sections further explore the kind of engagement and collaboration at the heart of the process-supporting framework.

The power of collaborative networks for scaling solutions

The NBRACER Process-Supporting Framework is focused on strengthening actor networks to scale NbS through relational diffusion - supported by peer-to-peer relationships (Goodwin, Olazabal, Castro, & Pascual, 2025). First, peer knowledge can address diverse and practical problem-solving needs, especially when it comes to tacit knowledge that is hard to capture and transfer through formal trainings or consultancies. Secondly, peer-to-peer learning also involves group dynamics shaped by social norms and professional cultures. People are more likely to adopt new behaviours when those behaviours are seen as typical within their social group (Tajfel & Turner, 2004; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Observing others' actions and the presence of role models can help normalise and spread new practices. Thirdly, individuals are more receptive to new information when it comes from trusted, successful peers-those who engage respectfully and build relationships within their networks (Rogers, 1983; Tajfel & Turner, 2004; Turner et al., 1987). In NBRACER a network of change agents will be established in each region to help to foster the diffusion of NbS amongst existing networks (connected with WP 1.3).

These collaborations of actors in the form of networks provide a wide range of functions that help to overcome scaling and transformation barriers (as listed above) (Chappin et al., 2024; Planko, Chappin, Cramer, & Hekkert, 2019; Planko, Cramer, Chappin, & Hekkert, 2016; Runhaar & Polman,

2018) (Popp, MacKean, Casebeer, Milward, & Lindstrom, 2014). Namely networks for NbS can help inspiring change, developing knowledge and expertise, knowledge sharing, facilitating collaboration and dialogue, community building, lobbying with policymakers and realizing economic benefits. Such activities help to increase understanding of the issues at stake and trust in the collaboration (Chappin et al., 2024). Engaging actors in a network also brings additional benefits like acceptability of process and outcome, more effective implementation and ownership of decisions and outcomes, social equity and cohesion, better access to knowledge and better coherence (OECD, 2015).

Translating these network functions to NBRACER: we are able to identify four types of collaborations where stakeholders engage:

- Collaborations between stakeholders who question the current approaches to regional development and jointly explore the underlying drivers of system dynamics are key to triggering **the unlocking processes** described above. These types of activities take place in NBRACER Task 1.1, particularly during the baseline assessment and the regional kick-off workshops amongst others. These collaborations can be supported by the NBRACER WP5 technical framework to gain joint understanding.
- Collaboration among existing NbS pilot projects, where actors share knowledge and advocate for institutional support to scale solutions and amplify impact. This aligns closely with **the stewarding processes and associated monitoring activities** in NBRACER, as outlined in WP2–4, and is supported by the Capacity Building Strategy (WP7).
- Regional or local collaboration to develop a shared future vision for the region, which can guide collective efforts toward systems transformation and support the orchestration of regional change. These collaborations are central to **the co-innovating and orchestrating processes** that are supported by WP7, and the X.3 tasks across WPs 2, 3 and 4.
- Stakeholder collaboration to co-design new NbS that respond to local needs and challenges, **as part of the co-innovating processes**. This form of collaboration is a key focus of the immersive visits in the replicating regions, as part of the Capacity Building Program (WP7), and aligns with the X.1 tasks in WP2, WP3, and WP4.

Initially, these actors may operate in a fragmented manner. However, through the support of NBRACER activities the goal is to gradually strengthen connections between them. NBRACER aims to foster relationships among these collaborative groups to build a more cohesive and supportive network that enables scaling of the NbS across the region.

Research shows that transformation can emerge from any one or multiple actor groups-there is no single entry-point. Transformation may be initiated from various directions, depending on context and opportunity. Applied to NBRACER, this means that transformative change in a region can:

- Begin with a small NbS initiative that gradually scales up to influence regional and systemic levels.
- Emerge through new collaborations, for example between people and organisations that are working for nature management and industry, around the co-design of innovative solutions.

- Be triggered by a policy change that enables systemic shifts and compels actors to adopt new ways of working and collaborating.

Task 6.4 is focussed on enhancing the engagement of the actors among partners in the transformation process.

Quadruple helix configuration for collaborations

NBRACER is aiming for collaborations to become quadruple helix collaborations. Quadruple helix collaborations involve systematic interactions among four principal actors: academia, industry, government, and civil society. This framework extends the traditional triple helix model by explicitly integrating societal stakeholders, thereby embedding inclusivity, transparency, and social relevance into processes of knowledge production and diffusion. Through this expanded paradigm, innovation is reframed not merely as a technological or economic endeavour but as a complex socio-technical process shaped by dialogical engagement and participatory governance. By incorporating the normative dimension of societal needs and values, the quadruple helix fosters more resilient and adaptive innovation ecosystems. (Carayannis & Campbell, 2013). These collaborations are beneficial for NbS and for systemic change (Lupp et al., 2021; Lupp, Zingraff-Hamed, Huang, Oen, & Pauleit, 2020).

Case of Klimatorium (Denmark): Quadruple Helix in action: A catalyst for climate innovation

Klimatorium is a non-profit climate innovation centre on Lemvig harbour that grew out of the EU LIFE–supported Coast-to-Coast Climate Challenge (C2C CC, 2017–2022), conceived in 2015 to build a climate-resilient Mid-Jutland. Operating a Quadruple Helix model - authorities/utilities, universities, businesses, and civil society -it is governed by a board and CEO linked to Lemvig Water Utility and partners with Aalborg University, DTU, SDU, Aarhus University, and VIA's Living Lab. The physical hub (completed 2020–21) combines exhibitions with real-world testbeds integrated into storm-surge public space. With a coastal/saltwater focus that complements AquaGlobe (freshwater), Klimatorium convenes and coordinates regional CCA activities.

Functionally, Klimatorium has evolved into an orchestrating mechanism: it brokers partnerships, aligns projects and funding, and supports co-innovation and mainstreaming. By enabling double-loop learning, it helps actors question assumptions, adapt norms, and co-create tailored solutions for adaptation and mitigation.

Key impacts

- Faster innovation uptake: university knowledge moves quickly into deployable solutions.
- System replacement: outdated practices are phased out in favour of cost-effective, climate-resilient alternatives.
- Wider outreach: on-site showcases communicate tangible value to policymakers, practitioners, and the public.
- Networked growth: successful collaborations trigger new initiatives, creating a reinforcing feedback loop that attracts partners and resources.

Klimatorium is a replicable model for how Quadruple Helix networks can drive regional transformation, economic regeneration, and circular, climate-positive solutions.

Mobilising the quadruple helix actors to collaborate: future-oriented design and mission driven innovation

Mobilising the quadruple helix actors to collaborate requires a careful planning and preparation. Stakeholders need to have a reason or motivation to collaborate and to engage. As not all stakeholders are familiar with climate impacts, climate resilience, or nature-based solutions (NbS), it is essential to identify a narrative that is both relevant and compelling to encourage their participation in NBRACER activities. Ensuring that the messaging resonates with their existing interests and responsibilities increases the likelihood that they will dedicate time and engage in the activities. This can take place by:

- Anchoring: This involves linking elements of climate resilience and NbS to ambitions and practices that stakeholders already are working on, enhancing relevance and fostering recognition in discussions (Buijs, 2009; Moscovici, 1984).

- Place-based convening, innovation, and collaboration: Drawing on the unique local context-including historical trajectories, current dynamics, and future aspirations-can help bring stakeholders together and facilitate dialogue grounded in shared values and concrete realities (Opdam, 2019).

One approach to engage groups of stakeholders from diverse backgrounds is by using a Mission-oriented innovation approach. This is a strategy to bring people from all kinds of organisations together to address complex societal challenges by setting clear goals and timeframes. In this way, efforts among these partners are aligned and targeted collaborative solutions are innovated (OECD, s.d.).

There is an extensive tradition of research into regional innovation systems (e.g. B.-k. Lundvall (2016), of which a mission driven innovation system is the latest branch (Elzinga, Janssen, Wesseling, Negro, & Hekkert, 2023). The concept of a 'system of innovation' was introduced by B.-Å. Lundvall (1985). According to innovation systems theory, innovation and technological change arise from the complex interdependent relationships among system actors. While innovation system thinking is grounded in socio-technological and sectoral innovation thinking, it is increasingly being applied in relation to sustainable development and transformative change, which has led to the emergence of mission-oriented innovation systems in relation to innovation policies, transformative innovation policies branch (Bergek, Hellsmark, & Karltorp, 2023; Elzinga et al., 2023). Although innovation systems exist at national and global scales, most innovation systems are found at the regional level, because of cultural, practical, network or other reasons. Mission oriented innovation systems consist of functions of programming, such as direction setting, direction implementation, and coordination of the transition and play a key role in mobilising and orchestrating actors and resources.

According to social learning theory, actors getting together with other actors who have never met before are likely to lead to innovative learning outcomes. In addition, the specific representation of a wider spectrum of whole of society actors, is more likely to bring knowledge which is more "rounded" and can bring an idea to implementation and more long-term realisation, taking consideration to a diverse set of insights and perspectives. For example, private sector actors can contribute with knowledge on how to bring a product to the market. However, effective collaboration must always provide a clear collaborative advantage, ensuring that partners achieve outcomes together that they could not accomplish alone. There must be a reason to collaborate, for all the engaged stakeholders. This reason is not always pure outcome driven and can also be related to specific types of ties, like friendship, advice, knowledge, finance, co-applicants, trade, etc. (Chappin et al., 2024; Nguyen & Marques, 2021) indicated that discrepancy in expectations among the quadruple helix partners lead to tensions and frustrations, affecting the collaboration. In conclusion, collaboration should in any case be carefully managed, be serving a purpose, and need to balance desired outcomes and resource availability (time, money) and be aware of the risks of conflict.

Weber and Rohracher (2012) propose that policies for transformative change begin with the recognition of four types of failures: 1) lack of directionality, 2) lack of policy coordination, 3) lack of demand-articulation and 4) lack of reflexivity. A mission-oriented approach is one way to promote transformative change. This approach is a way to establish alignment and coordination between different actors. Missions have the potential to address these failures, especially when

combined with the quadruple helix. Missions provide focus and in economic development terms can be seen as part of a regional specialisation strategy in which a region develops a socio-economic profile to distinguish itself from other regions. This is important because "While in the case of clear-cut 'moonshot' accelerator missions it is possible to envisage a top-down approach, transformative missions necessitate the mobilisation, alignment and coordination of a variety of distributed actors" (Edler, Matt, Polt, & Weber, 2025) (Uyarra et al., 2025). A mission's key characteristic is a measurable, ambitious and timebound objective, suitable for engaging diverse stakeholders in mission governance and in the development as well as the diffusion of innovative solutions (Kattel & Mazzucato, 2018). The term "directionality" has been used in the literature to define the direction of change that is part of the mission (Kattel & Mazzucato, 2018; Mazzucato, 2016; Schot & Kanger, 2018; Yap & Truffer, 2019).

An open discussion in the literature is whether directionality is more important than diversity in transitions and how these should be balanced. In addition to missions. As stated in the above, recently much attention has been given to directionality, which is enabled through the formulation of missions. Scholars have also highlighted the importance of fostering diversity in transitions (Köhler et al., 2019; Stirling, 2007, 2009, 2010) and mission-oriented innovation systems (Bulah et al., 2024). Diversity can be defined as *"the value of nurturing more plural discourses and cultures around deliberate choice of portfolios of pathways for innovation, sustainable and development – allowing greater variety, dynamism and context-sensitivity in technological and institutional trajectories" (Bulah et al., 2024; Stirling, 2009)*.

We mention this discussion because using a mission-oriented approach does not simply mean setting (policy) objectives. Because transitions face wicked problems and complexity that is often not an effective way to establish coordination, or it favours certain perspectives too strongly over others and is in danger of strengthening the incumbent and not a transition. More promising is finding some kind of middle ground by using '*corridors of acceptable development pathways'* (Weber & Rohracher, 2012), which leaves some options open while still offering directionality. This formulation of missions in a somewhat open-ended manner encourages experimentation and diversity, for which new forms of engagement and networks between actors are required (Schot & Kanger, 2018). This could enable new configurations of actors around a learning process towards transitioning.

The NBRACER Process-Supporting Framework: visual introduced in Figure 6.

This report synthesises the four concept sets that together form the NBRACER process-support framework for accelerating regional transformation. The figure below presents them in a single, four-ring graphic, read from the outside in.

Outer ring — Collaboration domain. NBRACER regions first broaden NbS collaboration across the full quadruple helix: government, science, industry, and civil society (Carayannis & Campbell, 2009).

Second (blue) ring — Governance principles. Regional partners align their activities with four principles of transformative governance: adaptive, inclusive, pluralist, and integrative (Visseren-Hamakers et al., 2021).

Third ring — Transformative processes. Activities are designed to activate one or more core processes—unlocking, co-innovating, stewarding, and orchestrating—that drive accelerated regional change (Hölscher et al., 2019).

Inner ring — Spheres of transformation. Ultimately, activities aim to generate outcomes across one or more spheres: the personal, operational, and strategic levels (Karen O'Brien & Sygna, 2013).

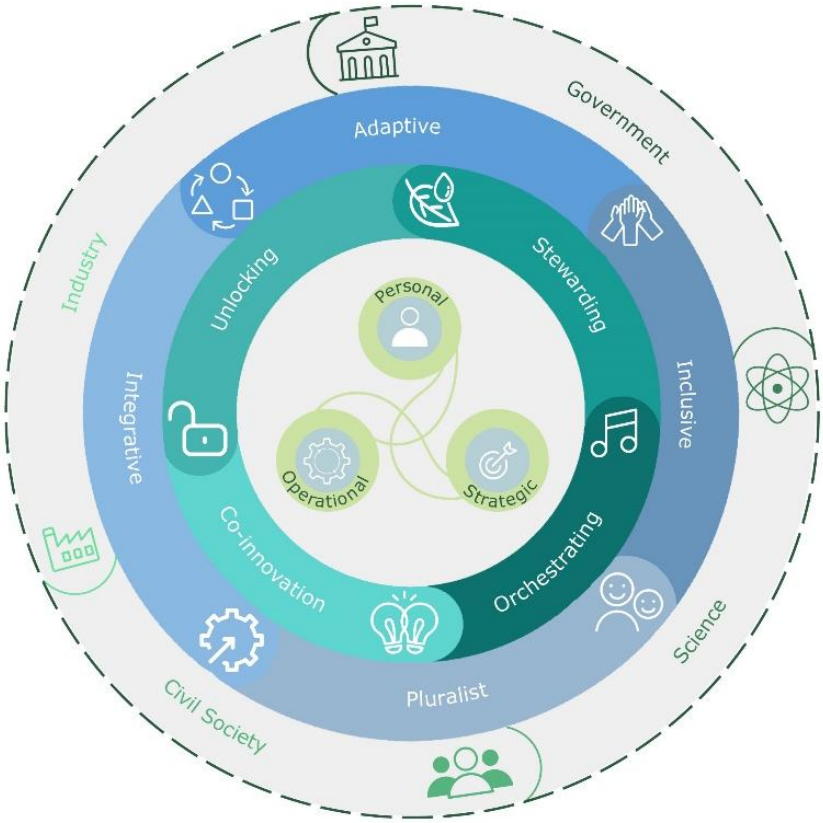

Figure 6: The NBRACER process-support framework. The four concentric circles should be read from the outer to the inner ring: (1) quadruple-helix collaboration; (2) principles of transformative governance (adaptive, inclusive, pluralist, integrative); (3) transformative processes (unlocking, co-innovating, stewarding, orchestrating); and (4) targeted spheres of change (personal, operational, strategic). Visualisation is inspired by Ipbes (2024a)

3 NBRACER Process-Supporting Framework: Practitioners' Playbook

This chapter intends to help regions to self-assess their regional transformative capacity. Therefore, the four key concepts can be explored by using the presented assessment approaches. The assessment can be done on the desk or in workshops/focus groups with key stakeholders in the region. The self-assessment can help to gain insights on how to accelerate transformative change. It is designed to be used periodically, enabling regions to identify emerging opportunities and adapt their strategies over time.

3.1 Quadruple helix collaboration: stakeholders mapping and their attitudes

Stakeholder mapping structures and clusters stakeholders to prepare an effective engagement strategy. The resulting categorisation clarifies the role of stakeholder in the design, decision making, implementation, and maintenance of NbS, and supports targeted engagement strategies to increase the region's transformation potential. Stakeholder maps should be updated regularly, and the categorisation should be chosen to fit the process at hand.

At the core is the quadruple helix: government, business, science, and societal partners. Collaboration across these domains should become stronger and less fragmented as regions progress through the phases of the Transformative Adaptation Journey.

3.1.1 Purpose of the stakeholders mapping

The stakeholder mapping of the quadruple helix actors helps to:

- Build an up-to-date stakeholder database for project communication and engagement.
- Reveal missing voices across the quadruple helix.
- Understand stakes and attitudes toward climate resilience via NbS, which can be used to tailor invitations to invite stakeholders to take part in the transformation journey.
- Group stakeholders into four engagement clusters (from the influence–interest matrix) to guide outreach.

3.1.2 Mapping approach

Ideally, the stakeholder mapping takes place by more than two people of a regional network, as they can bring in understanding from diverse background, diverse sector knowledge and diverse organisations. A varied group produces a more comprehensive and balanced mapping. The stakeholder mapping as is taking place in NBRACER follows a number of steps.

Step 1: Define the challenge

Start with a short activity to define the NBRACER challenge for your region (pilot or regional level). This shared objective provides context for selecting and mapping relevant stakeholders.

Step 2: List stakeholders by quadruple helix domains

Identify stakeholders from government, academia, the private sector, and civil society - -include those who can support communication and outreach (e.g., media, designers, local influencers) (Figure 7).

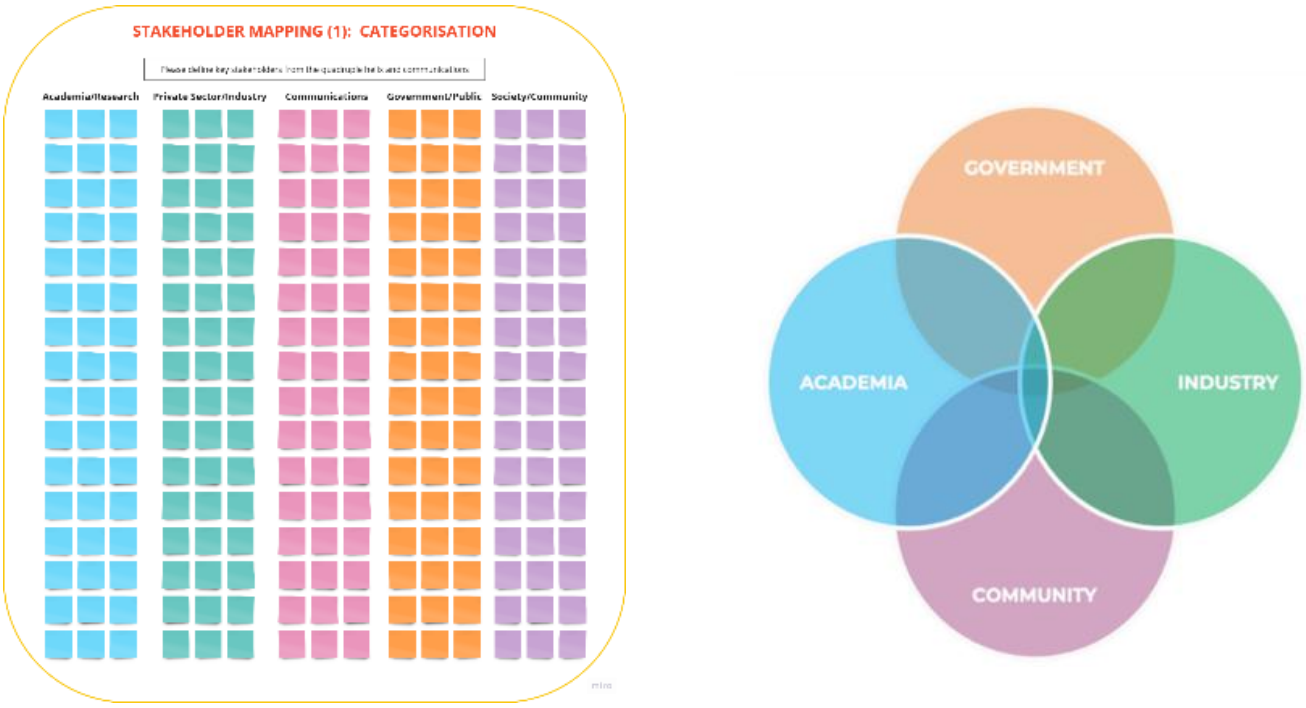

Figure 7: Stakeholder categorisation across the quadruple helix

To gain an understanding about this mapping of quadruple helix, reflect on the following questions:

- Who can influence, benefit from, or be impacted by the challenge/objective?
- Which quadruple helix domain do they belong to?
- Are any domains under-represented? Why? What does this suggest about the regional governance model?

Step 3: Cluster by key community systems

Map where each of the identified stakeholder contributes across key community systems (e.g., water, agriculture, health, infrastructure) (Figure 8).

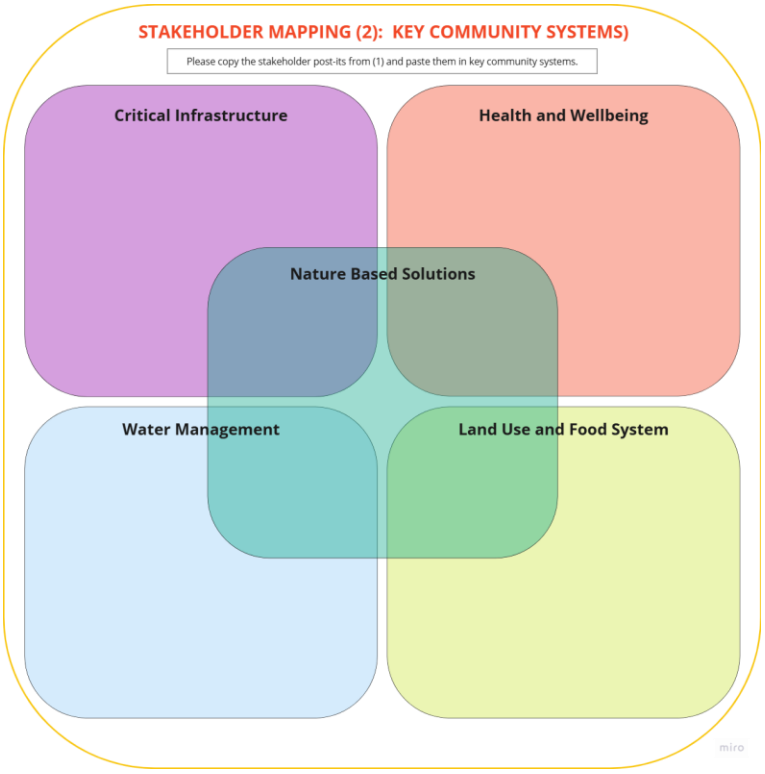

Figure 8: The key community systems

Reflective questions

- To which key community system(s) does the stakeholder contribute?
- Are they engaged in NbS and in the respective key community system or only in the respective key community system? Are there any stakeholders that are recurring across the key community systems? Stakeholders that are playing a central and driving role?
- Within each system, are stakeholders concentrated in a single domain (e.g., all academics*)?* A healthy mix across academia, government, industry, and community is ideal for each system.

Step 4: Assess attitudes to NbS

Classify stakeholders by their stance toward NbS (Figure 9):

- **Promoters** - actively support NbS, potential allies and champions.
- **Neutrals** - no defined position; may support NbS with appropriate engagement.
- **Opponents** - resist or reject NbS; understand concerns and explore ways to address them.

Figure 9: stakeholders attitude mapping

Step 5: Map influence and interest

Place stakeholders on an influence–interest grid (see Figure 10) to determine the appropriate engagement approach.

- Influence: power over direction and acceptance; ability to shape others' opinions or decisions.
- Interest: level of investment in NbS; willingness to dedicate time to learn about or support the initiative.

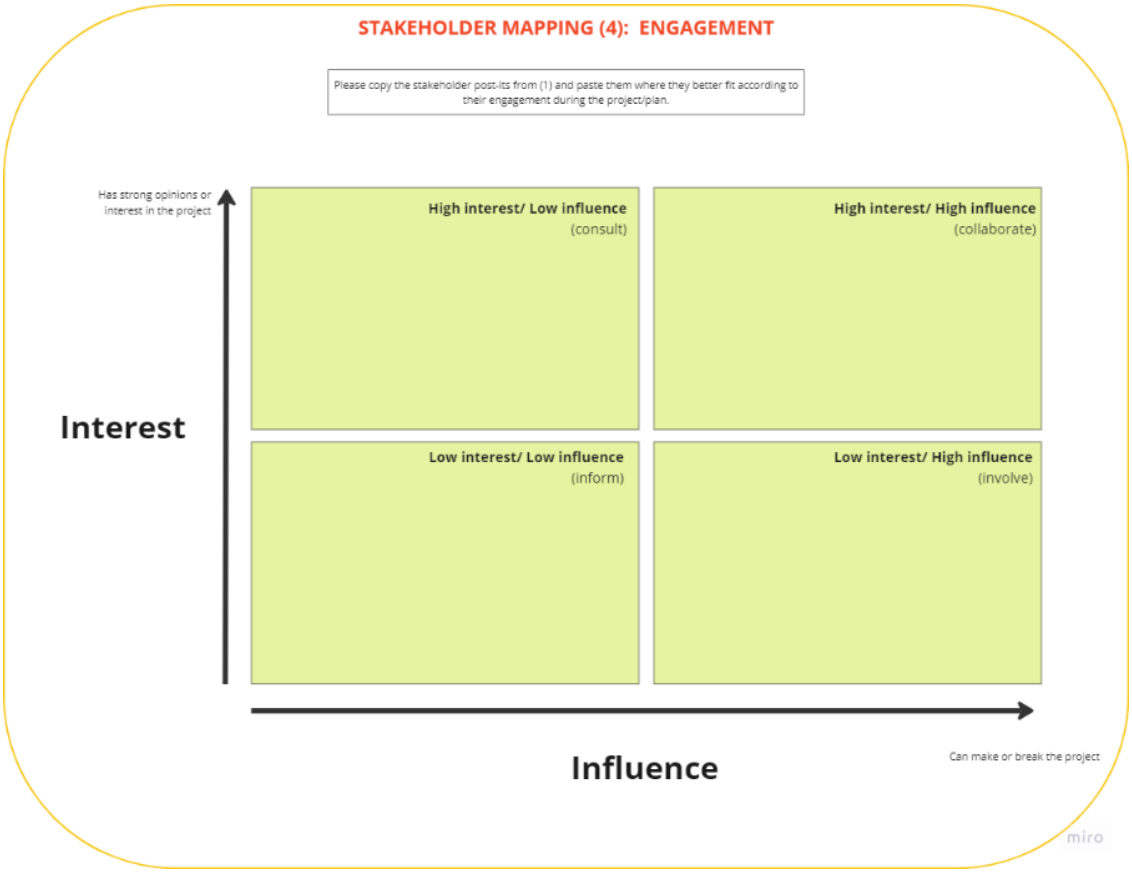

Figure 10: Interest/influence matrix for stakeholders

This mapping supports strategic decisions on outreach, communication, and partnership development, and yields four engagement groups (e.g., involve, consult, inform, monitor).

Reflective questions:

- In which quadrant can we find the promotors?
- In which quadrant can we find the opposers?
- How could they affect each other?

Reflective sensemaking

The mapping results are discussed amongst the people participating in the mapping. What are the key observations:

- Which quadruple helix domains are missing? Who is overrepresented? Why is this happening? What can you do about it?
- What key community systems are already working on NbS? Who is collaborating? Who is in the centre of the influencers? Which key community systems is missing stakeholders? Why is this and what to do about it?
- Who is in favour and who is opposing NbS and why?
- Which groups have less influence and high interest, and which groups have high interest and high influence? Relate this with the attitude matrix? What does this mean for your engagement strategy?

3.2 From mapping to engagement

Once mapped, the challenge is to bring stakeholders on board and keep them engaged throughout the transformation process.

Bring stakeholders on board

Use the NBRACER Handbook on Communication to present the project and invite participation. At its heart is anchoring: connect elements of climate resilience and NbS to ambitions and practices stakeholders already work on, increasing relevance and recognition in discussions (Buijs, 2009; Moscovici, 1984). Because not all stakeholders are familiar with climate impacts, climate resilience, or NbS, craft a relevant, compelling narrative that resonates with their interests and responsibilities.

Keep stakeholders on board

Apply place-based convening, innovation, and collaboration: draw on the local context-history, current dynamics, and future aspirations-to facilitate dialogue grounded in shared values and concrete realities (Opdam, 2019). In workshops, support joint narrative building (WP6.4). For example, a story-creating workshop has been applied in Cávado.

Diverse levels of engagement

Recognise that stakeholders differ in willingness and capacity to engage. Research shows not all are suited for intensive co-design, and involvement can vary considerably (Pfortmüller, 2021; Zingraff-Hamed et al., 2020). Take time to identify champions, understand stakeholder agendas, and assess local power dynamics. This preparation supports more inclusive and effective pathways to deep social change (Fedele et al., 2019). Tailor engagement approaches to each stakeholder group and their practices. WP6.4, WP7, and WP8 will support regions to tailor engagement in the best possible ways.

3.3 Self-diagnosis on the 4 guiding principles for transformative governance

As NbS require systems transformation, the collaboration between stakeholders is aimed to be in line with the four guiding principles for transformative governance. The self-diagnosis is to check if the regional partners are working along the 4 principles. The self-diagnosis would be ideally done by a mixed group of stakeholders from the quadruple helix that are engaged in the regional activities around NbS. It would be advised to regularly check the proposed regional activities in line with these 4 guiding principles.

Self-assessment method to evaluate the presence of the four guiding principles in regional activities.

The aim is to evaluate to what extent progress in the regional transformation embed these four guiding principles. The assessment will keep stakeholders aware about integrating these principles and may open up opportunities and adjust the regional activities to ensure the principles are aligned with.

For each governance principle, first rate to what extent the principle is embedded (e.g., 1–5). Identify one quick win per principle - a small, doable improvement that would meaningfully strengthen how the principle is applied regionally. Finally, record a single-line action with an owner (and, if useful, a target date) so responsibility is clear, and progress can be tracked.

Principle of integration

This refers to:

- Solutions that work across scales, sectors, and regions.
- Relationships between governance instruments or systems. This involves coherence across sectors, issues, governance levels and places and the integration of sustainability concerns into different sectors
- Integration of NbS into policies; awareness of vested interests.

Rating (pick one): what level of integration in your region:

- 1 = isolated pilots; no policy links; no alignment across scales or sectors
- 2 = some links between policy departments; informal alignment across scales and sectors
- 3 = pilots loosely tied to cross-departmental plans; ad-hoc interdepartmental working
- 4 = explicit links to masterplans/strategies and budgets; routine cross-level work
- 5 = coherent portfolio across sectors/levels, institutionalised collaboration between policy departments and governance levels, with clear trade-off handling

Quick wins

- What can be easily done to strengthen the integrative principle in the governance?
- What is hampering integrative principle?

Principle of inclusivity

It refers to:

- broad participation of stakeholders.
- empower marginalised groups.
- recognise diverse worldviews.
- address power imbalances.
- use deliberative processes while acknowledging value conflicts.

Rating (pick one): what level of inclusivity in your region

- 1 = expert-only decisions
- 2 = consultation after decisions
- 3 = mixed participation, uneven voice
- 4 = co-design with targeted inclusion and feedback loops
- 5 = shared decision rules, resources, and accountability with affected groups

Quick wins

- What can be easily done to strengthen the inclusivity principle in the governance?
- What is hampering inclusivity principle?

The principle of adaptation

It refers to:

- continuous learning and feedback.
- iterate under uncertainty.
- networked actors.
- nested scales and polycentricity.

Rating (pick one)

- 1 = “report at project end” only
- 2 = data collected, rarely used
- 3 = some quarterly reviews, decisions unclear
- 4 = routine sense-making huddles with stop/start/scale decisions
- 5 = portfolio learning across programmes with rules updated accordingly

Quick wins

- What can be easily done to strengthen the integrative principle in the governance?
- What is hampering integrative principle?

The principle of pluralism

The principle refers to:

- acknowledge multiple knowledge systems beyond traditional science.
- bring alternative perspectives on nature, climate, and development into production and use of knowledge.

Rate (pick one):

- 1 = only technical reports count
- 2 = community knowledge heard but not used
- 3 = mixed sources cited; weak influence on choices
- 4 = co-produced evidence shapes selection and design
- 5 = multiple knowledge systems institutionalised in rules, metrics, and reviews

Quick wins

- What can be easily done to strengthen the integrative principle in the governance?
- What is hampering integrative principle?

3.4 Diagnostic tool for detecting transformation opportunities in the transformative processes

3.4.1 Assessing unlocking processes in the region

Unlocking processes create safe spaces for dialogue where diverse stakeholders can reflect on system dynamics, align perceptions, and build trust to address societal, economic, and

environmental challenges. These inclusive conversations foster shared understanding and create both the momentum and opportunity for change and systemic transformation. To detect the unlocking processes in your region, check the presence/absence of the next conditions:

- Open forum exists: a recurring, open space where diverse stakeholders reflect on climate impacts and NbS.
- Business as usual is questioned: current conversations explicitly challenge "business-as-usual" or entrenched practices.
- Drivers of climate impacts and vulnerability are named: identify concrete drivers of unsustainability/maladaptation in our systems.
- Incentives tackled: discuss ways to change harmful incentives
- Resistance softening: signs that resistance to change is decreasing and stakeholders are finding common ground (or we use constructive disruption to open space).
- Multiple knowledges are present: scientific, local, traditional knowledge are actively brought together.
- Trust grows: dialogues deliberately build trust and social capital among a cross-section of actors.
- Shared narrative is forming: co-creating a shared story/vision about the role of nature in resilience.
- Broad participation: spaces include stakeholders beyond the "usual suspects," not just policy & science.
- Informal momentum: informal networks or "momentum events" are creating room for innovative ideas to surface.

Reflecting on these aspects in your regional activities and networks will help you spot the key actors and the drivers behind unlocking. The question then becomes: what should we do to further strengthen unlocking and build transformative capacity? That next step is your **transformation opportunity**.

WP5 is providing a significant amount of technical support and evidence that can enhance the unlocking processes and help to engage the various stakeholders.

3.4.2 Assessing the stewarding processes in the region

Stewarding processes involve developing monitoring systems for understanding NbS impacts, facilitating active and inclusive dialogue, experimentation, and adaptive learning. These processes also focus on understanding system dynamics and feedback mechanisms as well as supporting the strengthening of self-organisation and local-led initiatives. To detect the stewarding processes in your region, check the presence/absence of the next conditions:

- Monitoring exists: we track NbS progress/outcomes (ecological/social) with fit-for-purpose indicators.
- Learning loops are active: monitoring results are used for sense-making and adaptive adjustments across scales.
- Small wins are surfaced: we use a "small wins" approach to maintain momentum and reduce resistance.

- Self-organisation is supported: decentralised rules/initiatives enable local actors to respond flexibly.
- Collective memory grows: continuous monitoring and reflection build shared memory that guides future action.
- Anticipation improves: knowledge on system dynamics helps anticipate disturbances and options.
- Dialogue is inclusive: learning spaces bring together diverse actors and knowledge types.

Reflecting on these aspects in your regional activities and networks will help you spot the key actors and the drivers behind Stewarding. The question then becomes: what should we do to further strengthen stewarding and build transformative capacity? That next step is your **transformation opportunity**.

The monitoring team, led by Tecnalia, is providing support to the regions to set-up monitoring approaches. This involves reflecting on how such monitoring can play a role beyond the lifetime of NBRACER, who it will fund and how it can be organised. The team of Task 1.3 can support embedding learning to enable mainstreaming.

3.4.3 Assessing the co-innovating processes in the region

Co-innovating processes involve activities that foster innovation, increasing the visibility of novelty and anchoring novelty in context. This includes testing and experimenting with new paradigms, practices, processes, providing inspiration through communicating future visions and showcasing innovation. To detect the co-innovating processes in your region, check the presence/absence of the next conditions:

- Joint futures exist: co-develop visions/scenarios that actively guide innovative action.
- Innovation agenda is visible: a shared list of innovation needs/opportunities and use it to mobilise support.
- Piloting happens: running joint ideation, prototyping and pilot tests for NbS.
- Solutions are made visible: deliberately showcasing pilots and communicate the future vision to broaden the actor network and uptake.
- Multiple knowledges are integrated: scientific, local, and local knowledge are combined in design.
- Participatory methods are used: we apply citizen science, design thinking, systems mapping to align actors.
- Experiments feed the system: pilots are designed to inform later orchestration (embedding) and stewarding (learning).

Reflecting on these aspects in your regional activities and networks will help you spot the key actors and the drivers behind co-innovating. The question then becomes: what should we do to further strengthen co-innovating and build transformative capacity? That next step is your **transformation opportunity**.

WP6 together with WP2,3 and 4 are supporting regions in the co-design of solutions and governance.

3.4.4 Assessing the orchestrating processes in the region

Orchestrating processes involve defining a shared, long-term strategic vision that guides governance across sectors and scales, while actively engaging diverse actors to foster ownership, coordinated action. They link the strategic direction to ongoing processes by integrating resources such as enabling mechanisms (funding, technical support, knowledge, regulation) and facilitating communication through formal and informal platforms. Orchestrating involves mediating across levels and sectors, managing conflicts, and embedding multi-scale, long-term thinking into decision-making and implementation. While mainstreaming is key, care must be taken to avoid integrating innovations into rigid systems that block deeper change. Orchestration should remain flexible, mission-driven, and responsive to evolving regional needs. It should also work across scale and sectors.

To identify the orchestrating processes in the region, check the presence/absence of the next conditions:

- Shared direction exists: a long-term, integrative vision/goals guide actions across departments and levels.
- Cross-sector coordination works: mechanisms align strategies and actors across sectors/governance levels.
- Spaces for exchange are in place: formal/informal arenas enable knowledge exchange and conflict mediation.
- Enabling conditions exist: funding, incentives and regulatory support align with the shared direction.
- Quadruple-helix coalitions operate: government, academia, industry and civil society co-lead and own delivery.
- Future-oriented, multi-scale thinking: decisions account for long-term trajectories and
- Embedding happens (carefully): successful practices are institutionalised while keeping flexibility (avoid rigid lock-in).

Reflecting on these aspects in the regional activities and networks will help you spot the key actors and the drivers behind orchestrating. The question then becomes: what should we do to further strengthen orchestrating and build transformative capacity? That next step is your **transformation opportunity**. Task 6.2 about governance is aimed to support regions with the orchestration as well as Task. 1.3 on Mainstreaming.

3.5 Exploring the 3 Spheres of Transformation in regional NBRACER activities

To enable regional transformations, activities have to be carried out that touch upon all Three Spheres of Transformation. In order to understand to what extent past and pending NBRACER activities are focussing on each or all of the Three Spheres of Transformation, the following self-diagnostic tool is proposed. This can be conducted with a small group of people that are initiating these activities.

Step 1: Make a list of past and pending activities.

Step 2: Assess each activity whether they focus on which sphere of transformation

The personal sphere: this is about shifting individual mindsets values, believes, worldviews and learning. It is key for scaling deep (hearts, minds, relationships, and culture).

Assess to what extent the activities do the following:

- Deliberation/storytelling/transformative learning planned.
- Targeted inclusion & empowerment measures (e.g., stipends, childcare, translation).
- Co-produced narratives; explicit values/trade-offs.
- Plural knowledge used (local, non-formal, scientific).

The operational sphere this is about changing habits, behaviours, practices, and tools. It is key for scaling out (replication and spreading the solutions).

Assess to what extent the activities do the following:

- Technical/managerial change specified.
- Behaviour change target defined.
- Measurable outcomes/KPIs set.
- Delivery plan defined.
- Replication pathway described.

The strategic/systemic sphere: this is about redefining structures, policies, and norms. It is key for scaling up (laws, policies, and resources)

Assess to what extent the activities do the following

- Policy/regulatory instrument targeted (new/amended policy, guideline, budget line).
- Cross-level coordination formalised
- Incentives/finance aligned.
- Roles updated and agreed.
- Institutional monitoring in place (policy updates, inter-dept actions).

Reflective questions

- Are all spheres of transformation covered with the whole list of activities?
- Which sphere requires more attention in order to create change?
- What adjustments should be made to the activities or what new activities should be included?

4 Exploring transformation in the NBRACER regions

4.1 Preliminary results of the stakeholders mapping

All the NBRACER regions have taken part in a first mapping of their stakeholders, using the methods as described above. These mapping results can be analysed using three complementary lenses:

- The presence and activity of actors from the quadruple helix (government, science, industry, and civil society),
- The linkage between Key Community Systems (KCS) and nature-based solutions (NbS), that is, the extent to which KCS organisations are already involved in NbS actions,
- The positioning of actors by stance (promoter/neutral/opponent) relative to their influence and interest, to guide engagement pathways.

Quadruple helix lens

The mapping results indicate that across all regions, the coalitions of organisations driving NbS tend to be government-led, often closely partnering with universities. All four helix domains are present but not evenly distributed. Private sector and civil society can benefit from enhanced engagement. Given that the coalitions are mainly government-led, there is a large challenge dealing with the enduring tensions between biodiversity objectives and production interests. The recommendation is that the coalitions are supported with trade-off mechanisms to deal with these tensions in order to avoid that the process facilitators are constantly challenged.

Key Community Systems lens

Coverage patterns by KCS show relatively mature coalitions around land use/food and water management in every region reviewed. By contrast, health and wellbeing actors are comparatively under-represented, suggesting a need for tailored outreach and bridging functions to connect health agendas with NbS initiatives. Engagement with critical infrastructure stakeholders varies by regional context, indicating the value of site-specific framing and partnering strategies.

Attitudes, influence, and interest lens

Mapping of attitudes versus influence/interest highlights three actionable groups. First, academia are consistent promoters; their role should be leveraged not only for knowledge generation but also for targeted quantification of benefits and risks that can help shift sceptical high-influence stakeholders. Second, engagement of neutral actors would be encouraged to increase motivation and awareness, moving them into promotors too. Third, some sceptical groups also seem to have been mapped in the quadrant of high influence too, as according to the regional partners. This can be a subjective experience of the level of influence, due to the opposing behaviour. Dealing with opposing attitudes can be tackled by reframing nature-based solutions in a way that does matter to these groups or to present the NbS in a way that is familiar to them, for instance as a business case. In all cases, anchoring through reframing and inviting sceptics into NBRACER pilots are recommended to normalise practices, reduce perceived risk, and build trust.

Two cross-cutting engagement levers seems to have a big potential to enhance engagement:

- Communications and media actors are under-represented in interest/influence maps despite their centrality for reaching both promoters and sceptics; several regions list media/communications teams, but these are not yet strategically leveraged. Establishing a dedicated communications workstream—drawing on Porto/Cávado experience and with WP8 support—would strengthen knowledge translation, narrative consistency, and public legitimacy.
- In parallel, NGOs and community organisations are frequently situated in "high-interest/low-influence" zones and treated primarily as consultees. Elevating their role through co-design seats, micro-grants, stewardship responsibilities, citizen-monitoring contributions, and maintenance partnerships can mitigate land-use conflicts, embed local values, and enhance long-term legitimacy by mobilising neighbourhood networks, schools, and civil society infrastructures.

In sum, the preliminary results of the stakeholders mapping indicate a number of specific ways to enhance the engagement to accelerate further transformation. It is recommended to monitor the impacts of the engagement interventions and to evaluate what worked well and what should be further adjusted.

4.2 Preliminary results regional transformative capacities and the transformation opportunities

In addition, the four processes that determine regional transformative capacity have been assessed for the 8 NBRACER regions. The preliminary results can be found in the annexes. The aim of the assessment was to identify opportunities where regional transformative capacity can be further enhanced to accelerate transformation in the region. These assessments are helping regions to gain a clearer understanding of the current processes behind NBS transformation in their region too. These insights will be used to strategically prioritise NBRACER activities that further strengthen the regional transformative capacity and accelerate systemic transformation for regional climate resilience. Findings will serve as input for further strategic planning of NBRACER activities. The analysis in the annexes is designed as a living resource that will evolve over time, integrating newly identified gaps and opportunities as they emerge during the course of NBRACER. Data and information for the assessment are collected through a combination of methods:

- Desk research: Review of key policy documents and other locally available reports.
- Strategic meetings (WP1): Insights from conversations with regional partners.
- Other NBRACER deliverables and assessments: Including baseline reports, regional boards, and pilot canvases.
- Regional presentations: Updates and progress shared by regional partners.
- Reflections and analyses: Contributions from the "friends of the region," particularly the earlier Transformation Gap Sheet.
- Taking a comparison approach across the different regions, we can observe and summarise the next findings with regards to their transformation gaps and opportunities.

Some comparative findings

Comparing the assessments across the regions, while focussing on the four process lenses - unlocking, stewarding, co-creating/co-innovating, and orchestrating - reveal several pathways to shift from NbS pilots to systemic, climate-resilient practice.

All of the NBRACER regions have reached a level of policy maturity with regards to NbS, at least at one government level and NbS pilots and projects are taking place. However, the regions are in various stages of their transformation and demonstrating different pathways to do so.

In all of the regions, unlocking dialogues are taking place at a certain extent, most of them are government led, and mainly engaging public policymakers and scientists. These unlocking dialogues have several characteristics:

1. Unlocking at pilot/project level: Porto, East and West Flanders, Denmark
2. Unlocking at regional scale: East and West Flanders, Cantabria, Nouvelle-Aquitaine, Fryslân, Cavado

These conversations take place in the scope of:

1. Policy framework development: Porto, Cantabria, Fryslân
2. Other programmes: East and West Flanders (Labo ruimte, water-land-schap/blue deal) Nouvelle-Aquitaine (Neo Terra roadmap), Cavado

The analysis indicates the important of climate adaptation policies to convene stakeholders in an unlocking kind of conversation. The strongest unlocking blends policy anchors (plans/visions) with place-based dialogues. Where unlocking relies on projects alone, conversation cycles are rather fragmented. When it is connected with policy frameworks, there is a risk that the unlocking remains at a rather abstract and general level.

The co-innovating processes are mainly part of funded projects, as for instance URBiNat for Porto, Water-Land-Schap for East/West Flanders, the area committees and farm-level experiments for Fryslân, the EU funded projects in Cantabria, the multiple NbS of Cavado and the Klimatorium co-innovation for Denmark. Accelerating transformation would mean to further institutionalizing co-innovation as part of the NbS development processes.

Stewarding processes are about monitoring, learning, and adapting. All regions are engaged in the monitoring tasks of NBRACER and have some extent of monitoring taking place in their regions, however this is only structurally as part of legally obligations. When it comes to NbS, many regions mainly focus on the biodiversity indicators and not always on climate impacts or social indicators. Learning does not often take place, even not as part of projects or large programmes as for instance the once in East and West Flanders

Orchestrating processes concern system alignment. In Fryslân, Porto, and Denmark, orchestration is largely institutionalised, and Nouvelle-Aquitaine is progressing toward a robust orchestration model. By contrast, West and East Flanders lack a clearly defined, durable orchestration mechanism. In Cávado, CIM Cávado provides coordination, but its mandate is limited to municipalities only.

Transformation opportunities highlighted

The analysis of the transformative capacity in each of the NBRACER regions have indicated that a number of opportunities highlighted that could help to accelerate transformation, so called transformation opportunities (Table 2). This table is a summary of the findings of the regional applications of the process-supporting framework and clearly reflect the diversity amongst the NBRACER regions. It illustrates which regions have certain transformation opportunities in common. It is not required for a region to have all transformation opportunities in place as each region has unique approaches and are in a different stage of their journey.

Table 2 Regional transformational opportunities in the NBRACER regions

	Porto	East	West	Cantabria	Nouvelle-	Fryslân	Cavado	Denmark
Engagement & Equity: broaden and systematise stakeholder engagement (public, private, civic, political) with a justice/equity focus	X	X	X	X	X	X	X	X
Co-creation: institutionalise co-creation and unlocking arenas for innovation and upskilling	X	X		X				X
Finance: enable regional uptake and secure long-term financing pathways - Finance: shift to structural, place-based financing models	X		x	x				
Stewarding & learning: strengthen stewarding processes and link regional-local initiatives; embed evaluation and learning	X			X	X	X		X
Operations: make stewardship maintenance-ready	X							
MEL/Dashboards: develop an NbS monitoring and learning dashboard/framework			X			X		
Systems Thinking: build systems-thinking capability for integrated solutions			X					
Internal coordination: tighten internal orchestration (shared frameworks, commitments, routines)			X			X		
Regional vision and multi-level governance: function as regional orchestrator with a unified vision and coherent multi-level governance	X		X	X		X	X	X
Innovation and land use: co-innovate mechanisms for land-use transformation			X	X				
Policy windows: Harnessing the political momentum				X				
Knowledge to action: mobilise technical expertise within transformation processes				X				X
Governance reform: reduce rigidity and consultant-driven processes				X				
Adaptation: advance systemic adaptation approaches					X			
Territorial cohesions: bridge discrepancy between rural and urban areas in progressing NbS		X					X	

There are many opportunities among the regions to accelerate their transformation, in particular when it comes to:

- Engagement and equity: broaden and systematise stakeholders' engagement – this is a universal opportunity to accelerate transformation and is in line with the objectives of Task 6.4.
- Stewarding and learning: strengthen stewarding processes and link regional-local initiatives; embed evaluation and learning, which is key in the monitoring tasks and in Task 1.3
- Regional vision and multi-level governance: function as regional orchestrator with a unified vision and coherent multi-level governance – this is very much in line with Tasks 2.3, 3.3 and 4.3, with the support of Task 6.2.
- Co-creation: institutionalise co-creation and unlocking arenas for innovation and upskilling – this is in line with Tasks 2.2, 3.2 and 4.2.

5 Conclusions

This deliverable presents an NBRACER Process-Supporting Framework to support regions to accelerate transformation. The framework integrates selected key concepts and approaches in the related fields of climate resilience, regional development, biodiversity, and transformative governance. Alongside the theoretical and conceptual exploration of this framework, this deliverable also shares a "Practitioners' Playbook" to support regions to use the NBRACER Process-Supporting Framework to self-assess their regional transformative capacity over the course of NBRACER project and beyond.

The framework and its practitioners' playbook serve as a strategic and operational approach towards climate resilience in the region. Both guide regions in i) the diversity and variety of stakeholders to be considered including citizens and local community; ii) underlying principles to guide collaborations and governance; iii) understanding the different spheres of where transformation takes place; and iv) diverse types of processes that stimulate their regional transformative capacities.

This work has been applied to the eight NBRACER regions across Europe. Stakeholders mapping leads to some recommendations for better engaging with opposing organisations, as well as communication platforms and NGOs to enhance transformation. Furthermore, a first assessment of the transformative capacity has been carried out for the eight participating regions on the best available knowledge that the team had at this time. These preliminary assessments will serve as a basis to enhance and strengthen their ongoing transformative capacity in a way that it will accelerate their transformative journey. Initial cross-regional comparison shows a diversity of governance styles, challenges, and opportunities due to place-based contexts. To enable the transformation, regions are advised to consider the opportunities when developing activities and actions within NBRACER. Regions can accelerate their transformation via NBRACER by enhancing regional orchestration and establishing a shared vision for nature-based solutions. Priority actions include institutionalising co-innovation and "unlocking" conversations in governance, widening stakeholder participation, developing integrated NbS dashboards and monitoring frameworks, formalising knowledge stewardship and a culture of learning, and creating socially innovative financing models that cover implementation and ongoing maintenance.

Contributing to the overall NBRACER objectives, this deliverable specifically supports high-level objective (HLO3) with the development of a transformative process-supporting conceptual framework (specific objective - SO3.2) and systemic analysis (SO3.3) to support the NbS development and scaling in the regions (SO3.1). It also provides support to subsequent tasks in WP6, NbS portfolios (WP2-4); and guiding along with other WPs in the scaling, visioning and resilience journeys of the regions. The framework, playbook and insights gained from the regional chapters will guide the ongoing transformative capacity journeys of the regions and support their scaling and mainstreaming efforts.

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Annexes: Regional chapters

Annex A1. Preliminary assessment of regional transformative capacity for Cantabria region

Introduction

Aim of the assessment and information collection

Cantabria region participates in the NBRACER project as a demonstrating region. The goal of this analysis is to describe the current transformative capacity of Cantabria and identify opportunities that can be deployed to strengthen its capacity, accelerating transformation.

This preliminary assessment is based on the NBRACER process supporting framework, a dynamic and flexible framework that helps regions to understand and accelerate regional transformation. The assessment approach consists of four interconnected processes:

- Unlocking: jointly reflecting and sense-making of system dynamics and related issues via conversations
- Stewarding: monitoring of existing nature-based solutions (NbS) and adaptive learning
- Co-innovating: advancing place based NbS together
- Orchestrating: aligning, institutionalising, and mainstreaming

Four principles for transformation guide these processes: integrative, inclusive, adaptive, and pluralist. These guiding principles cut across governance levels and sectors, empower diverse voices, emphasise learning and feedback and value alternative knowledge systems.

These preliminary findings will serve as input for further strategic planning of NBRACER activities in close collaboration with WP1 (to be done during the General Assembly of October 2025).

The document is designed as a living resource that will evolve over time, integrating newly identified gaps and opportunities as they emerge during the course of NBRACER. The assessment is based on information gathered through a combination of methods:

- Desk research: Review of key policy documents and other locally available reports.
- Strategic meetings (WP1): Insights from conversations with regional partners.
- Other NBRACER deliverables and assessments: Including baseline reports, regional boards, and pilot canvases.
- Regional presentations: Updates and progress shared by regional partners
- Reflections and analyses: Contributions from the “friends of the region,” particularly the earlier Transformation Gap Sheet.

Regional context

Cantabria, a coastal region in northern Spain, faces emerging challenges, including severe floods and wildfires stemming from climate change alongside the need to modernize its economy and protect biodiversity. Nature-based Solutions are therefore considered as part of the resilience strategies and the regional government has increasingly embedded sustainability and resilience

into its legal, policy, and planning frameworks, aligning with EU[1] and national strategies[2] while also piloting local innovation.

In sum, three ongoing policy processes are currently driving change in climate resilience in Cantabria:

- The update of the Climate Change Action Strategy
- The Regional Land Management Plan (PROT)in which FIHAC plays a vital role
- The Regional Green Infrastructure Strategy

Climate adaptation policies

Cantabria adopted its first Climate Change Action Strategy (2008–2012) with support from local institutes (AdapteCCa, IH-Cantabria), updated it for 2018–2030, and plans a new adaptation-focused 2025–2050 version by end-2025 which has engaged quadruple helix partners in participatory workshops - creating a key window to advance nature-based climate resilience. Other policy frameworks are the Law 4/2006 of Conservation Nature in Cantabria, the Law 2/2004 Coastland Management Plan, Landscape Law 4/2014, which protects Cantabria's landscapes and introduces ecological criteria into planning.

Regional Land Management and the Regional Green Infrastructure Strategy

A Regional Green & Blue Infrastructure Strategy and a new Regional Land Management Plan (PROT) are currently under preparation, both aiming to integrate biodiversity, climate emergency considerations, and territorial rebalancing. The Regional Land Planning (PROT) is particularly significant. Still in its early design phase, it is intended to guide Cantabria's territorial development by embedding ecosystem services and green infrastructure at its core. However, the process is highly administrative, with approval expected only by 2026, making timelines uncertain.

Other relevant policies

Other relevant policy frameworks include strategies for managing invasive species, forest management and fire prevention, as well as basin-level planning such as the Saja-Besaya 2030 plan, as well as the regional law on territorial and urban planning and the Environmental Audit Plan (2021–2027), who collectively establish a regulatory environment that supports ecosystem protection, risk reduction, and the shift toward more sustainable territorial development.

The city of Santander

Santander has positioned itself as a regional frontrunner on climate adaptation. Severe floods and rising temperatures helped catalyse a clear policy arc: the 2019 Santander Charter ("La Carta de Santander") committed the municipality to using green infrastructure and biodiversity as core tools for healthier, more resilient, SDG-aligned urban development. Building on that foundation, the city updated its Municipal Emergency Plan (PEMUSAN) in 2024 to strengthen responses to extreme weather, is weaving adaptation into the ongoing update of the General Urban Plan (PGOU), and in 2025 issued its first stand-alone Climate Change Adaptation Plan under the EU-funded Santander Capital Natural project. In parallel, Santander is preparing a 2030–2050 Urban Green Strategy, led by a national consultancy through the same programme, and is advancing

integrated coastal resilience through Plan Bahía-an approach that combines nature-based solutions with spatial planning to address erosion, sea-level rise, and storm risks along the bay.

These city efforts sit within a wider regional push to align climate resilience with economic development. Cantabria's Innovation Strategy (RIS3) 2021–2027 prioritises resilience across the blue economy, agri-food, and digitalisation, with the Innovation Commission reactivated and plans to relaunch the Regional Innovation Forum to coordinate delivery across sectors. A major long-horizon engine is the Bioeconomy and Circular Economy Strategy 2024–2050, adopted in 2025: a €387 million programme of 70 actions and 23 measurable 2030 targets (including –55% GHG vs. 1990), projecting about 11,700 jobs and steering the region toward a fully circular economy by 2050. Developed through participatory processes and will be monitored by the Observatory on bioeconomy and the circular economy (under the Advisory Council of the Climate Change and Environment).

Transformative processes

Unlocking processes

> Unlocking processes are about recognising, challenging, rethinking, and opening up to dialogue about unsustainable path dependencies as well as the reimagining possible alternative, resilient futures.

In Cantabria, unlocking processes are gradually taking shape across multiple levels -through participatory strategy-making, institutional dialogue, and project-based collaboration. Policy development has been a major driver: the 2018–2030 Climate Action Strategy and the 2025 Circular Economy Strategy were prepared with broad consultation of government departments, businesses, municipalities, and citizens. This has not only improved the quality of the strategies; it has also opened new channels for cross-sector dialogue. Climate-related shocks have further catalysed public debate and expert reflection. The 2019 floods in Reinosa triggered media attention, community discussions about causes and responses, and technical exchanges among practitioners. A similar dynamic followed recent wildfires, which pushed land-management practices and "working with nature" into mainstream conversation.

Alongside formal processes, civil society provides informal spaces for unlocking. Associations and NGOs convene citizen groups focused on climate and NbS. For example, Red Cambera has coordinated volunteer monitoring of river ecological status for 16 years, producing annual public reports and organising hands-on actions-such as planting endemic species or removing exotics-in partnership with municipalities and other associations. This long-running effort receives regional funding. Even so, a NBRACER perception study (by Red Cambera) found that many municipalities either don't know about these instruments or consider them insufficient for climate adaptation.

Finally, EU-funded projects have created structured environments for joint learning-workshops where participants explore risks and co-design NbS. Within academia, the University of Cantabria and IH-Cantabria also host internal groups that exchange on NbS from a research perspective, reinforcing the region's knowledge base and helping to translate ideas into practice.

Stewarding processes

Stewarding processes involve developing monitoring systems for understanding NbS impacts, facilitating active and inclusive dialogue, experimentation, and adaptive learning. These processes also focus on understanding system dynamics and feedback mechanisms as well as supporting the strengthening of self-organisation and local-led initiatives.

Monitoring in Cantabria exists but is fragmented and leans toward ecological indicators rather than climate-resilience outcomes (incl. social metrics). Government efforts focus on natural parks AND protected areas, with limited region-wide coverage. Multiple systems run in parallel - e.g., the Water Monitoring Network (rivers/groundwater) and agency programs for biodiversity, forests, wildfires - but they aren't integrated for adaptation. Flood risk work still relies on gauges and post-event studies (e.g., Reinosa 2019), while drought/heat effects are inferred from sectoral data. A 2007 mechanism tracked the 2008–2012 Climate Action Strategy, but similar, continuous adaptation tracking is not yet routine.

Examples of stewarding include

Citizen & NGO programs: Provoca Plan (education/volunteering: dune restoration, invasive removal), Red Cambera (16-year river monitoring + native plantings with municipalities), SEO BirdLife (long-term migratory bird monitoring), and other NGOs monitoring species of community interest.

Research & EU projects: IH-Cantabria supports Natura 2000 monitoring; LIFE and other EU projects (river restoration, dam removal, coastal resilience) add methods, networks, and NbS pilots.

Knowledge platforms: use of AdapteCCa, IH-Cantabria tools (flood, coastal erosion, ecosystem services), and the Regional Climate Change Portal (inventories/scenarios; currently more mitigation-oriented). Municipalities like Santander apply these tools for vulnerability mapping.

Adaptive management signs: post-2019 actions in Reinosa (channel widening, bank replanting) and a shift from uncontrolled to controlled burning in agriculture.

Cantabria's monitoring and learning landscape shows recurring gaps. Many initiatives wind down once project funding ends, so data and insights are not embedded in durable systems. Flood analyses still privilege river-corridor evidence, leaving catchment-scale drivers-such as upstream erosion-underrepresented. Meanwhile, the Observatory for climate change, circular economy, and bioeconomy exists in name but is currently inactive, limiting region-wide coordination and continuity.

Against this backdrop, land stewardship offers a practical backbone for NbS. Voluntary agreements between landowners, stewardship organisations, and public administrations create a co-responsibility framework that aligns actors around conserving and restoring ecosystems. By clarifying roles and linking interventions to long-term maintenance and monitoring, stewardship can institutionalise NbS beyond project cycles and anchor learning in everyday practice.

A further constraint is the service-contract procurement model. Reliance on consultancy/technical assistance contracts-often delayed, re-tendered, or rigid-limits adaptive learning and mid-course

corrections. When contracts cannot flex as insights emerge, transformative approaches stall. Moving toward more flexible, outcome-oriented commissioning (with learning loops and revision clauses) would better align procurement with the region's resilience ambitions.

Co-innovating processes

> Co-innovating processes involve activities that foster innovation, increasing the visibility of novelty and anchoring novelty in context. This includes testing and experimenting with new paradigms, practices, and processes, providing inspiration through communicating future visions and showcasing innovation.

Co-innovation is emerging through three main channels. First, pilots and demonstrations: many projects are co-created with stakeholders, s solutions are tailored to local conditions and gain early legitimacy. This is because NbS implementation for climate adaptation remains largely project-based - a mosaic of rural, urban, and coastal interventions led by national, regional, and local authorities. These efforts draw on well-aligned public funding (national PGRI budgets, EU NextGeneration/RRP, 2021–2027 ERDF, and national calls that cover up to 90% of municipal pilot costs). Interreg Atlantic ALICE and the LIFE portfolio (AdaptaBlues, Convive, Divaqua+) are translating that finance into practice while building local capacity.

Alongside public programmes, private and third-sector initiatives are expanding the toolbox: PHYTOBATEA (RIA Association) applies constructed-wetland phytoremediation and floating ecosystems; the Santander Bay Green Belt (Fundación Naturaleza y Hombre) restores habitats and controls invasives; and SEO BirdLife is delivering multiple urban NbS under Santander Natural Capital.

Second, innovation hubs and knowledge centres: the updated RIS3 sets resilience as a cross-cutting goal, while CISE and university groups host hackathons, incubators, and events that increasingly foreground environment-oriented entrepreneurship.

Third, vision-led communication: municipal initiatives such as Santander Capital Natural reframe the city as "natural capital," using narratives and demonstrators to build social acceptance for NbS - though these visions still need wider diffusion across communities.

A final consideration is spatial imbalance. Much co-innovation clusters in urban centres; continued rural depopulation risks thinning the innovation networks in rural areas. Proposed activities should therefore deliberately seed co-innovation capacity outside cities-for example, by pairing rural pilots with dedicated facilitation, small-grant schemes, and local training to keep experimentation and learning anchored in place.

Orchestrating processes

Orchestrating processes involve defining a shared, long-term strategic vision that guide governance across sectors and scales, while actively engaging diverse actors to foster ownership and coordinated action. They link the strategic direction to ongoing processes by integrating resources such as enabling mechanisms (funding, technical support, regulation) and facilitating communication through formal and informal platforms. Orchestrating involves mediating across levels and sectors, managing conflicts, and embedding multi-scale, long-term thinking into decision-making and implementation.

In Cantabria, orchestration is emerging but uneven. A key arena where unlocking processes can converge is the Advisory Council on Climate Change and Environment (CACCyMAC, Decree 76/2021), created after the 2019 urban flood events and the declaration of a Climate Emergency. The council brings together government, academia, NGOs, and industry to maintain continuous dialogue on risks, policies, and measures-signalling an institutional intent to sustain unlocking conversations beyond one-off consultations. That intent, however, is sensitive to political shifts that can slow or reset momentum.

High-level policy strategies can also have an orchestrating role like the Climate Strategy 2018–2030 and the Circular Economy & Bioeconomy Strategy 2024–2050 that outline a green, climate-resilient vision and could play a stronger orchestrating role. Yet the NbS narrative is still fragmented, with overlapping terms (soluciones basadas en la naturaleza, infraestructura verde, servicios ecosistémicos) used inconsistently. A single, unifying storyline would improve communication and buy-in across sectors. At present, orchestration remains public-sector led-largely top-down - making it harder to fully engage all Quadruple Helix partners beyond the sciences.

On the ground, NbS implementation is project-based and EU-funded, but geographically and temporally fragmented. Multiple initiatives are active yet poorly connected, and stronger institutions (e.g., Santander City, FIHAC, University of Cantabria) draw disproportionate resources, leaving gaps elsewhere. Effective orchestration would weave projects into a coherent regional programme, sustain momentum beyond grant cycles, and ensure knowledge transfer across places and sectors.

Overall analysis

It is clear that transformation in the sphere of climate resilience and NbS in Cantabria has been catalysed by a combination of science-policy collaboration, strong NGOs and civil society engagement, extreme weather events, and EU/national policy frameworks. The region has merged environmental and economic policies, anchoring a narrative that positions the green transition as both an environmental necessity and an economic opportunity. This alignment of climate and development agendas has been backed by substantial funding (blending EU, national, and regional sources) and quantifiable targets, lending credibility to the region's commitment. This alignment is ongoing and is challenged to be completed due to disaggregation of competencies between different regional ministries, also national and local level.

Cantabria also benefits from strong knowledge institutions-particularly the Environmental Hydraulics Institute (IHCantabria) and the University of Cantabria-which have played a decisive

role by providing data, models, and technical guidance. Cantabria hosts also an array of experienced and dynamic NGOs and civil society organizations in the field of environmental protection and awareness. Another arena of transformation is stakeholder dialogue and partnerships. In developing its climate strategy and new circular economy plan, Cantabria involved a wide array of actors: all regional government departments were consulted, and inputs were gathered from businesses, academia, NGOs, and the public.

Cantabria stands at an important crossroads in building its regional transformative capacity. The region has initiated many positive steps towards systemic transformation for NbS, but to move beyond isolated projects and pilots, more integration, inclusiveness, and orchestration are required.

Conclusions: Transformation opportunities and the way forward

As stated above, a lot is happening and the transformation approach clearly has strong characteristics, but room for improvement to accelerate transformation does exist. We call these topics: transformation opportunities. They are the opportunities that can be deployed in order to increase the regional transformative capacity and strengthen the 4 underlying processes.

Harnessing the political momentum: There is strong political momentum around NbS and climate resilience in Cantabria, mainly driven at the regional level. The opportunity now is to strengthen local political engagement beyond Santander in unlocking processes, ensuring continuity across political cycles.

Build a coherent and inclusive stakeholder-engagement structure: Cantabria's climate/NbS agenda is advancing in policy and pilots, but engagement remains uneven. SMEs and much of the wider public still struggle to connect resilience and NbS to day-to-day interests; co-innovation leans on the "usual suspects" (research and government); and dialogues are fragmented across arenas and sometimes polarised (e.g., wolves vs. farming), with platforms stalling after government changes. Most conversations also happen in urban or formal settings, while rural actors-farmers, ranchers, and local councils-are under-represented despite their vital role in sustainable farming and wildfire prevention. The opportunity is to replace ad-hoc outreach with a structured, tailored approach that systematically maps and involves all Quadruple Helix actors-with special attention to SMEs, farmers, rural councils, youth, and citizens-and meets each group where they are. That means robust perception work (e.g., Red Cambera's surveys), sector-specific roundtables, rural community assemblies, youth tracks, and "green-innovation" showcases to raise climate/NbS literacy and co-create practical solutions. It also means widening co-innovation beyond the usual circle via RIS3 arenas and tailored awareness activities for businesses and citizens. Equally important is to thread today's dialogues into one continuous process: link consultant-led workshops with existing citizen/NGO fora into a single cadence of engagement to build continuity, reduce duplication, and keep conversations constructive even when politics shifts.

Leverage the knowledge base in transformation processes: Cantabria has a strong scientific and technical backbone, and the regional government is receptive to input from institutions such as FIHAC and the University of Cantabria. This creates a solid foundation for integrating NbS into regional governance. The next step is to formalise the role of IH-Cantabria, the University of

Cantabria, and Red Cambera, so that evidence and field experience flow consistently into practice and policy.

Build systematic arenas for co-innovation and upskilling: RIS3 and related innovation structures exist in Cantabria but are underused. Turning them into regular, structured spaces for experimentation and co-creation would give the region a stable backbone for NbS development. At the municipal level, limited experience with innovative green infrastructure and NbS often pushes city councils to rely on external consultants; targeted upskilling can change that.

Enhancing stewarding for transformation: Cantabria already has the ingredients for stewarding, monitoring, and learning. They can Build on established citizen science initiatives (e.g., 16 years of river monitoring by Red Cambera) to expand monitoring coverage, connect local knowledge with official systems, and sustain stewardship practices. Cantabria also has active NbS pilot sites, and strong technical partners (FIHAC, Red Cambera) plus growing policy momentum on adaptation. Progress is held back by fragmented monitoring, short project horizons, and weak coordination. The transformation opportunity is to build a province-wide stewarding/monitoring system that (1) formalises Monitoring, Evaluation, and Learning (MEL) for NbS and adaptation, including ecological and social indicators, (2) scales land-stewardship practices as a governance tool by integrating it into respective policies, and create mechanisms to ensure pilot lessons are transferred into standard procedures. and (3) turns planned observatories into learning hubs (not just data repositories) that has feedback mechanisms into projects, policies, plans and incentives.

Overcoming rigidity in governance and consultant-driven processes: The public administration relies heavily on consultants to deliver strategies and frameworks. While this brings expertise, contracts are often rigid, with fixed deliverables that leave little room for adaptation as new insights emerge. Consultants may be reluctant to adjust scope since this increases risks and costs. As a result, transformative governance-which requires flexibility and learning-is undermined. Strategy timelines and approval processes (e.g., climate change, green infrastructure, bioeconomy) are also frequently delayed by political or administrative factors.

Work towards regional coordination with unified regional vision and institutional mechanism for coherent multi-level governance: Current NbS and adaptation initiatives are often tied to EU-funded projects, with limited geographic and temporal continuity. Larger actors such as Santander City Council and research institutions such as FIHAC and University of Cantabria attract more resources, while smaller municipalities risk being left behind. This creates a patchwork of progress in which frontrunners advance but others lag. What is also missing is an overarching narrative that connects initiatives into a common vision. Developing such a vision-potentially as part of the Regional Green Infrastructure Strategy-could position Cantabria government as the area orchestrator. A unifying storyline around NbS and climate resilience would also make communication more accessible by reducing reliance on technical jargon (NbS, green infrastructure, ecosystem services). Cantabria's governance landscape is highly fragmented and characterised by top-down responsibilities spread across EU, national, regional, and municipal levels. This often results in overlapping mandates, accountability gaps, and slow progress on systemic adaptation. The complexity is even greater in coastal and river areas, where multiple authorities share jurisdiction. At the same time, the region has expressed an ambition to involve more municipalities, stakeholders, and communities to "leave no one behind." Moving forward, there is a need to identify what holds back more collaborative mechanisms, explore the wishes,

and needs of different quadruple helix actors, and find ways to address uneven outcomes across adaptation trajectories.

Co-innovate social and financial mechanisms (and align funding for long term commitment): Cantabria's NbS progress is constrained by land-use conflicts (e.g., wolves vs. farming; burning vs. restoration) and by fragmented financing. Set up a cross-sector group (government, landowners, farmers, NGOs, municipalities, insurers/finance) to mediate trade-offs and co-design mechanisms where public and private responsibilities are clear, and benefits are shared. Build on Cantabria's proven land stewardship (custodia) tradition as a trusted bridge-scaling agreements in marshes, riparian zones, forests, and peri-urban areas to mobilise private land, lock in maintenance, and reduce conflict. Pair this with social & financial innovation: pilot relocation/buy-out models for flood-prone areas, create new incentive schemes for NbS, and test regional funds/green partnerships (with clusters like Sea of Innovation, Sodercan) so NbS are both viable and acceptable. Finally, align EU and national streams (ERDF, RDP, EMFAF, RRF) into a predictable pipeline that covers implementation + long-term O&M. Provide technical assistance and targeted calls for low-capacity municipalities so rural areas and under-represented groups can access funds. This shifts resilience from a patchwork of frontrunners to a shared regional achievement.

Annex A2. Preliminary assessment of regional transformative capacity for Cávado region

Introduction

Aim of the assessment and information collection

Cávado region participates in the NBRACER project as a replicating region. The goal of this analysis is to describe the current transformative capacity of Cávado and identify opportunities that can be deployed to strengthen its capacity, accelerating transformation.

This preliminary assessment is based on the NBRACER process supporting framework, a dynamic and flexible framework that helps regions to understand and accelerate regional transformation. The assessment approach consists of four interconnected processes:

- Unlocking: jointly reflecting and sense-making of system dynamics and related issues via conversations
- Stewarding: monitoring of existing nature-based solutions (NbS) and adaptive learning
- Co-innovating: advancing place based NbS together
- Orchestrating: aligning, institutionalising, and mainstreaming

Four principles for transformation guide these processes: integrative, inclusive, adaptive, and pluralist. These guiding principles cut across governance levels and sectors, empower diverse voices, emphasise learning and feedback and value alternative knowledge systems.

These preliminary findings will serve as input for further strategic planning of NBRACER activities in close collaboration with WP1 (to be done during the General Assembly of October 2025).

The document is designed as a living resource that will evolve over time, integrating newly identified gaps and opportunities as they emerge during the course of NBRACER. The assessment is based on information gathered through a combination of methods:

- Desk research: Review of key policy documents and other locally available reports.
- Strategic meetings (WP1): Insights from conversations with regional partners.
- Other NBRACER deliverables and assessments: Including baseline reports, regional boards, and pilot canvases.
- Regional presentations: Updates and progress shared by regional partners
- Reflections and analyses: Contributions from the "friends of the region," particularly the earlier Transformation Gap Sheet.

Regional Context

The Cávado Region, situated in northern Portugal, covers approximately 1,246 km² and comprises six municipalities: Amares, Barcelos, Braga, Esposende, Vila Verde, and Terras de Bouro. With a population of 421,600 residents (as of 2022), the region is characterised by growing urban centres - anchored by the historic city of Braga - as well as expansive rural and natural landscapes, including Portugal's only national park, the Peneda-Gerês National Park. The six municipalities are coordinated through the Intermunicipal Community of Cávado (CIM Cávado), which plays a vital role in guiding regional planning, development, and cooperation across sectors.

Cávado is increasingly facing climate-related pressures, including heatwaves, flooding, droughts, wildfires, and coastal erosion. These emerging challenges call for integrated, forward-looking, and climate-resilient approaches to land and water management, as well as to regional planning and long-term adaptation. In response, the region is guided by two main local policy frameworks: the 2030 Territorial Development Strategy of Cávado region - Estratégia de Desenvolvimento Territorial Cávado 2030 (https://www.cimcavado.pt/cavado-2030/) and the Intermunicipal Climate Change Adaptation Strategy of Cávado region - Estratégia Intermunicipal de Adaptação às Alterações Climáticas da NUT III Cávado (EIAAC - NUT III CÁVADO) (https://www.cimcavado.pt/estrategia-intermunicipal-de-adaptacao-as-alteracoes-climaticas-da-nut-iii-cavado/). These strategies are interlinked and aim to foster systemic, cross-sectoral actions that align with both national and European climate, sustainability, and environmental objectives. The region's growing institutional commitment is further reflected in municipal participation in projects such as GrowGreen, ClimACT, SCORE, and NATURCHANGE, which address themes ranging from the circular economy and carbon neutrality in schools to coastal resilience and natural capital preservation.

The Cávado Region is beginning to explore the use of NbS as part of its climate adaptation efforts. An illustrative example is the completed Interceptor Channel in Esposende, a 4.5 km intervention that applied natural engineering techniques to reduce recurrent flooding while creating an ecological corridor and enhancing the urban–agricultural landscape. Two further flagship initiatives are under development: the renaturalisation of the Este and Torto rivers in Braga, designed to restore riparian habitats, reduce flood risks, and create new leisure spaces; and the Intermunicipal Greenway Ecovia Cávado Homem, a 75 km ecological corridor following the Cávado and Homem rivers, connecting all six municipalities and linking the North Coast Natural Park with the Peneda-Gerês National Park. While these projects represent early steps toward integrating NbS into long-term strategies, understanding of the concept is still developing among citizens and local stakeholders. Strengthening awareness therefore requires not only communication, but also demonstrating the effectiveness of NbS in practice, in order to strengthen confidence among the local community, decision-makers, and technical staff. As a replicating region within NBRACER, Cávado aims to advance the implementation of NbS across its urban, rural, and coastal landscapes by learning from other NBRACER regions (and beyond), adapting proven solutions to its own environmental, social, economic, and cultural context, and deepening local capacity through awareness-raising and stakeholder engagement.

Transformative processes

Unlocking processes

> Unlocking processes are about recognising, challenging, rethinking, and opening up to dialogue about unsustainable path dependencies as well as the reimagining possible alternative, resilient futures.

Discussions and debates related to climate adaptation and associated challenges have begun and are growing in the Cávado region. In terms of initiatives and organisations, there is, understandably, a disparity between the urban and rural areas within the region – with more formal activities taking place in the urban than the rural areas. In this region, CIM Cávado plays a

key role in paving the way forward for the region towards sustainable regional development and climate resilience. CIM Cávado is an intermunicipality that coordinates sustainability and climate adaptation strategies across six municipalities. They support the addressing of sources and responsibilities for, e.g., undesirable environmental side-effects, and foster shared understanding and resilient pathways among municipalities and stakeholders, e.g., through the Intermunicipal Strategy for Adaptation to Climate Change, AQUA Cávado and the Ecovia Cávado Homem project. These efforts integrate NbS while rethinking alternative (sustainable) ways of relating to especially water management, flood reduction and biodiversity restoration in the Cávado River basin.

Apart from CIM Cávado, there are several NGOs and grassroots initiatives engaged in activities that aim at disrupting unsustainable pathways, nation-wide and regional-focussed. WWF Portugal is one such important NGO working on this challenge at the national scale. They have promoted, for example, the removal of river dams across the country and have in fact succeeded in the removal of two dams in southern Portugal so far. Portugal is also a case study in WWF's project Bio-Just which seeks to address technological challenges related to water resource management, through NbS while simultaneously fostering social and ecological justice. ZERO - another national environmental NGO - is engaged in raising awareness, through workshops, campaigns, guided tours, and tree plantation events. ZERO has been advocating for NbS, freeing of rivers and fire protection measures, among other topics. At the regional-level, municipalities that are more urbanised such as Braga have more activities. Braga community has initiated dialogues about climate adaptation and is involved in international projects related to building climate resilience. For instance, Braga is one of the cities in the LIFE project ASAP which aims at accelerating climate action in Europe. One of the tasks involves working with the local community, especially with the younger communities, to engage them in the city's climate plan. The city of Braga is also highly active through its sustainable urban mobility plan, which emphasizes horizontal integration and collaboration with other regional actors to reduce greenhouse gas emissions, promote cycling, and improve public transport as key levers to overcoming unsustainable practices. These initiatives have fostered political willingness and public awareness for change.

Stewarding processes

> Stewarding processes involve developing monitoring systems for understanding NbS impacts, facilitating active and inclusive dialogue, experimentation, and adaptive learning. These processes also focus on understanding system dynamics and feedback mechanisms as well as supporting the strengthening of self-organisation and local-led initiatives.

CIM Cávado plays a key role in stewarding climate resilience in the region. They coordinate integrated regional strategies for economic, social, and environmental development, including climate adaptation plans and sustainable mobility programs. CIM Cávado participates in multi-stakeholder projects that promote knowledge transfer, collaboration across governance scales, and development of innovative ecological and social governance solutions. Within NBRACER, CIM Cávado has organized capacity-building sessions and knowledge exchanges that incorporate diverse stakeholder perspectives to strengthen social networks and shared governance arrangements that considers local social-ecological contexts. These are designed to enhance collective learning, iterative evaluation, and adaptive responses to environmental disturbances.

The region showcases a successfully implemented large-scale hybrid NbS that addresses flood risk reduction in Esposende coastal region. Monitoring infrastructures are in place to understand the short and long-term effects of the implemented NbS. As the NbS mature, maintenance of the place also requires more attention and adaptive learning is necessary to ensure the functioning of the NbS as well as the well-being of the local community and established ecosystem. Esposende has not experienced any flooding incidents or significant negative consequences from extreme events since implementation of the NbS. An increase in biodiversity has also been observed over the years. These findings are communicated within and across municipalities, and also beyond e.g., via news media and invited presentations. One of the main challenges of this project was the acquiring and accessing of private lands that were mostly owned by farmers. The ability of reaching farmers through local respected individuals within the community and the ability to listen and respond to their needs were key to the successful implementation of this project. The community perception changed after the "flooding no more" irrefutable evidence. Esposende hybrid NbS is a good practice exemplar and an inspiration for other places within the region and beyond. Another small-scale NbS initiative includes the River Este NbS - supported by green funds - where the first phase of implementation has been successfully implemented, and the extension of the intervention area, the second phase, is currently on-going. The monitoring responsibility lies with the national environmental agency (APA) with close cooperation with Braga municipality. While there has been an observation of an increase in biodiversity, it is still too early to properly quantify impacts of this NbS. Further effort to gather evidence on the tangible and intangible outcomes of NbS is also being undertaken by Barcelos municipality under the EU-funded project TRANS Lighthouses. The project – a participatory-action research - involves local communities in the co-creation of the solutions. This will contribute to future design, planning and implementation of NbSs that are ecologically and socially beneficial, highlighting the importance of considering social justice and inclusivity.

Other more local urban initiatives include, for example, the Rede the Hortas Urbanas de Braga, the network of urban gardening initiatives in Braga, a program that combines environmental sustainability, education, social inclusion, and community resilience in the urban context of Braga. The initiative promotes sustainable urban agriculture through a network of gardens established with the support of the Municipality of Braga and local parish councils. It encourages community involvement, environmental education, and social inclusion by engaging diverse groups such as children, seniors, volunteers, and people with special needs. It supports horticulture as a tool for pedagogy in schools, where children learn about nature, agriculture, and develop practical skills. The network manages a large number of plots distributed in various urban gardens across Braga and facilitates intergenerational learning and community building through shared gardening experiences. Within the rural context, an example of a local initiative is the Associação dos Baldios do Parque Nacional da Peneda Gerês (ABPNPG) - an organization that represents and defends the interests of common land communities in the Peneda-Gerês National Park area - focusing on the sustainable use and conservation of biological resources within these communal territories. These actors complement the public stewardship work by combining ecological restoration, community engagement, inclusive participation, and continuous learning.

Environmental awareness-raising programs are also available nation-wide and at local level. Examples of national-wide NbS-related initiatives occurring across Portugal include initiatives for planting trees that engage diverse groups of the society and facilitate learning about

environmental issues, namely, climate change, forest fires, invasive species, species extinction. Among them, there is Quercus, an environmental association, as well as the initiative Criar Bosques.

Permanent educational funds are available to all municipalities in Portugal. In Cávado region, environmental programs are implemented in schools and local communities. Supported by local municipality funds, field visit activities that are part of these programs include visiting the NbS sites in the region. Additionally, in Cávado region, a range of support is given to the environmental technicians from the municipalities, e.g., educational materials, lab centres, pedagogical companies, NGOs. There is again a disparity between urban and rural areas, with rural areas having fewer human resources available for environmental matters as well as more challenges in bringing onboard NGOs and associated initiatives to promote and use the educational mb centres.

Co-innovating processes

Co-innovating processes involve activities that foster innovation, increasing the visibility of novelty and anchoring novelty in context. This includes testing and experimenting with new paradigms, practices, and processes, providing inspiration through communicating future visions and showcasing innovation.

At a regional scale, higher education, and research institutions such as University of Minho and Polytechnic Institute of Cávado provide innovation infrastructure, research, and knowledge transfer that underpin co-creation efforts and provide human, technical, and scientific resources for practical deployment of innovative climate solutions. These actors communicate future visions and showcase innovations through collaborative events and living labs, fostering system change by raising awareness among local governments and communities about sustainable and just climate pathways. The region does not have a big presence of businesses, and hence does not have a significant innovation hub or platform that bring together businesses and fosters innovative NbS-related solutions beyond the academic context. While there may not be an innovative NbS business ecosystem in the region, driven by a flood-risk reduction need and driven by top-down initiative, this region successfully implemented a large-scale innovative NbS that reduced risk of flooding in the region. A smaller-scale NbS has also been implemented in the River Este, with an extension into a wider area currently being in development. Both projects showcase the adoption and implementation of novel solutions in the region with collaboration between organisations within and beyond the region.

At a local scale, the Transition movement – an international initiative that stands for a grassroots, community-led approach to building resilience and sustainability in the face of environmental and social challenges – has taken root in Braga (Braga em Transição) and Esposende (Esposende em Transição). Transition groups create local projects that reimagine work, economy, and community support. Their activities include actively experimenting and engaging in community visioning and imagination work, fostering local empowerment, developing local networks, supporting local and new economy projects, and addressing well-being and inner transition. They also focus on social justice and just transition activities, youth and education projects, energy, and transport initiatives. These groups aim to shift behaviours toward a sustainable lifestyle in harmony with nature and community, raising awareness and fostering positive stories locally.

Similar, the Northern Portugal Nature Tourism Consortium works on integrated nature tourism development, which supports conservation and environmental awareness in the wider Northern Portugal region. Associação Geres Viver Tourismo organizes activities aimed at enjoying Nature, but also cultural and educational, following the path of a destination that, without depleting its resources, seeks to offer quality products through partnership and networked collaboration. These actors contribute to co-creating processes, multi-level governance, and the empowerment of community stakeholders. They work together to experiment with new climate adaptation practices and embed novelty in local strategies and institutions while providing resources and platforms to implement these solutions at scale.

Within the organisation, CIM Cávado facilitates meetings with environmental technicians from all six municipalities on a quarterly basis since early 2024, as part of the intermunicipal effort to bring together the different municipalities to share, learn, create, and grow together. These meetings aim to align municipalities with higher-level national strategies, e.g., waste management, and local-level common concerns and challenges. During these meetings, representatives of each municipality is given space and time to share their needs, novel solutions, funding opportunities, as well as innovative ideas about different projects. (Note: There might be some changes to the staff post-election in October 2025.)

Orchestrating processes

> Orchestrating processes involve defining a shared, long-term strategic vision that guide governance across sectors and scales, while actively engaging diverse actors to foster ownership and coordinated action. They link the strategic direction to ongoing processes by integrating resources such as enabling mechanisms (funding, technical support, regulation) and facilitating communication through formal and informal platforms. Orchestrating involves mediating across levels and sectors, managing conflicts, and embedding multi-scale, long-term thinking into decision-making and implementation.

At the national scale, the Business Council for Sustainable Development (BCSD) Portugal is a non-profit association that brings together and represents more than 200 companies in Portugal that are actively committed to the transition to sustainability. They have contributed to orchestrating change processes in Portugal with their development of a manual for implementing NbS in companies. Similarly for the Engineering sector, the Portuguese Association of Sanitary and Environmental Engineering (APESB), is a hub that fosters knowledge sharing for engineers across the country by offering capacity building in sustainable management of water and waste resources. Seminars and trainings provided also include NbS design and implementation. Besides these platforms, there are also NGOs such as the Marine Environment Research Association (AIMM Portugal) and citizen science projects such as Promote Pollinators and Ciencia Viva that monitor and provide data to inform sustainable decision-making in Northern Portugal. While there are also several NGOs that organised initiatives to promote or counter actions directed to public entities, the level of participation of such NGOs has been decreasing due to several reasons.

In the region, there are also more localized and topic-specific initiatives that orchestrate transformative governance and the implementation of NbS across scales. The ADERE Peneda-Gerês (Associação de Desenvolvimento Rural das Terras do Parque Nacional da Peneda-Gerês), for example, is a non-profit private law association, whose mission is to contribute to a

sustainable, social, economic, and cultural development of the regions within the Peneda-Gerês National Park territory. As a managing institution for projects supported through national and European funding, they serve as a bridge between funding institutions and local initiatives promoting and supporting sustainable development of the territory. In addition, there are also projects for network of schools and associations to gather towards a common goal. For example, the project Rio where a network of schools and scouts work together to clean up the river, or citizen science on protecting biodiversity in the forest.

In terms of funding availabilities for the region, there are two main levels of funding sources: national level and regional level public funds for specific projects/initiatives. Examples of funding sources: environmental, recovery and resilience, EU. Funding programs are available until 2030. CIM Cávado and the six municipalities receive national funding. Cávado being a sub-region of the North region, is under the Northern Portugal Regional Coordination and Development Commission (CCDR-N): a public entity that manages national budget (e.g., flood risk plan) and fundings to different sub-regions. CIM Cávado cooperates with CCDR to comply with national law and receive public funds for specific projects. CCDR manages environmental monitoring such as air and noise quality, waste management and environmental impact evaluation.

Within the organisation, CIM Cávado has been focusing on cross-sector collaboration and aligning strategies, e.g., through participating in MIP4Adapt since early 2024. The organisation has also been supporting cooperations between and among the six municipalities, bringing different stakeholders together and collaborating on different themes. While there is no one unified vision representing Cávado region at the moment, a visual image of Cávado's vision has been created based on the participants' personal sharing in an NBRACER WP7 capacity building workshop in February 2025.

Overall analysis

Cávado region, in general, recognised and has several activities dedicated to the unlocking of (un)sustainable pathways. The region is also active in stewarding transformative change processes through the development of monitoring systems for NbS impacts and through its efforts to facilitate active and inclusive dialogue across sectors and municipalities. To date, there are several co-creative NbS projects in development that constitute more ad-hoc and still isolated interventions. As the NbS journey is still young, some monitoring systems have been set in place but will require an increased effort as well as longer-term monitoring before more comprehensive NbS impacts could be provided. Orchestrating efforts are taking place, with some uncertainties revolving around post-election change in strategic directions.

Overall, the region is moving and dedicated to continuing in the direction of a future that is integrative, pluralist, inclusive and adaptive, while changes take place across operational, strategic, and personal levels. There are initial steps being taken towards integrative governance processes that ensure that local solutions also have sustainable impacts at other scales, on other issues, and in other places and sectors. At the same time, inclusive processes that empower those whose interests are currently not being met are fostered in some cases. Adaptive governance processes that enable learning, experimentation, reflexivity, monitoringand feedback are in place. Pluralist processes that recognise and incorporate different scientific and societal knowledge systems are still in the beginning.

The operational level represents specific actions, interventions, strategies, and behaviours that directly contribute to a desired outcome, such as a climate resilient Cávado region. For example, these include small- and local-scale NbS implementations, developing new educational tools, promoting bicycle riding and urban gardening initiatives. As in most adaptation policies and actions, the practical sphere has been the primary focus in Cávado region. The strategic level represents the systems and structures that facilitate or constrain practical responses to climate change. It is in the strategic level where norms are challenged and social movements are formed to address structural injustices, and where interest groups and NGOs transform the status quo. It is also where cooperation, collaboration and compromise can lead to new alliances and innovations such as a regional NbS approach supported by businesses and communities. In Cávado region connecting small-scale, ad-hoc NbS projects, integrating more actors, challenging unsustainable status quo towards a regional approach can strengthen the strategic level. The personal level of transformation represents the beliefs, values and worldviews that influence how people perceive reality. It represents individual and shared understandings about current challenges such as climate change. It also defines what is individually and collectively imaginable, desirable, viable and achievable. Co-creating a common vision that represents shared understandings and shared values related to climate resilience and wellbeing would be a valuable first step to strengthen the personal level of transformation in Cávado region. The visual image of Cávado's vision created based on the participants' personal perceptions and values is an important first step. Validating and adapting the vision to include more perspectives would strengthen the personal level of transformation.

Conclusions: transformation opportunities and the way forward

Being a key actor of the region, CIM Cávado aims to continue stimulating dialogue and facilitating cooperation within, across and beyond the six municipalities. However, it is challenging to get the rural municipalities to participate at the same pace as the urban municipalities. There is a disparity between urban and rural areas, with rural areas having fewer human resources available for environmental matters as well as access to other resources in general. For example, some projects are funded through national funding program, however, it will depend on whether the municipality has capacity and human resources to apply to the funding call. Nevertheless, eventual budget cuts may provide an opportunity for businesses and cooperatives to think differently and work together in synergy.

NBRACER could provide more support for rural municipalities and the region by finding ways of sharing resources and expertise as well as learning from other NBRACER regions and beyond. This includes supporting awareness-raising activities, engaging communication and educational materials as well as citizen engagement. Additionally, support could also be given through replicating activities such as Connecting NBRACER, Finding Answers Together (FAT) session, Gathering Voices of the Youth contest and NBRACER-centred reflection mechanisms for the region.

Other opportunities for deepening and broadening the transformative governance processes in Cávado involve, for instance, analysing the Esposende NbS process and exploring how to learn from it and share with the region and beyond. Besides "flooding no more," it would be useful to understand how the Esposende NbS has the capacity to address and communicate the less tangible and measurable impacts on well-being in the community. There are potentially more

good practices or cases in Cávado region (which might not be labelled as NbS) that offer valuable opportunities to learn from including smaller- and local-scale NbS. Aside from learning from existing cases, NBRACER could also support the ongoing Ecovia project that aims to connect all six municipalities by providing a continuous human pathway along the Cávado river. Implementation has begun in certain stretches (municipalities) along the river. Types of additional support include communicating and providing capacity to some of the municipalities, such sharing human resources and funding support for the construction and maintenance of the NbS.

In addition to these potentials, there is a need to better understand which stakeholders need to be included and how to build and further develop transformative capacity of the identified stakeholders. The stakeholder mapping exercise provided a first attempt to list down all the relevant stakeholders in the region. The next step would involve identifying additional key stakeholders that are still not yet included and that need to be engaged. This step will also gather insights from the perspective of local stakeholders. In the stakeholder-related section of the reflection surveys shared with participants (invited local stakeholders) at the end of the NBRACER workshop, participants were asked to suggest additional stakeholders who, in their view, should be included in future workshops. In addition to "who" to involve, it is equally important to identify the "how" to engage them. A series of online webinars and in-person workshops will be conducted in collaboration with WP1, 7 & 8 to develop this opportunity.

While there is no "official" unified vision representing Cávado region, CIM Cávado plays a vital role in stimulating dialogue on climate resilience in the region, sharing innovative solutions such as Ecovia, NbS and fostering region-wide collaboration, A first step to co-create a common vision supported by stakeholders from across the region was developed within NBRACER. A visual image of Cávado's vision has been created based on the participants' personal perceptions and values within the NBRACER WP7 capacity building workshop in February 2025. There will be an English and Portuguese version. This visual can be used as a starting point of conversation in the next multi-actor workshop – validating and adapting the vision to include more perspectives.

At the moment of writing this report, wildfires are ravaging across Portugal, especially the northern parts of the country including Cávado region. Despite the tragedy of the multiple losses that such a wildfire crisis causes, it may provide an opening for a stronger NbS approach both regionally and nationally - as this situation is already generating discussion around deeper, more transformative change. Crises such as these can sometimes gather people together to work toward a common goal. Strategic support from NBRACER e.g., through sharing best practices from other regions can foster a stronger regional NbS approach.

Annex A3. Preliminary assessment of regional transformative capacity for East Flanders region

Introduction

Aim of the assessment and information collection

East-Flanders region participates in the NBRACER project as a replicating region. The goal of this analysis is to describe the current transformative capacity of East-Flanders and identify opportunities that can be deployed to strengthen its capacity, accelerating transformation.

This preliminary assessment is based on the NBRACER process supporting framework, a dynamic and flexible framework that helps regions to understand and accelerate regional transformation. The assessment approach consists of four interconnected processes:

- Unlocking: jointly reflecting and sense-making of system dynamics and related issues via conversations
- Stewarding: monitoring of existing nature-based solutions (NbS) and adaptive learning
- Co-innovating: advancing place based NbS together
- Orchestrating: aligning, institutionalising, and mainstreaming

Four principles for transformation guide these processes: integrative, inclusive, adaptive, and pluralist. These guiding principles cut across governance levels and sectors, empower diverse voices, emphasise learning and feedback and value alternative knowledge systems.

These preliminary findings will serve as input for further strategic planning of NBRACER activities in close collaboration with WP1 (to be done during the General Assembly of October 2025).

The document is designed as a living resource that will evolve over time, integrating newly identified gaps and opportunities as they emerge during the course of NBRACER. The assessment is based on information gathered through a combination of methods:

- Desk research: Review of key policy documents and other locally available reports.
- Strategic meetings (WP1): Insights from conversations with regional partners.
- Other NBRACER deliverables and assessments: Including baseline reports, regional boards, and pilot canvases.
- Regional presentations: Updates and progress shared by regional partners
- Reflections and analyses: Contributions from the “friends of the region,” particularly the earlier Transformation Gap Sheet.

Regional context

NbS in Flanders are anchored in European and Flemish frameworks, like the Flemish Climate Adaptation Plan, the Blue Deal, and the Beleidsplan Ruimte Vlaanderen (BRV)/Spatial Policy Plan with the bouwshift, as well as Green Deals on climate-resilient space and area-based programmes such as Water-Land-Schap. The province has played a key role by developing its first adaptation plan in 2014, as part of the Climate Action Plan. The province’s role and ambition are to support municipalities—through knowledge, funding impulses, and peer learning—to become resilient as part of their Covenant of Mayors pledges. East Flanders has also helped convene regional plans

so local actions align across municipalities, e.g., the Waasland regional climate plan with Interwaas and 8–11 municipalities, and the "Klimaatgezond Zuid-Oost-Vlaanderen" partnership with SOLVA. NbS are strongly integrated in provincial guidance, and the province co-runs and hosts Water+Land+Schap 2.0 projects that use NbS for flood mitigation, drought buffering, soil/erosion control, and landscape quality—e.g., Zwalmvallei. These projects are tied to Flanders' Blue Deal and the Flemish Adaptation Plan. The work is framed by the Flemish Adaptation Plan 2030 (with a horizon to 2050), which explicitly elevates NbS (forests, wetlands, urban green) as core levers, and by the updated Blue Deal for drought/flood resilience. On the economic and innovation front, the province advances a climate-innovative economy under its Provincial Climate Action Plan (e.g., smart specialization/bio-based, energy efficiency), helping mainstream adaptation into development. The provincial government does this by bringing together, motivating, and supporting local authorities, knowledge institutions, companies, and other organizations from East Flanders to take actions that contribute to a circular and energy-efficient economy. The provincial climate policy is structured around the following themes: pleasant living, sustainable energy, sustainable mobility, blue-green networks, and a climate-innovative economy.

VLM, a replicator partner in NBRACER, plays an important and specific role in driving Nature-based Solutions (NbS) for climate resilience in the province of East Flanders. As a Flemish partner working across multiple provinces, VLM is taking up the role of operationalising NbS in its working areas. Its activities sit within the Flemish Adaptation Plan and the Blue Deal for drought and flood resilience. VLM's mandate is to strengthen rural and open-space qualities and to support agricultural activities—including their resilience—by providing financial instruments and setting up collaborative projects to solve related issues such as erosion control, rewetting, de-sealing, village/landscape greening, and land development (landinrichting). VLM has responsibility for a set of spatial and financial instruments that can help adapt to climate change through water and soil interventions, while supporting farming.

From this role, VLM has taken on the operational programme delivery of Water+Land+Schap 2.0, via 15 area-based projects and 8 system innovations that tackle water scarcity and flooding with NbS. A number of these projects, including the Zwalmvallei, are located in East Flanders. VLM is also taking up the role of area-based, cross-sectoral collaborations and serves as an implementing partner in a number of EU funds. The VLM has executed and is executing many area-based nature and land development projects in East Flanders with an important upgrade of the water resilience at the local landscape scale, often using nature-based solutions. For instance VLM restores/d large areas of marshes of the Scheldt, Leie and Dender rivers, many green areas in the eastern urban fringes of the city Ghent,…. While the Province of East Flanders acts as the regional convenor and supports local authorities to develop climate-resilience plans, VLM can be seen as the implementation engine for climate resilience and NbS in rural/open space, deploying land-and-water instruments and programmes that operationalise NbS at landscape scale, in line with the Flemish 2030 plan and the Blue Deal.

Transformation in Flanders has been clearly stimulated by close collaboration between scientists and policymakers on nature-based solutions, although labelled differently. Disasters, particularly flood hazards, have also functioned as important triggers for change, as seen during the severe summer floods of 2011 and 2021.

Key arenas that have played a decisive role in driving transformation include:

- Knowledge development on ecosystem services, led by VITO, INBO, and the University of Antwerp.
- Integration of nature-based solutions (or equivalent concepts) into legislation and policy strategies.
- Explorative dialogue on climate resilience, landscapes, and nature-based solutions through Labo Ruimte, which has been instrumental in unlocking and co-innovating processes at the Flemish level.
- Pilot programmes such as the Blue Deal and Water-Land-Schap, which test how landscapes can be made more drought-resilient, as well as the Green Deal on Climate-Resilient Spatial Planning. These initiatives are particularly relevant for strengthening stewarding processes in West Flanders.

Taken together, this context and these historical events demonstrate that both West and East Flanders have been moving towards systemic climate resilience for quite some time.

Transformative processes

Unlocking processes

> Unlocking processes are about recognising, challenging, rethinking, and opening up to dialogue about unsustainable path dependencies as well as the reimagining possible alternative, resilient futures.

Flanders has a long tradition of such unlocking processes, many of them organised at the Flemish level and extending beyond provincial boundaries. Examples include the parliamentary dialogues after the 2011 floods, the expert panel convened following the severe flooding in 2021, various scientific symposia and knowledge exchanges facilitated through Labo Ruimte. These unlocking processes have played a key role in progressing climate resilience and nature-based solutions, primarily in policy development and legislation.

In East Flanders, additional and active unlocking processes have taken place, but it is unevenly distributed and often taking place around specific issues ad entry point. However, during such stakeholder dialogues there is increasingly a move beyond single measures toward options (incl. nature-based solutions) that have multiple benefits In the Flemish Ardennes, unlocking has been catalysed by erosion as a shared issue and priority. VLM's team emphasised that this focus helps convene farmers, municipalities, and provincial actors around more structural solutions rather than repeating legacy fixes (e.g., default weirs). In the scope of the riparian zones, another unlocking process is taking place: the Flemish Environment Agency (VMM) promotes solutions, but municipal awareness and framing of riparian corridors as climate-resilience assets still lag behind in several places. Another interesting unlocking processes was initiated by a local NGO that triggered permit halt on a controlled overflow area in order to force upstream erosion to be addressed first, shifting one municipality toward more systemic approaches. This example illustrates how civil society can open political and administrative space for change.

In other words, unlocking is taking place in relation to VLM's work. Especially as part of the W+L+S projects, VLM creates safe spaces for unlocking discussions - for instance, through information

evenings targeting farmers. Often, these unlocking discussions are issue-related and not always intentionally organised, sometimes they start in response to stakeholder requests.

Stewarding processes

> Stewarding processes involve developing monitoring systems for understanding NbS impacts, facilitating active and inclusive dialogue, experimentation, and adaptive learning. These processes also focus on understanding system dynamics and feedback mechanisms as well as supporting the strengthening of self-organisation and local-led initiatives.

Monitoring of nature-related aspects in Flanders is carried out by several Flemish departments with a legal mandate to collect data, such as VMM and ANB. Monitoring occurs both periodically and on an ad hoc basis through projects, for instance at the provincial level. Although ecosystem service mapping and supporting tools are available, there is not yet a comprehensive framework for monitoring nature-based solutions (NbS).

Data to improve the understanding of climate impacts is collected and shared through the Climate Portal, but this portal primarily covers all types of adaptation measures (not only NbS) and does not specifically track NbS. VLM conducts monitoring of its pilot projects, while experimentation and learning are encouraged through programmes such as Water-Land-Schap, the Blue Deal, and the Green Deal on Climate-Resilient Spatial Planning. These initiatives generate valuable lessons. For instance, tools for riparian zones currently capture environmental co-benefits reasonably well; however, climate-resilience metrics such as infiltration, evapotranspiration, heat mitigation and buffering capacity are not yet consistently quantified for candidate locations, which weakens comparative prioritisation.

Co-innovating processes

> Co-innovating processes involve activities that foster innovation, increasing the visibility of novelty and anchoring novelty in context. This includes testing and experimenting with new paradigms, practices, and processes, providing inspiration through communicating future visions and showcasing innovation.

In Flanders, co-innovation and co-creation of nature-based solutions implementation currently take place in the following ways:

Through subsidies – Companies, citizens, and local authorities can apply for Flemish or provincial funding to implement specific NbS.

Through area-based project approaches as part of EU of Flemish projects (like green deals) – These stimulate co-creation but remain unevenly distributed; progress is largely confined to areas where projects are active, while regions without capacity to build and manage projects experience little to no movement. These area-based project allow often for quadruple helix collaboration, but they are ending at certain point in time.

The co-innovation pattern is pragmatic, and area led. VLM is a key enabler of innovating processes, via their subsidy system and once sites are identified. They can scan the wider sub-region to map hydrological and erosion hotspots, then prioritise place-specific co-design around opportunities such as re-purposing an unused school site for water buffering, heat mitigation and

community amenities, or re-imagining a down-slope recreational area with meandering, buffering and climate-proof facilities. These prototype spaces are consistent with Blue Deal's "sponge" logic and with W+L+S 2.0 as a vehicle for multi-benefit NbS that protect against drought and flooding while improving landscape quality.

Private-sector involvement is present but still largely subsidy-driven: design offices contribute once mandates exist. Rural co-creation is structurally harder than in cities because benefits and costs are more dispersed across private landholdings, urgency is perceived as lower, and engagement must be negotiated parcel by parcel, a condition that reinforces the usefulness of VLM's land instruments and area-based facilitation.

Orchestrating processes

> Orchestrating processes involve defining a shared, long-term strategic vision that guide governance across sectors and scales, while actively engaging diverse actors to foster ownership and coordinated action. They link the strategic direction to ongoing processes by integrating resources such as enabling mechanisms (funding, technical support, regulation) and facilitating communication through formal and informal platforms. Orchestrating involves mediating across levels and sectors, managing conflicts, and embedding multi-scale, long-term thinking into decision-making and implementation.

While mainstreaming is key, care must be taken to avoid integrating innovations into rigid systems that block deeper change. Orchestration should remain flexible, mission-driven, and responsive to evolving regional needs. It should also work across scale and sectors.

NbS are well embedded in several Flemish policy programmes, though they are rarely labelled as such. Instead, terms like natuurgebaseerde oplossingen, groenblauwe infrastructuur, klimaatrobuuste inrichting, and ecosysteemdiensten versterken are commonly used. There is fragmentation across different labels, and they are not yet shared through a common spatial vision. However, the lack of a joint narrative might be a deliberate choice, as some words have a negative connotation for some stakeholder groups, while the same word has a positive connotation for other groups. This makes building a joint narrative a difficulty.

Provinces could take on a stronger role in coordinating and orchestrating the many NbS projects that are currently spread across policy departments. From VLM's perspective, its orchestration role lies primarily at the operational level, where it contributes to — and in some cases leads — the shift from a project-based to a more transformative approach. The Landschapsspark structures (including those financed by VLM) are well positioned to orchestrate across projects from this operational perspective.

There are already early signs that VLM is beginning to take up this role in the Flemish Ardennes, for example through multi-actor meetings on shared priorities. While a broad, shared vision for the entire region does not yet exist — and may not necessarily be VLM's responsibility to develop — VLM could experiment with creating "mini-visions" at the local scale through its land-directing projects. Teams within VLM are already gaining experience in shaping such local visions, which could serve as steppingstones towards more integrated regional approaches.

Overall analysis

Real transformation potential is taking place in the province of East Flanders, in particular with regards to NbS approaches that are part of the climate adaptation plan and the actual support towards municipalities to progress resilience. VLM is playing a key role to increase resilience in rural areas/open space. VLM's role is mainly the one of implementation engine to enable Flemish policies to happen in rural areas, in particular as part of the W+L+S 2.0.

Conclusions: transformation opportunities and the way forward

There are a number of opportunities identified that can help to accelerate transformation in East Flanders.

- Institutionalise unlocking conversations from the perspective of systems thinking and co-innovation

A transformation opportunity would be to have unlocking conversations via systems-thinking as a structured engagement component within VLM-managed projects, in particular as part of the Water-Land-Schap programme, exploring system boundaries and jointly examining the systemic drivers behind the issues at stake.

VLM could play a further co-innovating role by structurally initiating such inclusive processes when problems need to be solved. It would be good to start co-creation early into the process. It is recommended to embed co-innovation as part of the procurement to ensure that advisory teams consistently integrate co-creation into their processes.

- Enlarge and diversity the stakeholders engaged in processes

In order to bring in new and broad range or perspective, it is recommended to find ways to engage a broader diversity of stakeholders into the different engagement processes, as these range of perspectives deepens the understanding of the problem and the set of potential solutions. New voices can be added into the issue-based processes.

- Integrated NbS dashboard and monitoring approach for replication, foster learning and visioning

VLM could play a role via Water-Land-Schap to lead the development of an integrated NbS dashboard that couples hydrological, ecological, and socio-economic indicators that would help to guide siting, sizing, and scaling decisions across the portfolio. A practical next step would be to co-design a shared MEL framework and pilot it in Zwalmvallei under Water+Land+Schap 2.0, then replicate across East Flanders to build a province-wide picture of NbS performance that can inform municipal plans and procurement standards. In this way, VLM can play from its position in the Water-Land-Schap (W+L+S) a stewarding role and the programme itself can become a stewarding engine I Flanders (studies, knowledge sharing, funding).

- Long term financial model for maintenance

Longterm maintenance of NbS is often a challenge. As for instance in the case of the riparian zones, there are temporary management agreements. And responsibilities are also not often clear along the course of the rivers and streams.

Take a leadership role in knowledge exchange on unlocking, stewarding, and co-innovating processes by sharing lessons learned across NbS projects in the province. This could be facilitated through the Landschapspark structures (or other regional platforms).

Advance regional visioning by translating land-directing reports into shared, living visions for the Flemish Ardennes, which could then be federated to the provincial scale.

Annex A4. Preliminary assessment of regional transformative capacity for Fryslân

Introduction

Aim of the assessment and information collection

The Dutch province of Fryslân participates in the NBRACER project as a replicating region. The goal of this analysis is to describe the current transformative capacity of Fryslân and identify opportunities that can be deployed to strengthen its capacity, accelerating transformation.

This preliminary assessment is based on the NBRACER process supporting framework, a dynamic and flexible framework that helps regions to understand and accelerate regional transformation. The assessment approach consists of four interconnected processes:

- Unlocking: jointly reflecting and sense-making of system dynamics and related issues via conversations
- Stewarding: monitoring of existing nature-based solutions (NbS) and adaptive learning
- Co-innovating: advancing place based NbS together
- Orchestrating: aligning, institutionalising, and mainstreaming

Four principles for transformation guide these processes: integrative, inclusive, adaptive, and pluralist. These guiding principles cut across governance levels and sectors, empower diverse voices, emphasise learning and feedback and value alternative knowledge systems.

These preliminary findings will serve as input for further strategic planning of NBRACER activities in close collaboration with WP1 (to be done during the General Assembly of October 2025).

The document is designed as a living resource that will evolve over time, integrating newly identified gaps and opportunities as they emerge during the course of NBRACER. The assessment is based on information gathered through a combination of methods:

- Desk research: Review of key policy documents and other locally available reports.
- Strategic meetings (WP1): Insights from conversations with regional partners.
- Other NBRACER deliverables and assessments: Including baseline reports, regional boards, and pilot canvases.
- Regional presentations: Updates and progress shared by regional partners
- Reflections and analyses: Contributions from the “friends of the region,” particularly the earlier Transformation Gap Sheet.

Regional context

In Fryslân, the assessment of regional transformative capacity for systemic transformation on Nature-Based Solutions (NbS) for regional climate resilience is interconnected with thematic issues: 1) coastal management, 2) slowing soil oxidation by changing water management conditions in rural areas with peat soils, 3) restructuring brooks and slowing of rainwater runoff, 4) urban development and 5) the Maintaining the freshwater balance of the Wadden islands. In detail, NbS are operationalised for the following landscapes:

Sandy soils: To retain water longer, drain slowly with restored seepage in low areas, strong groundwater systems, and manageable temporary water issues.

Peatlands: Peat oxidation and carbon dioxide emissions halted, rainwater retention reduces dependence on Lake IJsselmeer, and regional measures work together.

Clay areas: Agriculture continues with healthy soils and freshwater lenses, salination controlled via raised groundwater levels and no runoff pollution.

Wadden Islands: Freshwater balance maintained despite sea level rise, with raised groundwater dunes and local salinisation flooding managed.

Built environment: Construction follows water-robust guidelines, no significant risks from heat stress, drought, or flooding.

These NbS do not stand-alone for Fryslân, but are anchored in European and national policies and legislations, such as the European Missions on Climate Adaptation and Soils, the European Water Framework Directive, The Birds and Habitats Directives, The Natura 2000 policy, and the National Deltaprogramma, Hoogwaterbeschermingsprogramma, Deltaplan Agrarisch Waterbeheer, Deltaplan Biodiversiteit, Stelsel Agrarisch Natuur- en Landschapsbeheer, the National Nature Netwerk, the Water Framework Directive and the NOVEX, which is the spatial development plan of the Netherlands, which includes the principle of Water and Soil leading in spatial development (Water en Bodem Sturend, or WaBoS).

The transformation of the region to enable NbS for climate resilience in Fryslân has been stimulated by collaboration between society, businesses, policymakers, researchers, and teachers, although the NbS label has not been used always. Key arenas that have played a decisive role in driving transformation include:

- Integration of NbS (or equivalent concepts) into policy strategies. Both national and regional.
- Development of an overall long-term vision.
- Knowledge development in pilots.
- Development of societal support in area-based processes (Mienskip; translates to community)
- High degree of organisation in agricultural collectives.

Apart from NBRACER, the province participates in a wider innovation portfolio that supports different elements of transformation —Horizon Europe projects and two National Growth Fund (Groeifonds) programs (NL2120 on NbS; ReGeNL on regenerative agriculture). These create pipelines for knowledge, tools, and cross-sector collaboration. Program examples include SOILCRATES (EU Soil Mission living labs), SPADES (soil-in-spatial-planning tools), and SMARTER (Climate Adaptation Labs, including Fryslân).

Transformative processes

Unlocking processes

> Unlocking processes are about recognising, challenging, rethinking, and opening up to dialogue about unsustainable path dependencies as well as the reimagining possible alternative, resilient futures.

The main examples of unlocking processes can be found in schemes to interact with the community about climate change and what is needed for adapting to it. This is primarily directed at the local community (the 'Mienskip'), but also at the wider public. This entails both informing the public and incorporating their ideas in the planning process.

The climate vision of the Province of Fryslân 'Fryslân Klimaatbestendig 2050+' was built upon an active participation process with the Frisian 'Mienskip' and representatives of interest groups, and in co-creation with public officials and representatives of the waterboard (Wetterskip Fryslân), the province of Fryslân and its municipalities. In total, eight regional workshops have been organised, in which local communities were asked for their concerns, ideas and local knowledge. Including one specific workshop for youth (aged 18-35).

The online platform 'Stim fan Fryslân' ("Voice of Fryslân") is an online participation platform through which the province receives direct consultation from its inhabitants on a variety of topics. In the summer of 2024, the platform was, for example, used for raising awareness on water conservation.

In a variety of area development programmes, the province collaborates closely with local communities – often united in an 'area committee.' Including the NbS of stream valley renaturation (such as the Linde Valley) and peatland conservation.

Throughout the year, the province organises workshops, information gatherings, consultation meetings, presentations, etc. on (new) policy, projects, programmes, etc. Fryslân also has an online climate atlas, which offers information about climate change and water management.

In case of specific area plans and measures on the farm level, so-called Kitchen Table talks are the widespread practice in which options and ambitions of the farmer are discussed. This is part of a wider area-based process in which an area plan is developed.

Working with the Mienskip is not without its challenges. There sometimes is resistance from stakeholders due to traditional practices and lack of familiarity with NbS, a low awareness and acceptance of NbS among technicians, inhabitants and politicians and a lack of community engagement and trust in government initiatives (this refers barrier that system choices often influenced by existing cultural and behavioural practices). These dynamics underline why unlocking needs consistent facilitation and time.

Stewarding processes

Stewarding processes involve developing monitoring systems for understanding NbS impacts, facilitating active and inclusive dialogue, experimentation, and adaptive learning. These processes also focus on understanding system dynamics and feedback mechanisms as well as supporting the strengthening of self-organisation and local-led initiatives

In Fryslân, stewarding is visible both in province-led programmes and in area-level arrangements that couple learning with implementation. Concerning NbS in different landscapes, there have been a wide array of research studies and experiments, often on the farm level or on infrastructure (such as dikes). These studies and experiments are part of wide area-based processes such as the Peat Meadow Program (Veenweideprogramma) for rural areas with peat soils and the Deltaprogramma for water-related issues.

The *National Delta Program* protects the Netherlands against flooding, ensures a sufficient freshwater supply, and contributes to climate-resilient and water-robust development. **Its goal is for the Netherlands to be climate-proof and water-robust by 2050**, with risk-based water safety standards, clearer freshwater availability, and climate-proof spatial planning, coordinated under the Delta Commissioner. Together with knowledge institutes, companies and social organisations, the government is collaborating in the delta in new ways. Various government bodies and organisations are working on the programme under the leadership of the Delta Commissioner, the independent government commissioner for the National Delta Programme.

To ensure continued good living, working, and ecreation in the Frisian Peat Area, the Veenweideprogramma addresses the problems of water level drops and the accompanying peat oxidation, surface lowering and CO2 emissions. Various research projects are conducted that focus on agricultural practices with a higher groundwater level and on water management, soil management, nature, and cultural history while working in collaboration with local organisations in the areas. Stewarding processes include pilots, water quality assessments, the development of new business models for agriculture under wetter conditions, a financial compensation instrument that is in line with EU regulations, and the development of new cooperative area-based governance arrangements.

These pilots, measurements and innovations are also pushed from neighbouring initiatives, such as the Regio Deal Natuurinclusieve Landbouw (a temporary stimulation program of the three northern provinces and national government), IBP Vitaal Landelijk Gebied (a national program on the public roles in territorial innovation) and the Netherlands Peatland Innovation Programme (VIPNL). VIPNL combines near-term practical measures with longer-term innovation to deliver viable land-use transitions and realise the ambitions in regional peatland strategies.

The stewarding activities are varied in how transformative they are. Sometimes activities are directed at awareness raising, support gathering or keeping everyone informed and on board, sometimes and especially in area committees, issues outside of the status quo are discussed. Who can participate varies as well. For the peat areas, it has been stated that the farmers are always well represented and other stakeholders sometimes (Kuindersma et al., 2023). Outside the mentioned programmes, studies and other EU-funded projects, there is no consistent framework for monitoring, learning, and adaptive management of nature-based solutions. Moreover, there is

much attention to supporting innovation and enabling farmers and citizens to develop plans, but there is little room for improvement in making strategic choices about what innovations to support and what not, this requires monitoring and learning in order to adapt management (Gerritsen & Van der Windt, 2025).

Co-innovating processes

> Co-innovating processes involve activities that foster innovation, increasing the visibility of novelty and anchoring novelty in context. This includes testing and experimenting with new paradigms, practices, and processes, providing inspiration through communicating future visions and showcasing innovation.

Co-innovating (or co-creating) is an integral part of many of the stewarding activities, especially those in rural areas in area-based development processes, which focus on area-specific opportunities. In the Veenweideprogramma, there are multiple examples of novel agricultural business models (for livestock farming under wet conditions and for alternative crops, such as cattail in the polder Hegewarren.

This includes cooperative governance models, overarching individual firms in Akkrumer Goedland and new financial instruments such as the Compensatie Systematiek Veenweide (CSV) that enable farmers to transition their company models. These models are not limited to specific areas but are developed out of area-based processes. Other co-creating activities have taken place along with developing future-oriented visions for water management and land use within specific territories, such as Aldeboarn De Deelen. These models and visions are devised to enable transformative change in water management and land use. They often are not final yet, and it is not certain that they will offer a proven transition path, but they aim to do so and are being developed programmatically.

These co-creation activities that encompass stewarding activities typically include different stakeholders. Public parties, such as the province, the water board (Wetterskip Fryslân) and municipalities, parties from knowledge and education, consultants, and advisors. Private organisations are farmers (and their associations) and the tourism industry, but sometimes also financial institutions, the food industry and water work contractors. And not in the least, the citizens of the areas in which NbS are to be deployed. Fryslân has well-developed village associations and also cultural organisations that proactively engage with governments. This is called 'De Mienskip.' Typically, an independent chair is appointed, and the local Mienskip takes or is invited to take up a coordinating role.

Orchestrating processes

> Orchestrating processes involve defining a shared, long-term strategic vision that guide governance across sectors and scales, while actively engaging diverse actors to foster ownership and coordinated action. They link the strategic direction to ongoing processes by integrating resources such as enabling mechanisms (funding, technical support, regulation) and facilitating communication through formal and informal platforms. Orchestrating involves mediating across levels and sectors, managing conflicts, and embedding multi-scale, long-term thinking into decision-making and implementation.

As mentioned at the beginning of this regional chapter, the orchestrating processes are anchored in national policies, such as the Delta Program and others. The most relevant provincial orchestrating plan is the Fryslân Climate Resilient 2050+ (Fryslân Klimaatbestendig 2050+, FK2050+). It not only describes a vision on future water management, but it is also the translation of the national WaBoS-principle (Water and Soil Leading in Spatial Development) for the various sub-areas of the province: sand, clay, peat, the Wadden Sea Islands, and the built environment. With this, Fryslân Climate-Resilient 2050+ is also the input from the water and soil system for the Frisian implementation of the national programs 'National Strategy on Spatial Planning and the Environment Extra' (Nationale Omgevingsvisie Extra, NOVEX) and the former National Rural Area Programme (Nationaal Programma Landelijk Gebied, NPLG). According to FK2050+, the water system of the future must be based on the natural principles of water and soil. This primarily means that the design of the water and soil system provides a solid foundation for a sustainable freshwater balance throughout Fryslân. In the Blue Environmental Vision (BOVI) and de 'Blauwe Drager,' the Province of Fryslân and Wetterskip Fryslân explore this vision. Together, these documents form Fryslân climate-proof 2050+. This is playing a key role in orchestrating as the BOVI is coordinating the frameworks for water management and the implementation. It has been used to update the environmental vision of the province of Fryslân (POVI) and implementing it in GOVIs, direction can be given to the considerations, choices, and adjustments in the future use of space in Fryslân.

In area-based processes—such as in the Frisian Peat Meadow area—visions and area plans are developed (for example, the Koersdocument Aldeboarn–De Deelen 2030–2050). These processes are usually coordinated by an area committee in which the province participates, though it does not always steer directly. The ambition is to take an integrated approach that brings together water, agriculture, biodiversity, landscape, energy, recreation, soil, and climate at a scale between local and regional. Each area is different—physically and socially—so opportunities and constraints vary.

In practice, delivering this integrated approach is difficult. Kuindersma et al. (2023), studying the Aldeboarn–De Deelen process, found that policy integration was not optimal: agriculture tended to set the agenda, with other domains considered mainly from an agricultural perspective. They note the approach has strengthened over time but still missed opportunities, particularly regarding Natura 2000. The process also shifted from a short-term horizon to a longer-term perspective (beyond 2030), driven by policy needs, especially climate policy.

Overall, the Peat Meadow Area faces a major transition: agriculture must operate under less-than-ideal conditions due to changed water management (e.g., higher groundwater levels), while viable business models for farmers are still limited.

Overall analysis

The transformative capacity Fryslân can be categorised as 'well embedded in European and national policy frameworks and shows clear attention to orchestration across scales'.

There is much attention to multi-actor and multi-level anchoring of NbS. There is an overarching vision (BOVI) that is aligned with European, national, regional, and local visions, and with those of other actors within Fryslân.

There is a strong, sustained focus on innovation to steward the transformation. Stewarding and co-innovating processes are closely interlinked. Stewarding—especially research and innovation - is actively pursued, while most co-creation/co-innovation occurs in area-based settings where silos are crossed, and integrated visions and measures are developed through multi-actor collaboration. Crucially, the work addresses not only bio-physical dimensions but also business and governance instruments, with concrete steps that move from experimentation to implementation. These coalitions test new business and governance models in real-life pilots, often financed with national and European co-funding mobilised by and for the province.

Overarching policy objectives set the direction, yet territorial opportunities are deliberately sought. Much attention goes to energising local communities and keeping them well-involved. At the same time, implementation faces local resistance, trust gaps with government, limited awareness of NbS value, and a siloed public sector. While steps have been taken to improve this, there is still room to accelerate change.

For instance, the transformative approach is very dependent on temporary projects and programs. Long-term commitment is not guaranteed. There is also a need for better alignment within the provincial organisation around NbS, including concerning rules, permits and conflicting policies. It remains difficult to integrate NbS in existing grey infrastructure and overcoming siloed thinking. To enable overall coherence, there is a need for more anchoring of NbS and its regional vision within the provincial organisation.

Conclusions: transformation opportunities and the way forward

As stated above, a lot is happening and the Frisian transformation approach clearly has strong characteristics, but room for improvement to accelerate transformation does exist. We call these topics: transformation opportunities. They are the opportunities that can be deployed in order to increase the regional transformative capacity and strengthen the 4 underlying processes.

The province of Fryslân can decide to accelerate transformation by focussing actions on:

Better alignment within the provincial organisation around NbS and working towards a clearer commitment of the province for NbS for regional climate resilience. Within the province, contact between project teams is limited. This could be improved by developing **shared frameworks and findings** to increase the impact of new and ongoing work**. A clear commitment** from the province must be reflected not only in strategic visions (such as FK2050+) but also in the area-based processes that are essential for long-term transformation. Such alignment and commitment would push stewarding processes. This more coherent stance from the province may provoke resistance from the Mienskip, but it is needed to make progress and reduce fragmentation and uncertainty.

Broaden participation and buy-in in the area-based processes. The approach currently relies heavily on **citizens and farmers**, who are not always convinced of NbS value. Targeted engagement in unlocking, co-innovating and stewarding processes and clearer benefit pathways are needed to strengthen participation.

Bring more coherence and exchange between NbS pilots—and embed them in regional policy. Strengthening cross-team collaboration inside the province and taking a more strategic, orchestrated approach to bottom-up innovations could help current efforts add up faster and

more visibly. A helpful first step might be to share and reflect on success and failure stories of NbS across different landscapes and areas—within the provincial organisation and with Mienskip participation. These sessions could be convened by the regional coordinator together with WR and Deltares, and linked to related initiatives such as SPADES, SOILCRATES, and SMARTER. Within NBRACER, replicating regions are already guided to organise workshops and immersive visits; these can both grow NbS knowledge and build transformative capacity in the province. Designing them as multi-stakeholder by default and explicitly connecting ongoing projects may further boost knowledge sharing. To target these efforts where they will stick, a concise scan of key players, processes, and decision points in the region could clarify how best to integrate and mainstream NbS.

Leverage NBRACER monitoring. Use the NBRACER programme's monitoring to **enhance stewarding**: develop a **comprehensive framework**, and **build capacity** to collect, interpret, and apply results in decisions. This will help prioritise which farmer- and citizen-led innovations to support and scale. It could be considered to make use of the monitoring in NBRACER to enhance the stewarding processes in Fryslân, oriented to developing the comprehensive framework and enhancing capacity building to collect and make use of the monitoring results.

Annex A5. Preliminary assessment of regional transformative capacity for Nouvelle-Aquitaine region

Introduction

Aim of the assessment and information collection

Nouvelle-Aquitaine region participates in the NBRACER project as a demonstrating region. The goal of this analysis is to describe the current transformative capacity of Nouvelle-Aquitaine and identify opportunities that can be deployed to strengthen its capacity, accelerating transformation.

This preliminary assessment is based on the NBRACER process supporting framework, a dynamic and flexible framework that helps regions to understand and accelerate regional transformation. The assessment approach consists of four interconnected processes:

- Unlocking: jointly reflecting and sense-making of system dynamics and related issues via conversations
- Stewarding: monitoring of existing nature-based solutions (NbS) and adaptive learning
- Co-innovating: advancing place based NbS together
- Orchestrating: aligning, institutionalising, and mainstreaming

Four principles for transformation guide these processes: integrative, inclusive, adaptive, and pluralist. These guiding principles cut across governance levels and sectors, empower diverse voices, emphasise learning and feedback and value alternative knowledge systems.

These preliminary findings will serve as input for further strategic planning of NBRACER activities in close collaboration with WP1 (to be done during the General Assembly of October 2025).

The document is designed as a living resource that will evolve over time, integrating newly identified gaps and opportunities as they emerge during the course of NBRACER. The assessment is based on information gathered through a combination of methods:

- Desk research: Review of key policy documents and other locally available reports.
- Strategic meetings (WP1): Insights from conversations with regional partners.
- Other NBRACER deliverables and assessments: Including baseline reports, regional boards, and pilot canvases.
- Regional presentations: Updates and progress shared by regional partners
- Reflections and analyses: Contributions from the “friends of the region,” particularly the earlier Transformation Gap Sheet.

Regional Context

Nouvelle-Aquitaine, in the southwest of France, is the country’s largest administrative region. It covers around 84,100 square kilometres and is home to roughly 6 million people. The region stretches from the Atlantic coastline inland toward the Massif Central and brings together 12 departments. Its geography is varied, with an extensive hydrological and coastal network that includes 74,000 km of streams and 700 km of coastline. The economy is anchored in agriculture, viticulture, and tourism, making it a vital contributor to these sectors nationally.

The region faces a set of interconnected climate risks that are expected to intensify in the years ahead. Water availability is a central challenge, with increasing competition between agricultural, ecological, and domestic uses. This is compounded by more frequent droughts and declining groundwater reserves. Flooding is also a recurrent risk, linked to river overflows, flash floods and coastal inundation, and is likely to worsen with shifting rainfall patterns and sea-level rise. At the same time, heatwaves are growing in frequency and intensity, placing stress on agriculture, forests, and urban areas, while hotter and drier conditions also raise the risk of wildfires. Along the Atlantic coast, erosion and saltwater intrusion pose additional pressures, threatening sensitive ecosystems, settlements, and infrastructure. Taken together, these challenges highlight the urgency of strengthening adaptation planning, with nature-based solutions (NbS) and improved water governance at the core, as outlined in the 2018 regional water plan and the 2019 Néo Terra roadmap.

Climate governance in Nouvelle-Aquitaine is organised across three levels. At the national level, France sets the overarching framework through the Environmental Code, the Grenelle I and II laws, and the PNACC (National Plan for Adaptation to Climate Change). At the regional level, the Nouvelle-Aquitaine Regional Council manages the SRADDET (Regional Scheme on Planning, Sustainable Development, and Territorial Equality), which sets strategic goals for air quality, carbon emissions, transport, housing, and land use. The Néo Terra roadmap complements this by ensuring climate change is systematically integrated into regional policy. At the local level, municipalities and intercommunalities implement the PCAET (Territorial Climate-Air-Energy Plans) and the PLUi (Local Urbanism Plans), both of which must align with the SRADDET while also meeting national requirements. Together, these layers create a governance system where national priorities are interpreted regionally and applied locally. The Regional Council remains the central authority, guiding strategic development and climate-related initiatives.

It is important to note that in France, water resources are managed through integrated river basin management by the Water Agencies. River basins are delimited by surface water divide lines. Twelve basins have been defined: seven in metropolitan France and five in the overseas territories. The missions of the Water Agencies are to assist local authorities, industries, farmers, fishing associations, and nature conservation organizations in financing, supporting, and promoting their projects and initiatives aimed at improving health, quality of life, water resource preservation, and biodiversity. Several tools enable integrated water management: the Water Development and Management Master Plans (SDAGE) and the Water Development and Management Plans (SAGE). This coordinated management of water and associated environments aims to reconcile water uses with the preservation of ecosystems. It is established and implemented with all stakeholders: the State, elected officials, and users.

Within the NBRACER project, Nouvelle-Aquitaine is a demonstrating region, piloting NbS that respond to its key climate risks, especially water management. The pilot sites are in located in the Garonne basin, where artificial recharge of the aquifer is being tested to sustain low summer flows, and in the Marais poitevin, where reconnecting a river with its floodplain and remeandering its course aims to improve water retention and ecological continuity.

Transformative processes

Unlocking processes

Unlocking processes create safe spaces for dialogue where diverse stakeholders can reflect on system dynamics, align perceptions, and build trust to address societal, economic, and environmental challenges. These inclusive conversations foster shared understanding and create both the momentum and opportunity for change and systemic transformation.

The SRADDET (Regional Scheme on Planning, Sustainable Development and Territorial Equality) sets the overall strategy for planning policies in Nouvelle-Aquitaine. Developed by the Regional Council, it defines objectives on issues such as air pollution, carbon emissions, transport, and housing, and is a mandatory framework for departments and municipalities.

At the regional level, much attention is given to integrating policies. Two initiatives stand out: AcclimaTerra - the Regional Scientific Committee on Climate Change and the Néo Terra roadmap. AcclimaTerra grew out of a scientific committee first set up in 2010 in the former Aquitaine Region. After the creation of Nouvelle-Aquitaine in 2015, it became the region's permanent scientific committee on climate change. Today, it connects the regional government with universities and academic experts, helping to translate research into practical advice and providing a bridge between science and policy (alike an IPCC group at a local scale). Néo Terra is the region's roadmap for ecological and energy transition, first adopted in 2019 and expanded in 2023 as Néo Terra 2. It lays out six broad ambitions, from resource management and agriculture to mobility, health, and social cohesion, and introduces new measures such as eco-social conditionalities for regional aid. The roadmap was developed with strong input from AcclimaTerra, leading research centres (including Sorbonne University, Bordeaux University, INRAE, University of Poitiers, and the Emile Durkheim Center), and a former committee Ecobiose that assed the roles of biodiversity in the functioning of human societies. The Region is also responsible for implementing more than 80 activities launched under Néo Terra to support mitigation and adaptation to climate change, originally linked to eleven ambitions. These were later streamlined to six in Néo Terra 2, reflecting public consultations and input from regional stakeholders, including municipalities and youth representatives. This wide collaboration has helped ensure that biodiversity, health, and climate science are embedded in the region's long-term strategy.

These initiatives illustrate unlocking processes in the region: creating spaces where scientific expertise, policy actors, and elements of society come together to reflect on climate challenges, align perspectives, and shape pathways for adaptation. They provide a foundation for dialogue, shared understanding, and opportunities to strengthen trust and collaboration in support of transformative change.

Stewarding processes

Stewarding processes involve developing monitoring systems for understanding NbS impacts, facilitating active and inclusive dialogue, experimentation and adaptive learning. These processes also focus on understanding system dynamics and feedback mechanisms as well as supporting the strengthening of self-organisation and local-led initiatives.

In Nouvelle-Aquitaine, stewarding processes are shaped through a strong regional partnership around NBRACER. Coordination is led by the Région Nouvelle-Aquitaine, supported by AcclimaTerra and professional expertise from knowledge partners such as Bordeaux INP and

Sorbonne Université. The project also draws on the leadership of the demonstrator sites, including the PNR Marais poitevin and the RAMAGE project (led by the Établissement public Garonne, Gasconne & affluents pyrénéens former SMEAG), and engages companies such as Atos and MEOSS, who bring interest and capacity as service providers for satellite images analysis. The partnership is anchored by a dedicated regional coordinator, a civil servant from the Région Nouvelle-Aquitaine, who manages day-to-day activities and ensures links across diverse levels of governance. Weekly meetings of the Water Unit, monthly meetings with regional partners, and broader project assemblies create structured spaces for dialogue and coordination. The coordinator also works to strengthen alignment with other directorates and units of the Regional Council, aiming to raise awareness, improve capacities and broaden support for NbS pilot sites and related activities.

This strong role of the regional authority reflects the wider governance tradition in France, where public institutions at national, regional, departmental, and municipal levels play a leading role in policy coordination and implementation. At the same time, there are numerous bottom-up initiatives, which in Nouvelle-Aquitaine come from local governments, associations, civil society, and private sector. The challenge lies in connecting, integrating, and scaling these efforts, as without public support (including funding), it is difficult for smaller initiatives to grow and generate durable impact.

Co-innovating processes

> Co-innovating processes involve activities that foster innovation, increasing the visibility of novelty and anchoring novelty in context. This includes testing and experimenting with new paradigms, practices, and processes, providing inspiration through communicating future visions and showcasing innovation.

In Nouvelle-Aquitaine, co-creation of NbS remains challenging at the regional scale but is emerging within large project initiatives (such as river basins) and at the local level. The region's diversity in e.g., geography, geology, water systems, makes it difficult to apply a single, consistent framework for innovation. Instead, the priority has been to help each local community build the capacity to design strategies that fit their specific needs and contexts. This tension between consistency and flexibility is central to climate adaptation planning in the region.

Traditionally, French planning is strongly led by the public sector, with expertise concentrated in regional and municipal administrations as well as public entities and service providers. This has limited opportunities for early-stage co-design with other domains. In practice, collaboration during the initial stages of project development has been limited. Some stakeholder groups are absent from regional planning processes - not systematically included - and can also be difficult to engage when efforts are made. These include the private sector, farmers and agricultural representatives, local civil society organisations and residents. Existing projects are also often tightly defined in terms of scope, budget, and timelines, which makes it difficult to broaden partnerships or adapt plans once they are underway. Even within NBRACER pilot sites, co-creation has been strongest with place-based professionals and knowledge partners from nature and environmental sectors, while engagement of other stakeholders has proven more challenging.

The regional NBRACER coordinator and AcclimaTerra as well as the demo site managers, have taken steps to explore new ways of working. This has included setting up workshops mainly on the demo perimeters and awareness days (in collaboration with LIFE ARTISAN) to bring together regional agents across different sectors, initiating exchanges with European peers through MIP4Adapt, EU Green Week, Network Nature, and Mission Adaptation forum, and gradually extending networks to involve more diverse partners. These activities provide opportunities to raise awareness, showcase pilot sites, and strengthen dialogue on NbS.

Citizen engagement has also been attempted within the NBRACER project, though it remains limited and sometimes challenging. Explaining NbS benefits can be difficult when communities or farmers face trade-offs or potential losses (for example, land changes due to re-meandering). AcclimaTerra is preparing reports to provide more guidance on citizen engagement, but this area remains in early development.

Nevertheless, many organisations, associations and NGOs are working towards inclusivity and environmental awareness. An example could be the Regional Natural Parks (PNRs) whose missions lie at the intersection of landscape and biodiversity preservation and the maintenance of economic activities. The Marais poitevin Regional Natural Park is leading the LIFE Maraisilience project on Governance, which directly addresses these themes of citizen inclusion.

Overall, co-creation in Nouvelle-Aquitaine is still at an experimental stage, with initiatives often framed by strict project definitions, budgets, and timelines that constrain flexibility. Nonetheless, the region has begun to embrace mission-driven innovation approaches, exploring living labs, awareness days and peer learning as pathways to extend partnerships and make NbS more visible and relevant across different sectors.

Orchestrating processes

> Orchestrating processes involve defining a shared, long-term strategic vision that guide governance across sectors and scales, while actively engaging diverse actors to foster ownership and coordinated action. They link the strategic direction to ongoing processes by integrating resources such as enabling mechanisms (funding, technical support, regulation) and facilitating communication through formal and informal platforms. Orchestrating involves mediating across levels and sectors, managing conflicts, and embedding multi-scale, long-term thinking into decision-making and implementation.

In Nouvelle-Aquitaine, orchestration is taking shape through the role of the regional coordinator, who is working to move beyond sectoral silos and strengthen collaboration across diverse levels and domains. This includes building connections within the Région Nouvelle-Aquitaine itself, linking NbS initiatives with other policy departments and sectors; extending partnerships within the NBRACER pilot cases to involve local partners, interest groups, and additional sectors; and fostering synergies with other relevant projects in the region.

The coordinator has also sought to bridge to wider initiatives by convening project leads of NbS initiatives across the region, exchanging lessons with other European and French projects (such as LIFE ARTISAN and NATALIE), and engaging in European-level forums and networks. Participation in events like EU Green Week, Mission Adaptation forum, and other peer-learning exchanges has helped raise the profile of Nouvelle-Aquitaine, while also allowing the region to

reflect on approaches, share its pilot cases and connect with broader European frameworks. These orchestration efforts have already supported new initiatives, such as the region's application to the Pathways2Resilience call.

At sub-regional scales, for example around cities such as Bordeaux, Poitiers and Limoges, or at catchment level in the Garonne basin, orchestration involves building bridges between local realities and the regional strategy. AcclimaTerra also plays a role as a knowledge partner, providing scientific grounding and acting as a connector between research and policy.

Overall analysis

The governance of climate adaptation and NbS in Nouvelle-Aquitaine reveals both considerable strengths and important gaps. Across different processes, the region demonstrates a strong strategic capacity, backed by scientific expertise and institutional resources, yet it faces challenges in translating this vision into inclusive, systemic, and durable action on the ground.

At the strategic level, the region is well positioned. Frameworks such as the SRADDET and the Néo Terra roadmap provide a solid basis for long-term planning, while the presence of AcclimaTerra and partnerships with major universities ensure a robust scientific foundation. The region's involvement in European projects and networks further strengthens its role as a regional actor for innovation and resilience. Orchestration is emerging here as a valuable practice, with the regional coordinator and partners actively seeking connections across scales, sectors, and projects, both within France and at the EU level.

At the operational level, pilot projects such as those in the Garonne basin and Marais poitevin provide tangible opportunities to test hybrid and NbS in practice. These initiatives are supported by structured coordination mechanisms, regular partner meetings and efforts to extend collaboration with local actors. Stewarding processes are evident in the way monitoring, dialogue, and knowledge exchange are built into these pilot cases, though much of the leadership and resources still come from the public sector.

At the personal and societal levels, the picture is more uneven. Unlocking and co-innovating processes show that while dialogue is taking place among institutional partners, broader inclusion remains limited. Farmers, private sector actors, and local civil society groups are not consistently engaged, and citizen involvement is still at an early stage. Efforts to raise awareness such as workshops, awareness days and exchanges with EU peers, are valuable steps, but tensions can arise when NbS imply trade-offs for certain groups, such as farmers facing land-use changes.

Across the four principles of transformative change, Nouvelle-Aquitaine shows a mixed profile. The region is integrative, in that policies and projects are being linked across domains, though this integration is still partial. It is pluralist, with climate change recognised as a multi-dimensional issue, but participation is not yet balanced across all sectors. Inclusiveness is the area with the greatest room for improvement: scientific and institutional actors remain at the centre, while broader societal voices are less visible. Finally, the region is adaptive, learning through experimentation, demonstration, and knowledge exchange, but translating this learning into systemic shifts remains a work in progress.

Taken together, the overall analysis suggests that Nouvelle-Aquitaine has strong assets in its scientific base, institutional capacity, and European connections. Yet the transformative potential

of its strategies will depend on deepening inclusiveness, strengthening the link between vision and practice, and ensuring that the lessons from pilot cases are scaled and embedded across the diverse landscapes of the region.

Conclusions: transformation opportunities and the way forward

In Nouvelle-Aquitaine, four areas emerge as opportunities for strengthening adaptation, though each remains a work in progress.

The first is the move towards more systemic adaptation. Frameworks such as the EU Mission on Adaptation and the Néo Terra roadmap provide promising entry points, but translating these into practice is still at an early stage. Many ideas such as circular economy approaches, eco-production, or citizen engagement, are visible but not yet integrated into decision-making across levels and sectors.

A second area is the exchange between regional and local initiatives. While regional strategies and pilot cases offer useful structure, the link to municipalities and communities is not always strong. More consistent two-way dialogue will be needed if local knowledge and practice are to feed into regional planning, and if regional visions are to be understood and applied more widely.

Third, there is the question of broadening partnerships across the quadruple helix. The process has so far relied heavily on scientific and institutional partners. Farmers, businesses, and local organisations have been harder to involve, and their perspectives are important for anchoring NbS in land use, local economies, and everyday life.

Finally, there is an opening to support bottom-up initiatives. Many exist in the region - driven by municipalities, associations, and civil society - but they remain small and fragmented. Without additional support, whether financial, technical, or institutional, their impact risks staying limited.

Overall, the analysis highlights several opportunities for strengthening transformative adaptation in Nouvelle-Aquitaine, but these remain at an early stage. Initiatives such as Néo Terra and the NbS pilot sites represent important first steps, but their contribution to systemic transformation is still limited. The main challenge lies in bridging the gap between regional vision and local implementation, and in broadening participation beyond the usual actors. Addressing these issues will require continued attention to inclusiveness, cross-sector collaboration, and stronger links between strategy and practice.

Annex A6. Preliminary assessment of regional transformative capacity for Porto region

Introduction

Aim of the assessment and information collection

Porto region participates in the NBRACER project as a demonstrating region. The goal of this analysis is to describe the current transformative capacity of Porto and identify opportunities that can be deployed to strengthen its capacity, accelerating transformation.

This preliminary assessment is based on the NBRACER process supporting framework, a dynamic and flexible framework that helps regions to understand and accelerate regional transformation. The assessment approach consists of four interconnected processes:

- Unlocking: jointly reflecting and sense-making of system dynamics and related issues via conversations
- Stewarding: monitoring of existing nature-based solutions (NbS) and adaptive learning
- Co-innovating: advancing place based NbS together
- Orchestrating: aligning, institutionalising, and mainstreaming

Four principles for transformation guide these processes: integrative, inclusive, adaptive, and pluralist. These guiding principles cut across governance levels and sectors, empower diverse voices, emphasise learning and feedback and value alternative knowledge systems.

These preliminary findings will serve as input for further strategic planning of NBRACER activities in close collaboration with WP1 (to be done during the General Assembly of October 2025).

The document is designed as a living resource that will evolve over time, integrating newly identified gaps and opportunities as they emerge during the course of NBRACER. The assessment is based on information gathered through a combination of methods:

- Desk research: Review of key policy documents and other locally available reports.
- Strategic meetings (WP1): Insights from conversations with regional partners.
- Other NBRACER deliverables and assessments: Including baseline reports, regional boards, and pilot canvases.
- Regional presentations: Updates and progress shared by regional partners
- Reflections and analyses: Contributions from the "friends of the region," particularly the earlier Transformation Gap Sheet.

Regional context

The focus of the transformative capacity assessment of Porto region is on the NBRACER pilot Quinta de Salgueiros. This pilot supports the understanding of transformation processes in relation to nature-based solutions for climate resilience for other zones of the Porto region.

Porto City in the Porto region

The Porto Metropolitan Area covers 17 municipalities and about 1.8 million people (2023), making it Portugal's second-largest urban area. Porto city has 248,769 residents (INE 2023) and one of

the country's highest densities (~5,595 inh. /km²). Porto city is an urban territory is predominantly covered by impermeable areas (69%). The permeable areas of the city are widespread through the city, and include gardens, parks, forests, farming areas and coastal areas. The climate sits between warm-summer Mediterranean (Csb) and oceanic (Cfb). Porto aims for **carbon neutrality by 2030**, prioritizing inclusive, sustainable NbS to improve health and quality of life.

Since 2014**, a citywide environmental strategy** has guided policy and investment around five structural axes ("conscious," "green and resilient," "energy revolution," "analytical and transparent," and "biolab" city). NbS sits at the intersection of three strands of that strategy: climate adaptation (cooling, stormwater, water security) and a deliberate repositioning of nature in urban development (ecological structure, biodiversity connectivity, and incentives for greener private projects), and the establishment of the first Biolab of the city (where different NbS will be implemented).

Three policy processes now anchor Porto's NbS trajectory. First, the **Municipal Master Plan (PDM, 2021)** hard wires the Estrutura Ecológica Municipal (EEM) as a spatial backbone, densifying the green structure. The EEM is the mapping layer that the Biodiversity Strategy will rely on for habitat and corridor connectivity, which is presently under development. Second, **the Municipal Climate Action Plan (PMAC),** approved by the Municipal Assembly in September 2025, sets the adaptation agenda alongside the neutrality pathway, prioritises NbS across seven action areas and earmarks roughly €234 million for adaptation measures. Third, **a Municipal Biodiversity Strategy** is in progress to systematise species and habitats, set targets, and translate "bringing nature closer to people" into site-specific actions using the EEM.

Supporting plans and programmes turn these frameworks into place-based projects. **The Enhancement and Rehabilitation of Watercourses Plan (PVRLA**) renaturalises piped sections, creates retention basins, and increase permeability**. More Permeable Porto** identifies flood hotspots and deploys near-term NbS fixes. **The Tree-Planting Plan (2023)** improves the conditions for tree planting in public space (streets) contributing to ecosystem enhancement and city's adaptation to climate change negative effects.

In parallel, a green-space expansion program aims to lift public green from ~455 ha to ~612 ha, with key interventions such as the Charca de Salgueiros corridor (≈4 ha) and new or expanded parks (e.g., Prelada 21 ha; Fontainhas/Carquejeiras 14 ha; Lapa 4 ha; Aldoar 4 ha). Initiatives like FUN Porto (native urban forests), the Biospots network, MORE Porto/Água com Vida that are widespread through the city territory enhance biodiversity outcomes and promote civic engagement.

Governance follows a clear "stack." PMAC and the environmental strategy set missions, targets, and monitoring (the why/what). The EEM and PDM fix spatial priorities (the where). Specialised municipal companies deliver and maintain assets under orchestration by the Municipal Environmental Department (the how) and others just in collaboration with the competent units.

Implementation builds on a decade of learning. Before NBRACER, URBiNAT's "Healthy Corridor" in Campanhã piloted co-planning with residents; it revealed where participation models needed adjustment when working in lower-income neighbourhoods. The NBRACER pilot at Quinta de Salgueiros now scales that approach: a large, accessible green "Biolab" functioning as open-air research and education space, with biodiversity monitoring and citizen activities in a parish where access to nature is a social priority. Elsewhere, Parque Central da Asprela demonstrates

hydrologically functional design with major stormwater retention capacity, offering a replicable NbS template for other areas of the city and the inspiration for other regions.

Finally, Porto's city policies align with national and EU frameworks: Law 98/2021 (Climate Framework) envisages municipal climate plans; adaptation pathways build on EMAAC 2016/2020 while mitigation aligns to PNEC 2030. Through the EU Cities Mission/NetZeroCities, Porto's Climate City Contract / 2030 Action Plan is mission-labelled, anchoring a multi-annual portfolio for neutrality and resilience. In sum, Porto's model links strategy to map, and map to projects: PMAC sets the goals, the EEM/PDM sets the ground, municipal companies deliver, and co-creation keeps it legitimate and usable—so NbS are not isolated pilots but a citywide operating system.

Transformative processes

Unlocking processes

> Unlocking processes are about recognising, challenging, rethinking, and opening up to dialogue about unsustainable path dependencies as well as the reimagining possible alternative, resilient futures.

Unlocking conversations are taking place at two levels - as part of the above-mentioned policy developments on greening and the climate-adaptation work, as well as in projects like the URBINAT project in Campanhã and the Quinta de Salgueiros rehabilitation adding a new piece to the city's wider environmental strategy. There are spaces for opening up dialogue across technical departments, scientific actors, and the public.

At project level

Although the Quinta de Salgueiros is not physically connected to the URBINAT corridor, it sits in the same parish and is framed as part of a broader municipal vision rather than a stand-alone pilot. The parish context matters: Campanhã is a largely deprived area close to the city centre and major transit hubs. This territory is crossed and surrounded by natural topographic barriers and heavy road structures that create a series of connection and mobility challenges including isolating Campanhã from the centre of Porto.

Concerns about green gentrification surfaced in early dialogues; the city addressed these by involving the social-housing institution from the start and committing that nearby social housing will not be displaced or replaced by luxury development.

Unlocking has been institutionally led. As landowner, the municipality initiated and steers the overall strategy - including the dialogue process and the Quinta works - by coordinating a cross-departmental coalition. A sequence of initiatives brought together municipal divisions, national agencies (e.g., the infrastructure authority), research partners (e.g., FCUP), and – residents. Participation sequencing evolved: (1) a first workshop focused on institutional and technical actors, to present them the idea and gather their opinions and ideas for the design of park development; the second(2) involvement of local citizens through guided visits to the site and application of surveys (online and in-person), to understand their perception about Quinta de Salgueiros project; (3) involvement of local citizens through a pilot project to evaluate climate comfort on site; (4) a workshop to institutional and technical actors to present them an updated version of the project and the development done so far, while promoting feedback and the

establishment of potential partnerships in the future; (5) a final workshop dedicated to residents for presentation of Quinta de Salgueiros project and feedback session to understand if it meets the needs and visions. This close communication with stakeholders allows for a greater sense of belonging and more active participation and collaboration. Citizens and residents involvement in activities was disseminated via guided visits and targeted communication through the social-housing organisation and mail boxes invitations distribution in the buildings in the surroundings. Surveys and neighbourhood activities around the Quinta site presented proposals and gathered local feedback.

At the level of policy development

City-wide, unlocking is reinforced by the Porto Climate Pact, which builds a whole-of-society constituency (citizens and organisations) for decarbonisation and resilience and recognises the role of private actors. The PMAC Adaptation Plan sets local hazard/risk profiles and monitoring, strengthening an evidence-led storyline for NbS to address flooding, heat, and drought. It involves all departments and invites public input, creating a common dialogue space.

Co-innovating processes

Co-innovating processes involve activities that foster innovation, increasing the visibility of novelty and anchoring novelty in context. This includes testing and experimenting with new paradigms, practices, and processes, providing inspiration through communicating future visions and showcasing innovation.

Co-creation is built into the approach to engage stakeholders.

At the project level

Co-innovation and co-creation have taken different forms. Much of the co-creation happens within projects: URBiNAT (2018–2024) matured Porto's co-creation routines, while Quinta de Salgueiros (NBRACER) is being positioned as a public "Biolab"/living lab for systemic NbS mainstreaming in a deprived parish (≈6.36 ha). The wider innovation ecosystem adds momentum: the Asprela/UPTEC cluster hosts 200+ projects and companies, runs regular TECH4 Sustainability events and ClimateLaunchpad programmes, and creates a pipeline of cleantech/NbS-adjacent solutions in water, energy, materials, and data - an engine to translate pilots into services, specifications, and SMEs. In the same line, Associação Porto Digital, held by Porto municipality, University of Porto, and Porto Metro, has the aim of promoting ICT (information and communication technologies) projects in Porto city and its metropolitan area context. The project Indice Ambiental (Environmental Index) do Porto is an initiative highly innovative that aims to create an objective framework to assess the urban environmental performance of buildings and promote Porto city sustainability through the involvement of public and private stakeholders, making NbS implementation the "new normal". It is structured around four domains, aligned within environmental goals of Porto city: "energy"; "green infrastructure and biodiversity"; "water and sustainable drainage"; and "circular economy and carbon". This project developed a calculator tool encompassing several criteria. Depending on the final score achieved, some incentives and other tax benefits can be given.

At the same time, there are limits. URBiNAT offered an open platform for dialogue and co-creation, but the Quinta de Salgueiros project has limited flexibility because plans had been in place for a decade before funding was secured; as a result, co-creation was largely focused on the use and monitoring of the space rather than its design. Recent initiatives seek to broaden participation: surveys (2024–2025) with residents, schools, and potential users to gather perspectives; guided walks and workshops (as also stated in the section on the unlocking processes) as part of discussion on the biodiversity strategy and external facilitation by consultancies to mediate co-creation of that strategy.

Despite these efforts, truly transformative co-creation is still constrained by formal planning procedures, procurement processes, and the municipality's need to meet project deadlines once funding becomes available. Even so, the regional partner shows growing awareness of the need to involve maintenance teams, schools, and vulnerable communities earlier in co-creation, so that implementation and long-term stewardship strengthen each other.

At policy development level

Through the Porto Climate Pact and the Roteiros com ImPacto, citizen meetings in transformation hotspots are taking place as well as projects are stress-tested with residents, businesses, and institutions before designs are locked in. Where NbS intersects with vulnerable communities and public housing, Domus Social is engaged early to ensure access, long-term use, and inclusive resilience.

Stewarding processes

Stewarding processes involve developing monitoring systems for understanding NbS impacts, facilitating active and inclusive dialogue, experimentation, and adaptive learning. These processes also focus on understanding system dynamics and feedback mechanisms as well as supporting the strengthening of self-organisation and local-led initiatives.

Since 2014, Porto has an environmental strategy that underpins stewardship. The biodiversity strategy under progress, consolidates learning and signals mainstreaming. Operationally, the municipal portfolio already includes wetland monitoring/restoration (**MoRe Porto / Água com Vida Porto**), invasive-species control, and a continued ban on glyphosate in public-space management—giving the strategy a running start.

Active stewarding processes

Escola do Falcão Green Roof : Internationally showcased but internally challenging, namely due to maintenance competences after construction. It is owned by different teams which also represents a challenge, due to lack of clearance on responsibilities, accountability and knowledge (e.g., maintenance problems caused by people with lack of proper training; monitoring equipment that did not work properly). This case illustrates the need for aspects improvement after implementation (e.g. turn clear the specific role and responsibility of each involved team/department), and also for better institutional mediation mechanisms in order to enable cross-departmental (e.g., urban school and greening departments) and scaling. The technical

visibility is high, but replication readiness is low due to governance problems not being resolved. This signals a need for maintenance-ready stewardship (roles, budgets, and responsibilities).

Citizen monitoring agreements: Community participation is linked to technical oversight, strengthening data quality and ownership.

CommunCity project: Porto alongside Helsinki and Amsterdam is partnering to promote innovative technologies, digitally sustainable and inclusive to create solutions for urban challenge of loneliness, which benefit disadvantaged communities. In Porto it is coordinated by Porto Digital, Domus Social and Municipal Department of Social cohesion.

URBiNAT: (2018–2024): healthy corridor in Campanhã matured Porto's co-creation routines.

Integration into climate plans: NBRACER outputs are being folded into municipal climate action plans, aligning pilots with long-term strategies.

Stewardship is further supported by the scientific community, which contributes monitoring capacity and applied knowledge.

Orchestrating processes

> Orchestrating processes involve defining a shared, long-term strategic vision that guide governance across sectors and scales, while actively engaging diverse actors to foster ownership and coordinated action. They link the strategic direction to ongoing processes by integrating resources such as enabling mechanisms (funding, technical support, regulation) and facilitating communication through formal and informal platforms. Orchestrating involves mediating across levels and sectors, managing conflicts, and embedding multi-scale, long-term thinking into decision-making and implementation.

Porto's orchestration works on two intertwined levels. Strategically, the Environmental Department of the Municipality of Porto anchors a shared, long-term direction by embedding nature-based solutions (NbS) in the city's and metropolis' core frameworks - PMAC 2030 at city level. The Urban Biodiversity Strategy under progress, together with the PMAC 2030 (already approved in september 2025), the PDM, the Plano Municipal de Arborização and Plano de valorização e reabilitação das linhas de água do município (PVRLA), provides a durable policy spine that normalises NbS across plans, regulations, and capital programs.

This architecture is reinforced by continuity in environmental leadership since 2014 and habitual cross-departmental collaboration, which together preserve momentum through electoral cycles and link strategy to enabling resources - funding lines, technical support, and regulatory tools.

Operationally, orchestration shows up as disciplined delivery. The Environmental Department brokers alignment across internal teams and external operators, clarifying handovers from design to construction to maintenance so projects are replication-ready rather than one-off pilots.

Together, these strategic and operational mechanisms let Porto translate commitment into consistent outcomes: NbS are framed in long-term visions, resourced through multi-level instruments, and executed through clear roles, stable processes, and feedback loops that improve the next wave of delivery.

Overall analysis

Porto is well-positioned to drive NbS beyond pilot level and even city limits into the metropolitan level. It has strong orchestrating processes. Since 2014, strong municipal leadership and a productive city–university partnership have delivered a series of pilots (from the URBiNAT healthy corridor in Campanhã to the rehabilitation of Quinta de Salgueiros), guided by landscape-architect–led designs and solid technical stewardship. Near-term policy anchors - the Urban Biodiversity Strategy (under progress), the Municipal Climate Action Plan (PMAC 2030), recently approved in September 2025, the PDM, the Plano Municipal de Arborização and PVRLA - provide the orchestration spine that turns isolated projects into a coherent programme. The Municipal Environmental Department has also shown it can unlock EU and regional funds, which is critical for moving from projects to pilots, and then to a durable portfolio.

Across the four transformative processes, the picture is clear. Unlocking is strong inside the municipality and with core stakeholders, mainly from public services and knowledge partners: a coordination mechanism has been created already in the 2016 Adaptation Strategy and is to be confirmed in the new plan under adoption. Departments work together; national agencies and research partners are engaged; and the Porto Climate Pact is widening the tent by bringing organisations and residents into a shared agenda for decarbonisation and resilience. Unlocking could be further enhanced by the development of a single regional NbS narrative that is synchronised in the biodiversity and climate plans. Unlocking is happening in projects and living labs. These labs focus on research and exploration. Main actors are academics and scientific researchers. The level of co-innovation is rather limited and could be further deployed.

Stewarding processes exist (monitoring, learning, operational follow-through) but can benefit from governance for maintenance.

Conclusions: transformation opportunities and the way forward

As stated above, a lot is happening and the transformation approach clearly has strong characteristics, but room for improvement to accelerate transformation does exist. We call these topics: transformation opportunities. They are the opportunities that can be deployed in order to increase Porto region transformative capacity and strengthen the 4 underlying processes.

- Engage with the public and focus on justice/equity

The involvement of civil society is still critical. They can play a key role in the unlocking, co-innovating, and stewarding processes. Porto is having specific attention for social justice as a result of tackling earlier concerns about green gentrification. Therefore, DOMUS social (the entity responsible for social housing) was engaged from the very beginning of the NBRACER project development. This experience of considering social justice in the design of NbS is key and the transformation opportunity is to further include the voices of the most vulnerable people in all stages of the decision-making and implementation around NbS.

The public is engaged in the use and monitoring phases in the pilot projects, while participation of inhabitants and stakeholders in design is not strong due to compressed timelines of the legal process (e.g., licencing, public contracts for construction), in particular in NBRACER pilot. The recommendation is therefore to bring participation forward into the problem-definition and keep it continuous amongst the different groups.

- Institutionalise co-creation in the regional innovation ecosystems

Furthermore, there is a risk that co-creation remains project-bounded rather than embedded in the wider regional innovation ecosystem of businesses and associations. For real transformation, there is a need for stronger involvement of private sector. Porto has interesting regional economic development program - PULSAR - that is a result of the collective reflection of the entities that have a direct and indirect impact on the economic development of Porto, with the participation of several strategic actors from both civil and local society, institutions, and the business ecosystem. PULSAR focus on digital tools and services, mobility, energy, environment, construction, and their strategies based on innovation ecosystem approach and quadruple helix. Also, the project Índice Ambiental do Porto, represents a significative step forward a sustainable urban development, through different partners collaboration and involvement (municipal departments and companies, public academic institutions, and private stakeholders).

- Facilitate regional uptake and enabling long-term financing

Orchestration by the Municipal Environment Department is strong; the next step is consistent metropolitan uptake—aligning AMP municipalities and the regional innovation ecosystem so that what works in Porto becomes the regional default. Scale through It would be good to explore how Porto Climate Pact can be used to scale NbS. In parallel, it would be helpful to design a long-term financing model that clarifies who pays what and when, and pilot incentives/tax reductions for private NbS—reducing reliance on project-based funding.

- Enhance the Biolab's stewarding processes

The transformation opportunity lies in the establishment of the Porto Bio/Living Lab node that convenes universities, municipal companies, SMEs, neighborhood groups, and schools to prototype service-ready NbS with clear maintenance, monitoring, and social-equity guardrails, and to channel recurring solution patterns into procurement specifications and district-scale plans. In this way, the BioLab at Quinta de Salgueiros would play a key role in institutionalising stewarding processes which enables learning loops that are built into the place and addressing governance of the operation, maintenance, and monitoring phase as well.

- Enhance policy coherence between regional strategies and multi-level governance

A number of policies are in development and the opportunity is to align NBRACER with the adaptation strategy as well as to support further policy coherence between policy strategies to design, plan and implement NbS.

- Make stewardship “maintenance-ready”

UBRINAT and Escola do Falcão Green Roof have shown that there is a need to fix maintenance governance and make it measurable.

6.1 Preliminary assessment of regional transformative capacity for West Flanders region

Introduction

Aim of the assessment and information collection

West-Flanders region participates in the NBRACER project as a demonstrating region. The goal of this analysis is to describe the current transformative capacity of West-Flanders and identify opportunities that can be deployed to strengthen its capacity, accelerating transformation.

This preliminary assessment is based on the NBRACER process supporting framework, a dynamic and flexible framework that helps regions to understand and accelerate regional transformation. The assessment approach consists of four interconnected processes:

- Unlocking: jointly reflecting and sense-making of system dynamics and related issues via conversations
- Stewarding: monitoring of existing nature-based solutions (NbS) and adaptive learning
- Co-innovating: advancing place based NbS together
- Orchestrating: aligning, institutionalising, and mainstreaming

Four principles for transformation guide these processes: integrative, inclusive, adaptive, and pluralist. These guiding principles cut across governance levels and sectors, empower diverse voices, emphasise learning and feedback and value alternative knowledge systems.

These preliminary findings will serve as input for further strategic planning of NBRACER activities in close collaboration with WP1 (to be done during the General Assembly of October 2025).

The document is designed as a living resource that will evolve over time, integrating newly identified gaps and opportunities as they emerge during the course of NBRACER. The assessment is based on information gathered through a combination of methods:

- Desk research: Review of key policy documents and other locally available reports.
- Strategic meetings (WP1): Insights from conversations with regional partners.
- Other NBRACER deliverables and assessments: Including baseline reports, regional boards, and pilot canvases.
- Regional presentations: Updates and progress shared by regional partners
- Reflections and analyses: Contributions from the “friends of the region,” particularly the earlier Transformation Gap Sheet.

Regional Context

NbS in Flanders are anchored in European and Flemish frameworks, like the Flemish Climate Adaptation Plan, the Blue Deal, and the Beleidsplan Ruimte Vlaanderen (BRV) with the bouwshift, as well as Green Deals on climate-resilient space and area-based programmes such as Water-Land-Schap.

The transformation toward NbS in West Flanders has been catalysed by science–policy collaboration, repeated extreme events (floods in 2011 and 2021; droughts in 2018 and 2020),

and programmatic funding that moves beyond one-off projects. Key arenas that have driven change include:

Integration of ES/NbS into policy and strategy, culminating in the Blue Deal and the Climate Adaptation Plan 2030.

Explorative dialogue and design via Labo Ruimte, which unlocked and connected climate resilience, landscapes and NbS.

Area-based pilots through Water-Land-Schap and the Green Deal Klimaatbestendige Omgeving, strengthening stewarding (monitoring–learning) and replication.

Structural municipal support through the Local Energy & Climate Pact (funded via the Flemish Climate Fund/EU ETS revenues), accelerating local implementation.

Overall, West (and East) Flanders have been moving toward systemic climate resilience for over a decade. The governance model is multi-level and polycentric: Flemish strategies and funds set direction; provinces and municipalities deliver through programmatic coalitions (catchment partnerships, inter-municipal collaborations, regional landscapes); and advisory bodies (SALV, MINA, SERV) help align policy with practice. The opportunity now is to convert mature pilots and standards into default practice across plans, procurement, and operations—so NbS become the region's routine answer to heat, drought and floods.

Transformative processes

Unlocking processes

> Unlocking processes are about recognising, challenging, rethinking, and opening up to dialogue about unsustainable path dependencies as well as the reimagining possible alternative, resilient futures.

Flanders has a long tradition of such unlocking processes, many of them organised at the Flemish level and extending beyond provincial boundaries. Examples include the parliamentary dialogues after the 2011 floods, the expert panel convened following the severe flooding in 2021 and the taskforce on the 2023 floodings in West-Flanders as well as various scientific symposia and knowledge exchanges facilitated through *Labo Ruimte*. These unlocking processes have played an important role in progressing climate resilience and NbS, primarily in policy development and legislation.

In West Flanders, additional unlocking processes have taken place:

Within policy programmes – e.g., as part of the upcoming provincial spatial plan, local adaptation planning (for instance Ostend), Water-Land-Schap projects, and the Green Deal on Climate-Resilient Space.

Through stakeholder engagement – in EU- and Flemish-funded projects.

Via research and dissemination – universities and research institutes sharing findings with policymakers and practitioners.

Triggered by climate hazards – media debates and expert groups reflecting after events such as floods in the IJzer basin, droughts, or other climate-related impacts.

Approaches for unlocking include workshops, conferences, symposia, and the media debates. At a more local level, unlocking dialogues also occur through smaller-scale initiatives such as guided walks, field visits, and community workshops.

Most of these conversations focus on why climate change (or flooding/drought) is a challenge and what role NbS can play in reducing impacts, alongside other co-benefits. These dialogues have contributed significantly to the mainstreaming of NbS in Flemish policy development and to the growing consensus that NbS provide integrated solutions for multiple issues at once.

Stewarding processes

> Stewarding processes involve developing monitoring systems for understanding NbS impacts, facilitating active and inclusive dialogue, experimentation, and adaptive learning. These processes also focus on understanding system dynamics and feedback mechanisms as well as supporting the strengthening of self-organisation and local-led initiatives.

Monitoring of nature-related aspects in Flanders is carried out by several Flemish departments with a legal mandate to collect data, including VMM and ANB. Monitoring takes place both periodically and ad hoc, for example through projects at the provincial level. Although ecosystem service mapping and supporting tools exist, there is still no comprehensive framework for monitoring NbS.

Hazards and climate change impacts are not monitored specifically. While relevant data are available through existing legal frameworks such as Water Framework Directive monitoring, these systems are not designed for assessing hazards or the impacts of adaptation measures. As a result, their spatial and temporal resolution is not always appropriate to monitor climate impacts—except in the case of large-scale flooding, where navigable waterways are covered by a well-developed monitoring network. Some innovations are emerging, such as remote sensing for more detailed flood monitoring and the development of the verziltingsdashboard, though spatial coverage remains limited. Furthermore, there is also a legal obligation to perform monitoring for constructed wetlands that are flowing into waterways.

Efforts to monitor non-physical aspects are still modest. For example, initiatives such as De Grote Water-enquête aimed more at raising awareness than at generating robust, repeatable scientific data.

In addition, Flanders has developed a Climate Portal that integrates existing data to improve understanding of climate impacts. Although it is not a monitoring tool, nor does it monitor the effects of adaptation measures, it provides useful guidance on the selection of measures (including but not limited to NbS), particularly regarding costs and benefits.

Monitoring of pilot projects is conducted by VLM, and experimentation and learning are promoted through programmes such as Water-Land-Schap, the Blue Deal, and the Green Deal on Climate-Resilient Spatial Planning. However, these programmes are missing programme-level KPI's, hampering the evaluation of their effectiveness.

Co-innovating processes

> Co-innovating processes involve activities that foster innovation, increasing the visibility of novelty and anchoring novelty in context. This includes testing and experimenting with new paradigms, practices, and processes, providing inspiration through communicating future visions and showcasing innovation.

In Flanders, co-innovation, and co-creation of NbS implementation currently take place in the following ways:

Through subsidies – Companies, citizens, and local authorities can apply for Flemish or provincial funding to implement specific NbS.

Through area-based project approaches as part of EU or Flemish projects (like grean deals) – These stimulate co-creation but remain unevenly distributed; progress is largely confined to areas where projects are active, while regions without capacity to build and manage projects experience little to no movement. These area-based project allow often for quadruple helix collaboration, but they are ending at certain point in time.

Orchestrating processes

> Orchestrating processes involve defining a shared, long-term strategic vision that guide governance across sectors and scales, while actively engaging diverse actors to foster ownership and coordinated action. They link the strategic direction to ongoing processes by integrating resources such as enabling mechanisms (funding, technical support, regulation) and facilitating communication through formal and informal platforms. Orchestrating involves mediating across levels and sectors, managing conflicts, and embedding multi-scale, long-term thinking into decision-making and implementation.

While mainstreaming is key, care must be taken to avoid integrating innovations into rigid systems that block deeper change. Orchestration should remain flexible, mission-driven, and responsive to evolving regional needs. It should also work across scale and sectors.

NbS are well embedded in several Flemish policy programmes, though they are rarely labelled as such. Instead, terms like natuurgebaseerde oplossingen, groenblauwe infrastructuur, klimaatrobuuste inrichting, and ecosysteemdiensten versterken are commonly used. There is fragmentation across different labels, and they are not yet shared through a common spatial vision. However, the lack of a joint narrative might be a deliberate choice, as some words have a negative connotation for some stakeholder groups, while the same word has a positive connotation for other groups. This makes building a joint narrative a difficulty.

There is at the moment no strong orchestrating process in Flanders, apart from ambitions in policy frameworks. Currently, NbS implementation in Flanders — and thus also in West Flanders — is fragmented among policy departments and very much project-driven, yet often area-based. Responsibilities are blurred because the governance model is strongly policy-centric, which slows overarching decision-making across policy departments. Projects depend on funding cycles, and success is often limited to areas that have the capacity and experience to build coalitions. This creates inequality between regions and hinders systemic uptake. On the other hand, in the areas

and regions where programmes and activities are taking place, the concentrated effort may lead to real-world changes that are able to reach good impact. To benefit from this in the long-term, there is a need for orchestrating mechanisms that stimulate change in areas that are currently not the focus yet. The result is that West Flanders, like other provinces, is confronted with a growing number of NbS projects and pilots initiated by various Flemish policy departments, without a clear regional overview of how they contribute to climate resilience. There are multiple organisations playing an orchestrating role in specific domains — the Flemish Climate Portal (municipal adaptation support), CIW and catchment bodies (water quality and quantity), VLM (rural landscape programmes such as Water-Land-Schap), and Inagro (agricultural pilots and stakeholder engagement). Many activities, however, are scattered across levels and sectors. A long-term, integrated regional vision for NbS in West Flanders seems missing.

This fragmentation has several consequences:

Limited continuity: pilots often stop when funding ends, and there are no mechanisms to ensure mainstreaming into existing policy instruments.

Stakeholder fatigue: each project designs its own engagement strategy, leading to repeated demands on the same actors, particularly in areas with many pilots.

Limited inclusiveness: although many projects already form coalitions across the quadruple helix, groups such as farmers and citizens could be more systematically involved.

Uncertain financing: resources are dispersed and not clearly aligned to support sustained NbS implementation.

Yet, time horizons and spatial scales are not aligned among the different governmental plans, highlighting the need for future-oriented, cross-scale thinking. The *Beleidsplan Ruimte Vlaanderen* (BRV) has strong potential as an orchestrating framework, but its application is not mandatory.

Overall analysis

West Flanders is making progress in the transformation towards climate resilience via Nbs. There is a strong consensus at the Flemish level on the need for NbS and the concept is embedded in high level policy documents. Flemish funding streams are aligned with policy goals and local projects can access it. The polycentric governance model allows movement happening from different sides and areas. Area-based coalitions support place-based coalition building and co-innovation. This is a strong approach to align perceptions and organise legitimacy and buy-in for NbS measures. Such projects are mainly in rural area and provide flexibility to adapt Nbs to local circumstances. The area-based approach allows experimentation and innovation before scaling. Technical capacity is organized as well and accessible across Flanders via VLM and VMM. However, there are also a number of weaknesses, mainly related to the fragmentation of responsibilities.

The region's main vulnerability is fragmentation: there is no single, integrated NbS strategy or shared regional vision, and provinces without an adaptation plan weaken overall coherence. In a polycentric governance landscape, responsibilities blur and decisions can misalign across institutions. Momentum is also fragile—implementation often follows stop–start cycles tied to funding windows, with few mechanisms to embed learning into durable policy instruments.

Engagement is strong within projects, yet thin at the system level, and many local organisations lack the capacity to build and sustain coalitions. Finally, monitoring remains sectoral and scattered (e.g., water separate from biodiversity), leaving the region without an integrated NbS performance dashboard to guide scaling and prioritisation.

Conclusions: transformation opportunities and the way forward

- Tailored engagement of citizens, private sector and politicians and preventing stakeholders' fatigue.

Unlocking and co-innovating processes mainly engage scientists and public officers and often take place at the Flemish level. Accelerating transformation would involve more tailored engagement of groups like citizens, private sector (including farmers) and also local politicians, as these latter have the ability to get the local level moving. There are already some examples of successful engagement of these groups, but they are not structurally part of engagement for NbS yet. Therefore, there is a need to find ways to foster constructive dialogue and collaboration, engagement strategies that prioritize trust-building, transparency, and mutual respect. Such processes would lead to recognizing concerns, ensuring these groups have a voice in decision-making, and in co-developing solutions that fit with their contexts.

Local political engagement is key for local empowerment around NbS. What can help is to explore how NbS can be framed as solutions that directly enhance citizens' wellbeing, economic resilience, and regional development, while at the same time aligning with political and societal interests. It is equally important to demonstrate their tangible benefits and to reduce the perceived risks associated with political support. Unmistakable evidence and compelling narratives are required to show how NbS can contribute to economic growth, job creation, and social stability.

Once engaged, it is key to have meaningful involvement without overburdening participants. Therefore, a wide range of alternative engagement approaches could be considered, as well as working with different 'circles of involvement.' Stakeholders' engagement across all the ongoing projects could be coordinated and aligned at the provincial level. And it should be made clear how stakeholders' input has been used in the later stages of the process. Engagement can involve more than participation in discussions. Instead, it can be a transparent and traceable process where stakeholders can clearly see how their input influences outcomes. This can build trust, avoids fatigue, and increases the legitimacy of decisions.

Another way forward is to consider formats beyond traditional workshops, such as field visits, hands-on demonstrations, online collaboration, or one-on-one discussions. Engagement can be more effectively integrated into existing stakeholder activities, rather than requiring additional dedicated events. Digital tools and platforms can help facilitate ongoing collaboration and input without the need for physical presence, reducing the burden of travel and time. Moreover, engagement efforts can be more targeted and purpose-driven, ensuring that stakeholders clearly see the value of their participation. Finally, there may be opportunities to combine efforts with other initiatives, thereby reducing duplication and streamlining engagement processes. The province may play a coordinating role in this.

- Stimulate systems-thinking for integrated solutions, in an accessible way

Many projects place NbS within the context of existing systems. However, transformative thinking and systems design can help to envision NbS differently, as part of solutions to climate change. In Flanders, scientists and experts are leading much of this systems-design work. Yet, during co-creation workshops it becomes clear that additional methods and techniques are needed to enable a broader range of stakeholders to co-create for the longer term and at a systems level. There is therefore a need to introduce approaches that stimulate systems-thinking in the unlocking and co-innovating processes. The challenge lies in creating an environment that fosters more forward-looking and transformative thinking. Furthermore, to be truly transformative, the co-innovated solutions require an integrative approach that takes place at different scales. Assessing the integrative characteristics of such solutions will help to co-innovate in a transformative way.

- Enhancing internal provincial orchestration

NbS is part of the policy ambition in different departments and there is a need to orchestrate the work of the Province on NbS within the province. The transformation opportunity is to develop an nature-based adaptation plan for the province with the main aim to have a common direction among the provincial departments on building climate resilience via NbS. Currently, policies to support NbS are siloed and fragmented and there is a strong need for more coherence between departments.

- Province as area orchestrator, developing a regional vision to bring together all initiatives and develop a consistent framework for MEL of NbS

To enable the scaling of the many NbS projects in West Flanders, there is a need for regional coordination and orchestration to avoid fragmentation. The transformation opportunity is to map these NbS of the area of West Flanders and to identify how these NbS are reinforcing each other and to identify cumulative benefits for climate resilience and its key community systems across the province. In this way, a regional vision on climate resilience with all these NbS can be developed. The mapping of these NbS can thus help to enable a province wide unlocking dialogue on the role of NbS. To support the collection of ongoing NbS and the regional vision, it is also a transformation opportunity to develop a consistent framework for monitoring, learning, and adaptive management of NbS. It could be considered to make use of the monitoring in NBRACER to enhance the stewarding processes in West-Flanders, oriented to developing the comprehensive framework and enhancing capacity building for monitoring.

- Co-innovating new land use transformation mechanisms

Dealing with climate risks and NbS often requires strategic land use changes, but relocating homes comes with substantial financial costs. Additionally, designated building land in flood-prone areas presents financial challenges, as several municipalities struggle to independently bear the costs associated with compensating for these land use changes, as according to the Flemish Structural Plan. The transformation opportunity is to explore how the recently approved bouwshift fund can support NbS planning and implementation in West Flanders.

- Moving from project-based to structural, place-based financing

To date, most climate-adaptation funding has been project-based. This fragments impact, favours actors with strong grant-writing capacity over those with the greatest needs or best

implementation capability and leaves a significant pool of high-impact opportunities untapped. Furthermore, projects rarely include maintenance and operational costs. There is a need to explore how such costs can be reduced and distributed amongst diverse types of partners.

A structural financing approach -anchored in a clear, area-based strategy and vision - would help to move from pilots towards mainstreamed practices and enable continuous delivery rather than one-off projects. Project grants remain valuable for innovation, but the large-scale implementation of nature-based solutions sits beyond the pilot stage and requires predictable, multi-year funding lines embedded in regular operations. The province, given its place-based mandate, is well positioned to coordinate such a structural fund with regional priorities and establishing the mechanisms (criteria, co-financing, and oversight) needed to scale what works.

Annex A7. Preliminary assessment of regional transformative capacity for Western Denmark region

Introduction

Aim of the assessment and information collection

Western Denmark region participates in the NBRACER project as a demonstrating region. The goal of this analysis is to describe the current transformative capacity of Western Denmark and identify opportunities that can be deployed to strengthen its capacity, accelerating transformation.

This preliminary assessment is based on the NBRACER process supporting framework, a dynamic and flexible framework that helps regions to understand and accelerate regional transformation. The assessment approach consists of four interconnected processes:

- Unlocking: jointly reflecting and sense-making of system dynamics and related issues via conversations
- Stewarding: monitoring of existing nature-based solutions (NbS) and adaptive learning
- Co-innovating: advancing place based NbS together
- Orchestrating: aligning, institutionalising, and mainstreaming

Four principles for transformation guide these processes: integrative, inclusive, adaptive, and pluralist. These guiding principles cut across governance levels and sectors, empower diverse voices, emphasise learning and feedback and value alternative knowledge systems.

These preliminary findings will serve as input for further strategic planning of NBRACER activities in close collaboration with WP1 (to be done during the General Assembly of October 2025).

The document is designed as a living resource that will evolve over time, integrating newly identified gaps and opportunities as they emerge during the course of NBRACER. The assessment is based on information gathered through a combination of methods:

- Desk research: Review of key policy documents and other locally available reports.
- Strategic meetings (WP1): Insights from conversations with regional partners.
- Other NBRACER deliverables and assessments: Including baseline reports, regional boards, and pilot canvases.
- Regional presentations: Updates and progress shared by regional partners
- Reflections and analyses: Contributions from the “friends of the region,” particularly the earlier Transformation Gap Sheet.

Regional context

In Denmark, the Atlantic biogeographical region runs from the south of Denmark up through the Jutland peninsular, following the Jutlandic ridge, and up to northern Denmark covering a substantial part of western Denmark. Here, 15 municipalities are located as well as the three administrative Regions of Sothern, Central, and Northern Denmark. The demonstration actions are in Lemvig Municipality.

The biogeographical region is characterized by a diverse mix of landscapes and socio-ecological systems. From coastal and riverine zones to low-lying plains, highlands, forests, wetlands, and with agricultural areas forming up a major part of the land-use on the mainland (between 48.6% in Thisted and 73.1% in Morsø), but only a small part on the island of Fanø (6.4%) where nature (dry & wet habitat types) is predominant (67.4%).

Its landscapes are shaped by both inland and marine dynamics, and despite being sparsely populated with only approx. 667,000 inhabitants mostly located in smaller urban and rural settlements[2], climate adaptation is a complex challenge as well as an urgent one.

The region's agriculture and food systems face both opportunities and risks: longer growing seasons and elevated CO_2 may increase productivity, but flooding, nutrient runoff, and irrigation challenges threaten soils and water quality.

Public systems - health, emergency preparedness, transport, utilities - are under pressure from sewer overflows, heatwaves, and flood risks, while both private citizens and industry and business struggle with rising repair and insurance costs. Ecologically, warming can boost productivity but also heightens the risk of eutrophication, habitat loss, and ecosystem fragility. Vulnerable social groups - including the elderly, children, immigrants, and people with disabilities - face disproportionate impacts, emphasizing the need for equitable, inclusive adaptation strategies.

Climate Challenges – now and in the future

Denmark is already experiencing impacts of climate change stemming from both regional and local factors. Most often, the impacts are water-related, e.g., storm surges, cloudburst, or prolonged periods with heavy rain resulting in coastal and inland flooding, and/or erosion. Both frequency and severity of such events is increasing, e.g., towards late-century (2071-2100) storm surges may happen 9 to 20 times more often than today, and we may see a 30 to 70 percent increase in cloudbursts.

Severe, regionally relevant examples include the storm Bodil in 2013, twin storms Dagmar and Egon hitting western Denmark in January 2015, and the (slightly less severe) storm Floriane causing flooding in Esbjerg and Ribe in January 2025. In August 2022, a rain event with estimated intensity of a triple cloudburst (more than 45 mm precipitation in 30 minutes) caused a rupture on the railway line near the town Kibæk; 3 October 2023 – normally a period not associated with cloudburst season – a low-pressure convection front resulted in cloudbursts on 11 percent of Denmark's area, the most severe in Varde (double cloudburst), leading to large-scale flooding in a belt across south-central Denmark.

Generally, 2023 broke the precipitation record, 2024 followed suite (8th wettest on record), and with both 2024 and 2025 also bringing severe rain events, e.g., record 24-hour rain in Esbjerg in September 2024, and several days with cloudburst in the summer of 2025, again across a belt in southern-central Denmark. As a contrast to this, spring of 2025 was very dry resulting in severe drought-conditions in April and until mid-May.

The changes in seasonal precipitation and general increases in annual precipitation leads to a third type of flooding stemming from near-surface ground water. Especially during late fall and winter, high ground water levels exacerbate impacts from longer, but not necessarily severe rain events. The saturated soil cannot absorb the rain leading to local inundation, increased run-off to

nearby recipients and from there potentially into urban areas (such as Holstebro, Lemvig, Ribe), and at times also erosion.

All the above examples of weather events illustrate risks the region may face in a future that will be increasingly "warmer, wetter, wilder." As the main responsible for ensuring adaptation to this future lies at the local level, with the municipalities, The Danish Meteorological Institute has developed the Danish Climate Atlas (Klimaatlas: https://www.dmi.dk/klimaatlas), to support understanding and decision-making on the basis of spatially sound, relevant, and actionable data.

Partners and stakeholders

Klimatorium, as the regional coordinator, together with Aalborg University, provides knowledge and innovation support to guide adaptation efforts under the NBRACER project. Klimatorium's work builds on a foundation of collaboration and innovation through a triple-helix approach and with strong engagement with communities and stakeholders at local, national, and international levels, beginning with the LIFE-funded Coast to Coast Climate Challenge (2017-2022). In their relatively brief history, they have succeeded in engaging in a large number of activities, and thus 'punch above their weight'.

In the NBRACER project, testing and demonstration of decentralised, nature-based solutions (NBS), including the innovative Climate Road 2.0, form a major part of Klimatorium's activities. They have also set up a variety of related and relevant projects in their Lemvig Living Lab, which actively engages local and regional stakeholders. Finally, Klimatorium is designated as Denmark's National Adaptation Hub (NAH) for the EU Green Deal and serves as an ambassador to the EU Green Deal objectives. It positions itself as an international climate innovation centre, hosting the annual Danish Climate Summit, large-scale exhibitions, and acting as a lighthouse for NbS mainstreaming at European levels.

As western Denmark continues to face increasing climate pressures, the regional response depends not only on technical solutions but also on the capacity of actors and institutions to transform their planning, governance, and implementation practices. The region is dynamic, spatially, and economically diverse, and home to both vulnerable ecosystems and citizens. It is also a region marked by innovation and multi-level collaboration, both essential to build systemic climate resilience.

The ongoing demonstration activities in Lemvig- such as decentralised storm water cleaning systems and the Climate Road 2.0 - illustrate how technical innovation, stakeholder engagement, and NBRACER's support converge to address urgent adaptation needs while creating opportunities for scaling NbS solutions across the region.

While both demonstration projects show promising socio-technical innovation, their wider impact relies on unlocking, stewarding, co-creating, and orchestrating processes across spatial and administrative scales, not least municipal. Understanding how these processes are currently unfolding provides insight into the region's transformative capacity, identifying both enabling conditions and persistent barriers to systemic change.

The NBRACER project plays a leading role in this context by supporting knowledge exchange, stakeholder engagement, and experimental approaches that link Nature-Based Solutions (NbS) to broader resilience goals. By analyzing the region through the lenses of unlocking, stewarding,

co-creating, and orchestrating, we can assess how well the current governance arrangements integrate diverse actors, foster inclusive participation, enable adaptive learning, and promote multi-level change. This process-focused assessment highlights where strategic interventions are most needed and where NBRACER can facilitate the scaling and institutionalization of NbS, ensuring that innovations in Lemvig and other municipalities translate into lasting regional resilience.

Transformative processes

Unlocking processes

> Unlocking processes are about recognizing, challenging, rethinking, and opening up to dialogue about unsustainable path dependencies as well as the reimagining possible alternative, resilient futures.

In terms of what has taken place, Denmark already shows a high level of awareness of Nature-Based Solutions regarding Nature-Based Solutions (NbS), though this awareness is often narrowly framed. NbS are still largely equated with wetland or nature restoration projects, rather than being understood as tools for urban water or sewage infrastructure. To shift this perception, Klimatorium and the NBRACER project have strategically focused on integrating NbS with grey infrastructure, particularly in stormwater and sewage management. Their approach positions NbS as a cost-effective and sustainable alternative to expensive upgrades of traditional grey systems, which are increasingly unsuited to cope with heavier rainfall. Yet challenges remain. A legacy of distrust, rooted in failed "root zone" wetland projects of the 1980s, still lingers, and technical expertise in applying NbS to sewage systems is limited. Despite this, momentum is building: utilities, funders, universities, and private innovators are beginning to support these efforts. Klimatorium's unique role and strong connections within national and EU networks further strengthen its influence in reframing debates on the role of NbS.

When asking who initiated, who is involved, and who is missing, the picture becomes clearer. Klimatorium, through the NBRACER project, has acted as a key initiator, working alongside utilities, private innovators, and academic allies. Environmental sectors, municipalities, funding bodies, and professional networks are actively engaged in moving the agenda forward. At the same time, some crucial elements are lacking. The technical expertise needed to implement NbS in sewage management on a wider scale is still scarce. Regulatory authorities have yet to fully commit to NbS as part of their frameworks, and institutional trust in the effectiveness of NbS remains underdeveloped. Without these missing pieces, the coalition for systemic change is incomplete.

Looking at the characterization and assessment of the process, Klimatorium's approach is best described as integrative, since it bridges ecological and technical approaches by linking NbS with grey infrastructure. It is also pluralist in the sense that it brings together utilities, academics, innovators, and networks. However, the absence of strong engagement from regulators weakens the systemic reach of the initiative. Inclusiveness remains another challenge, as professional stakeholders dominate discussions, while citizens are only marginally included. Encouragingly, there are signs of adaptiveness: stakeholders are beginning to rethink NbS as more than wetlands, showing a capacity to reinterpret and expand the concept toward new applications.

Finally, when considering the level of change, it is possible to observe shifts across several dimensions. At the strategic level, Klimatorium is challenging long-standing assumptions about grey infrastructure by influencing narratives and policies. At the operational level, utilities and innovators are piloting hybrid NbS–grey solutions that test new approaches in practice. And at the personal level, municipal actors and experts are gradually changing their perspectives, signalling an important shift in how NbS are perceived and valued. Klimatorium's unique role and its positioning in strategic national and EU networks strengthen its influence in reframing NbS debates.

Stewarding processes

Stewarding processes involve developing monitoring systems for understanding NbS impacts, facilitating active and inclusive dialogue, experimentation, and adaptive learning. These processes also focus on understanding system dynamics and feedback mechanisms as well as supporting the strengthening of self-organisation and local-led initiatives.

In terms of what has taken place, municipalities have emerged as the primary stewards of climate adaptation in Denmark (but maybe this needs to be extended to transformative change), as the country has no regional authority in this field. The Climate Alliance, which brings together all 98 municipalities, provides a voluntary framework for cooperation and shared learning. All municipalities have adopted a C40-inspired approach, introducing more formalised planning cycles with revisions every five years, which adds structure and accountability to adaptation work. At the national level, CONCITO is developing a monitoring and learning system, though adaptation and NbS indicators remain weak. Meanwhile, the LIFE ACT project is playing a vital role in supporting practical implementation across 27 municipalities. Despite these efforts, systematic involvement of universities is lacking, limiting the long-term knowledge anchoring. of knowledge in stewardship practices. Through DNNK (Det Nationale Netværk for Klimatilpasning), the national network on climate change adaptation, and Realdania initiatives such as *Cities and the Rising Sea* (*Byerne og det stigende havvand*), a broad network of stakeholders from policy, practice, and academia is quite engaged. We can question, though, how well this network is working outside the larger cities—which gives rise to renewed discussion about Klimatorium's potential role in western Denmark, far from Copenhagen.

A significant new opportunity comes from the Danish Tripartite Agreement of 2024, which sets ambitious goals for sustainable agriculture, biodiversity, and water quality. Its implementation through 23 local cross-municipal groups—including five in the NBRACER geographical area—creates a concrete governance mechanism where municipalities, farmers, and nature actors are required to collaborate more directly.

When asking who initiated, who is involved, and who is missing, it becomes clear that municipalities have taken the lead, particularly through the Climate Alliance, with strong support from CONCITO and the LIFE IP project. Involvement has been broad, including local authorities, NGOs, funders, and some academic actors, though not in a systematic way. Missing, however, are several key pieces: there is no regional coordination to link local initiatives, universities are not consistently engaged in stewardship, and NbS monitoring frameworks remain incomplete and uneven. These gaps make it more difficult to consolidate learning and scale up promising practices.

Looking at the characterization and assessment of stewardship, the framework can be seen as integrative, since it combines both mitigation and adaptation goals, even though the NbS dimension is still underdeveloped. It is pluralist in that it involves municipalities and NGOs but suffers from weak cross-sector integration of science and research. Inclusiveness is largely municipal-focused, with few institutionalized roles for citizens or private actors in stewardship. On the adaptive side, iterative five-year planning cycles allow for gradual learning and adjustment, though the lack of robust monitoring limits the capacity to track progress and adapt more effectively.

Finally, considering the level of change, stewardship processes are advancing across multiple dimensions. At the strategic level, municipalities are moving toward more formalized frameworks inspired by C40 cities, which marks a significant step in structuring climate governance. At the operational level, the LIFE IP project is bridging the gap between planning and action, providing municipalities with tools and resources to implement adaptation measures on the ground. And at the personal level, municipal staff are gradually building expertise and confidence in stewardship, though this is happening unevenly across different municipalities.

Co-innovating processes

Co-innovating processes involve activities that foster innovation, increasing the visibility of novelty and anchoring novelty in context. This includes testing and experimenting with new paradigms, practices, and processes, providing inspiration through communicating future visions and showcasing innovation.

In terms of what has taken place, Denmark has developed several platforms and initiatives that strengthen co-creation. The Danish Climate Adaptation Network has become a key hub for knowledge exchange, while universities and researchers—such as those at Copenhagen University and the Folehaven project—contribute essential expertise. Klimatorium has played a key role by facilitating dialogues with municipal leaders, raising the profile of Nature-Based Solutions (NbS) in local decision-making processes. Co-creation now involves a broad set of actors: municipalities, citizens, private stakeholders, and even the Church of Denmark, which provides not only land but also legitimacy and values-based perspectives. Concrete outcomes are visible in the form of urban NbS projects such as Local Discharge of Rainwater (LAR) systems and hybrid water basins. At the same time, new legislation requiring wind turbine revenues to be redirected to communities is opening additional spaces for co-creation. Yet this opportunity is uneven, as smaller communities often lack the facilitation capacity needed to make the most of these resources.

When asking who initiated, who is involved, and who is missing, it is clear that Klimatorium, municipalities, national networks, and academic actors have been the main initiators of co-creation processes. A wide range of participants are actively involved, including citizens, private companies, NGOs, the Church of Denmark, and municipal technical departments. However, certain gaps are evident. Small communities often lack strong facilitation, which reduces their ability to engage meaningfully. Cross-sector consultants, who could help bridge technical and social dimensions, are also missing, as is a clear mechanism for integrating co-created outcomes into formal planning frameworks. These missing elements risk limiting the sustainability of co-created innovations.

Looking at the characterization and assessment of co-creation, the processes are clearly integrative, bringing together urban and rural actors across land, water, and energy sectors. They are also pluralist, since they include unusual but influential stakeholders such as the Church of Denmark, engineers, and citizens. Inclusiveness is a notable strength, as co-creation in Denmark has involved a wide variety of local voices, although capacity gaps continue to pose barriers in some places. The adaptive quality is also significant, as both communities and municipalities are increasingly co-designing solutions in direct response to mounting climate pressures.

Finally, considering the level of change, co-creation is taking shape across several dimensions. At the strategic level, policy frameworks now embed facilitation and capacity-building as legal requirements, which provides stronger institutional backing. At the operational level, municipalities and communities are actively implementing co-created NbS projects that blend ecological and technical approaches. And at the personal level, a cultural shift is visible: citizens and local leaders are moving from being passive recipients of climate measures to becoming active partners in shaping and delivering solutions.

Orchestrating processes

Orchestrating processes involve defining a shared, long-term strategic vision that guides governance across sectors and scales, while actively engaging diverse actors to foster ownership and coordinated action. These processes link strategic direction to ongoing activities by integrating resources—such as funding, technical support, and regulation—and facilitating communication through both formal and informal platforms. Orchestrating also requires mediating across levels and sectors, managing conflicts, and embedding multi-scale, long-term thinking into decision-making and implementation.

When examining what has taken place in Denmark, a clear gap emerges. There is no higher-level orchestration, and municipalities largely operate independently. The mandate for regional facilitation is set to expire in 2026, creating a potential governance vacuum. Following the DK2020 initiative, orchestration varies regionally: it has largely been lost in Southern and Central Denmark but is partially retained in Northern Denmark. In practice, intermediaries like Danish Coastal Authority and Klimatorium have stepped in as de facto orchestrators, despite lacking formal mandates to do so. Coastal municipalities, despite sharing climate risks, lack joint governance structures, leaving coordination uneven. In response, the NBRACER project has begun piloting new orchestration methods, such as decentralized "travelling engagement communities," which aim to bridge local knowledge and action. Additional soft orchestration tools—documentation, cross-regional hubs, and emerging data systems like CONCITO—are gradually shaping collaboration. Furthermore, the Tripartite Agreement has introduced local groups organized around ecosystems, rather than administrative boundaries. These groups, which align with NBRACER's ecosystem-based adaptation goals, create a potential layer of orchestration that could link municipal plans with national objectives, offering new avenues for systemic transformation.

When asking who initiated, who is involved, and who is missing, Klimatorium, Gate 21, and the NBRACER team emerge as the primary initiators of orchestration experiments. Municipalities, NGOs, think tanks, and consultants participate actively, forming a web of voluntary collaboration. However, important gaps remain: there is no stable national or regional orchestration mandate,

and formal cross-municipal coordination mechanisms are largely absent. This missing part leaves orchestration fragmented and dependent on voluntary effort rather than systematic governance. However, Denmark (e.g. not just western Denmark) is in a bit of a transition period now. The Climate Alliance (Klimaalliancen) is slowly getting to grips with the reform affecting the regions' abilities to engage and fund; in some regions, they have found stability and organisations to 'take over' (e.g., KlimaNord in northern Denmark, and Gate21 in Zealand). In others, consolidation can take a few more months. We can revisit certain parts of the document later to update.

Looking at the characterization and assessment of orchestration processes, it is clear that integrative capacity is limited. While multiple actors are experimenting, the integration of scientific knowledge and practice is still weak. The process is pluralist in that it involves many different stakeholders, but systemic cohesion is missing. Inclusiveness relies heavily on voluntary alliances, which risks uneven participation across municipalities and sectors. Despite these limitations, orchestration remains adaptive: experimental models, such as decentralized outreach and engagement communities, are being tested and refined, creating opportunities to learn and adjust approaches over time.

Finally, considering the level of change, orchestration shows potential across several dimensions. At the strategic level, the post-2026 context offers an opportunity to establish new frameworks that could formalize and strengthen orchestration. Operationally, municipal silos still dominate, with collaboration largely facilitated through soft networks and voluntary initiatives. At the personal level, individuals within hubs like Klimatorium play key bridging roles, connecting actors, knowledge, and processes across scales and sectors, demonstrating the critical role of people in driving multi-level coordination.

Overall analysis

Western Denmark demonstrates high awareness and engagement with NbS, as a solution for Impacts of climate change, but practices are uneven. At the level of the region most awareness initiatives of mission Adaptation and transformative change is concentrated at Klimatorium. Municipalities are the primary stewards, with voluntary networks filling governance gaps. Co-creation is particularly advanced—bringing in municipalities, citizens, private actors, and even unexpected partners like the Church of Denmark – but is taking place at local level of small cities, not at the regional level.

Unlocking processes are innovative but face historical distrust—both between stakeholders and in the reliability of certain solutions—as well as specific expertise gaps, particularly in scaling and maintaining NbS for sewage and water management. Stewardship is strong locally but suffers from a lack of systematic monitoring and weak integration of universities. Orchestration remains the weakest dimension, with no national or regional mandate beyond 2026, leaving experimentation and initiatives to mainly intermediaries like Klimatorium. An important cross-cutting barrier is access to funding and permission to use it under the *anlægsloft* (annual cap on municipal building and renovation funds negotiated with the national government). A recent survey indicates a perceived need for about DKK 26.6 billion in 2026, while municipalities may only be allowed around 20 billion—continuing a trend from previous years. The region shows transformative potential, but structural gaps—especially in orchestration and knowledge stewardship—risk limiting scaling and institutionalization.

Conclusions: transformation opportunities and the way forward

At the regional level, several challenges hinder the advancement of Nature-based Solutions (NbS) and broader adaptation efforts. There is no clear long-term vision or common agenda that unites stakeholders across municipalities, and both financial and human capacities remain limited. Stable orchestration mechanisms above the municipal scale are also missing, leaving coordination fragmented. Another critical gap lies in the absence of robust monitoring and evaluation frameworks tailored to NbS, making it difficult to assess effectiveness and build evidence. Knowledge infrastructure is underdeveloped, with weak connections between universities, Klimatorium, regional partner networks, municipalities, and institutions. Small communities in particular struggle with capacity, for instance in managing new financial resources such as revenues from wind energy. Moreover, institutional distrust persists, especially toward the application of NbS in sensitive areas like sewage infrastructure.

Despite these gaps, the region holds strong opportunities. Klimatorium and the NBRACER project can act as temporary orchestrators, bridging municipalities and experimenting with innovative models of engagement. The emerging monitoring system offers a unique chance to integrate NbS indicators from the outset, ensuring they become part of the standard practice. Municipalities, already showing strong stewardship, could provide a foundation to formalize adaptation mandates at the national level. There is also growing co-creation momentum, with citizens, churches, municipalities, and private actors actively engaging, which creates fertile ground for building ownership and legitimacy. The private sector and academia bring innovation and expertise that can both address current capacity gaps and help rebuild trust in NbS. Finally, the Danish Tripartite Agreement presents a timely policy anchor, offering alignment between local NbS efforts and broader national sustainability and biodiversity goals.

The region can decide to accelerate transformation by focussing actions on:

1. Strengthening Orchestration and Cross-Sectoral coordination in Western part of Denmark

- Creating a regional coordination mechanism, connecting domains, sectors and levels; strengthen the regional partnership on the Mission on Adaptation; management board for transformative change.
- Act as a regional orchestrator post-2026, bridging municipalities and ensuring alignment of adaptation actions. Currently, this role rests mainly with Klimatorium, but the main challenge is the absence of a strong regional partnership to carry the mission forward—so who should take this on?
- Facilitate cross-municipal dialogue on shared risks (coastlines, watersheds, flood-prone areas) and enable exchange of knowledge, experiences, and aspirations. Support ideation and exploration by creating a collective working space for building shared visions, agendas, and new solution pathways.
- Engage proactively with the new Tripartite local groups to ensure NbS are embedded in their land-use, water, and biodiversity planning.

2. Enhancing Monitoring, Evaluation, and Learning

- Support municipalities to develop and implement NbS-specific indicators in the national monitoring framework.

- Support systematic pre- and post-assessments to move beyond event-driven learning.
- Help integrate universities and research institutions into stewardship and monitoring, ensuring scientific validation and continuity. For example, the monitoring and development of the Climate Road in WP3 is guided by collaboration between Aalborg University, Copenhagen University, VIA University College, and NBRACER (being represented by Wageningen University.

3. Supporting Co-Creation and Stakeholder Engagement

- Facilitate capacity-building for small municipalities/village councils, particularly those managing new wind turbine revenues, to help communities invest these funds effectively in NbS and broader resilience initiatives aligned with the Regional Resilience Journey.
- Encourage broader inclusion of stakeholders—citizens, private actors, local NGOs, and institutional landowners such as the Church of Denmark—to co-design NbS solutions.
- There is also a need for more knowledge on how to include the justice component
- Provide tools, methods, and guidance for values-based engagement, leveraging local ethical and social frameworks to strengthen ownership.
- Find broader alignment. With frameworks, networks, and investments; for example, smart specialization strategies, Water Valley Cluster organization, Food Cluster Aarhus - innovative concepts of agriculture and Food production
- Pilot decentralized engagement approaches like the "Travelling Engagement Community" to embed NbS understanding locally.
- Use Klimatorium's role as National Adaptation Hub and NbS Hub Denmark partner to channel European knowledge, capacity-building programmes, and climate justice principles into local co-creation processes, while connecting with regional and national networks to find synergies and attract additional capacities and funding.
- Klimatorium can strengthen profile of the region. Attract partners, collect capacities and resources.

4. Unlocking Technical Expertise and Innovation

- Connect private innovators and municipal practitioners to scale promising NbS solutions, particularly hybrid grey-green infrastructure for urban water management.
- Offer training and knowledge-sharing platforms to expand technical expertise in NbS for sewage and stormwater management. strengthen profile of the region. Attract partners, collect capacities and resources.

5. Bridging Strategic and Operational Change

- Support municipalities in embedding NbS into formal climate action plans, moving from voluntary to legally anchored planning.
- Foster peer learning and benchmarking across municipalities to accelerate adoption of effective NbS practices.
- Translate local pilot projects into scalable models that can influence national adaptation strategies.
- Leverage Klimatorium's international networking (Climate Summit, exhibitions, global partnerships) to disseminate Western Denmark's NbS experiences and strengthen its role as a global Living Lab.