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Building capacity to transform for climate resilience

Lessons from NBRACER Regions



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Abstract

Climate change increasingly challenges European regions through growing frequency and intensities of floods, droughts, and heatwaves. These demand adaptation approaches that go beyond short-term, fragmented actions. Nature-Based Solutions (NbS) provide a powerful means to enhance climate resilience while delivering environmental, social, and economic co-benefits. This article summarises key findings from the NBRACER report D6.1 – Concepts and approaches for transformative capacity, which presents a framework to help regions strengthen their capacity to transform towards climate resilience through NbS. The framework highlights transformative change across operational, strategic, and personal spheres, supported by processes of unlocking, co-innovating, stewarding, and orchestrating, and guided by inclusive, integrative, adaptive, and pluralist governance. Lessons from European regions reveal shared challenges—such as fragmented initiatives, limited inclusiveness, and short-term funding—as well as opportunities to improve coordination, stakeholder engagement, learning, and long-term planning. Overall, the article shows that building regional transformative capacity is key to sustaining and scaling NbS for effective climate adaptation.

Key Words

Climate adaptation;
Nature-Based Solutions
(NbS); regional
transformative capacity;
Quadruple Helix; climate
resilience; systemic
change





Introduction

Climate change poses a profound challenge for people, ecosystems, and economies. Many European regions are already struggling with their growing impacts—droughts, floods, and heatwaves among them. Addressing these issues requires more than isolated, short-term projects. It calls for fundamental shifts in how regions manage and implement their climate adaptation strategies, how they collaborate with partners on EU strategies such as the Mission Adaptation to Climate Change, and how they harness nature to support well-being and safety. NBRACER recently published deliverable “D6.1 –Report on concepts and approaches for transformative capacity”. The report provides a framework and examples for regions aiming to accelerate climate adaptation through Nature-Based Solutions (NbS). This article distils key insights from the report.

What are Nature-Based Solutions?

Nature-Based Solutions (NbS) use natural processes to address societal, economic and environmental challenges. Examples include planting trees to reduce flood risk, restoring wetlands to improve water quality, or expanding urban green spaces to mitigate heat. These interventions generate multiple benefits simultaneously—enhancing ecosystems, supporting public health, and contributing to economic vitality. However, to design, plan and implement NbS, transformation is needed. To support regions, NBRACER has provided a process-supporting framework.

NBRACER process-supporting framework for regional transformative capacity

Deliverable D6.1 Report on concepts and approaches for transformative capacity introduces NBRACER process-supporting framework for regional transformative capacity. The framework describes how regions can shift from isolated climate actions toward systemic, long-term adaptation using NbS. It brings together the key elements that shape this shift (figure 1): Quadruple Helix (the actors who engage in transformative governance), Guiding Principles of

Transformative Governance (which underlying principles should guide the collaboration processes), Regional Transformative Capacities (what kind of processes are driving transformation) and Three Spheres of Transformation (where change needs to occur). These key elements are described in the following paragraphs.

The Quadruple Helix

Transformation is more effective when diverse actors collaborate. The report draws on the Quadruple Helix model, in which four key groups engage in transformative innovation and governance: government, science & academia, industry & business and civil society (citizens, NGOs, community groups). Successful NbS planning and implementation require constructive cooperation among all four. The report recommends mapping stakeholders to understand who is involved, who is supportive, and who may need further engagement.





Guiding Principles of Transformative Governance

Governance refers to the processes by which decisions are made and collective action is organised. For transformative adaptation, governance should reflect four core principles:

- Integrative: Bridging sectors and governance levels; aligning policies and actions.
- Inclusive: Ensuring broad participation, especially of marginalized groups, and addressing power imbalances.
- Adaptive: Learning from experience, updating strategies, and staying open to innovation.
- Pluralist: Valuing diverse forms of knowledge, from scientific expertise to local and traditional insights.

Regional Transformative Capacities

The report highlights four types of processes that would increase the capacities of regions to lead to transformation towards climate resilience:

- Unlocking: Creating open spaces for reflection where established assumptions can be questioned and new futures imagined.
- Co-innovating: Collaboratively designing, testing, and refining new solutions.
- Stewarding: Monitoring results, learning systematically, and adjusting approaches.
- Orchestrating: Aligning strategies, coordinating efforts, and ensuring that change is sustained over time.

Three Spheres of Transformation

Climate adaptation requires transformative change to create systemic shifts in how social, economic, and governance structures are organized and how they relate to nature. The report is based on the 'Three Spheres of Transformation' framework as proposed, inter alia, by O'Brien & Sygna, (2013) O'Brien, 2018 and Sharma (2007) which stresses the interdependency of three spheres where changes can trigger transformation:

- Operational sphere: where responses, connected to specific objectives, are planned and implemented, shape the way, adaptation measures are implemented and behaviours are formed.
- Strategic sphere: where rules, legal frameworks and regulations, and institutional arrangements steer the way decisions are taken, based on subjective views and perceptions of the world.
- Personal sphere: the domain of individual and collective beliefs, values, worldviews, that shape and define paradigms for change processes.



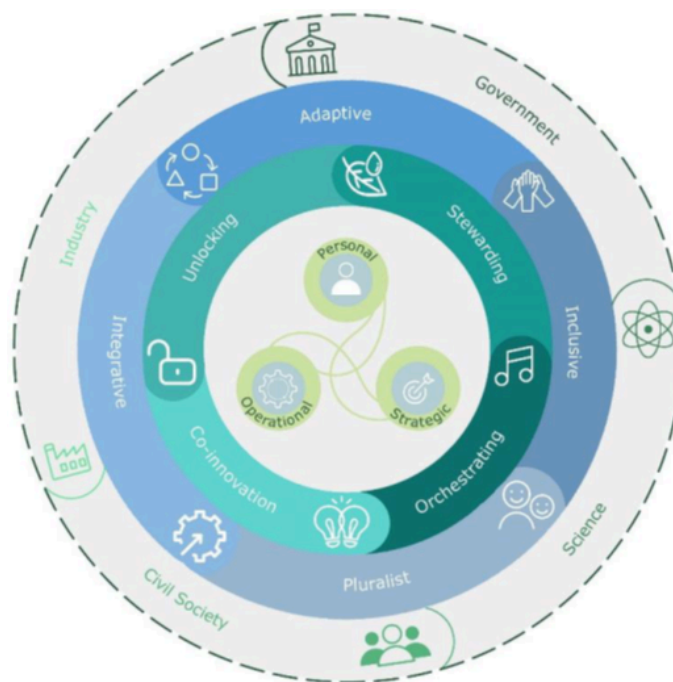


Figure 1: NBRACER process-supporting framework for regional transformative capacity: Quadruple helix (outer ring), Principles of Transformative Governance (blue ring), Interconnected Transformative Processes (green ring) and Integrated Spheres of transformation (inner circle with three spheres).

Lessons Learned from regions

Experiences from the NBRACER regions offer practical lessons on how unlocking, co-innovating, stewarding, and orchestrating can be strengthened in real contexts—and how the integrative, inclusive, adaptive, and pluralist principles help connect efforts across the operational, strategic, and personal spheres. These lessons provide inspiration for other regions seeking to advance NbS for climate resilience.

Cantabria (Spain): Strong political momentum and scientific backing exist, but orchestration is uneven. NbS projects are fragmented geographically and temporally due to discontinuity of funding. Opportunities to accelerate transformation include strengthening local political engagement, building structured stakeholder engagement, including rural actors, formalizing knowledge flows from research institutions, creating systematic monitoring and stewardship systems, and developing financial/social mechanisms for long-term NbS maintenance.

Cávado (Portugal): Active in unlocking and stewarding NbS, with several co-innovation projects at early stages. Challenges include disparities between urban and rural participation and limited human resources, especially in rural areas. Opportunities lie in sharing resources and expertise across municipalities, enhancing citizen engagement, better stakeholder mapping and inclusion, and leveraging crises like wildfires to drive stronger NbS approaches.



East Flanders and West Flanders (Belgium): NbS are anchored in Flemish and EU frameworks but these regions face fragmentation in monitoring, stakeholder engagement, and orchestration. Transformation may be accelerated by the development of integrated NbS dashboards, broader stakeholder diversity in processes, long-term financial models for maintenance, and a coherent regional vision to avoid patchy progress.

Fryslân (Netherlands): Strong community engagement through the 'Mienskip' and area-based processes, but challenges include resistance due to traditional practices, low NbS awareness, and fragmented internal coordination. Opportunities to accelerate transformation include better provincial alignment, broadening participation, sharing success/failure stories, and leveraging NBRACER monitoring to enhance stewardship.

Nouvelle-Aquitaine (France): Well-positioned strategically with strong scientific and institutional assets, but co-creation and inclusiveness remain limited. Local initiatives are fragmented and often constrained by rigid project frameworks. Opportunities include advancing systemic adaptation, improving regional-local dialogue, broadening quadruple helix partnerships, and supporting bottom-up initiatives with more resources.

Porto (Portugal): Strong municipal leadership with integrated policy and project frameworks and active co-creation in some pilot projects. Challenges include limited broader co-innovation and the need for metropolitan-scale orchestration. Opportunities focus on institutionalizing co-creation, developing long-term financing models, enhancing stewardship via the Biolab, and improving policy coherence.

Western Denmark: Coordination above municipal scale is lacking, with limited long-term vision and capacity. However, initiatives like the NBRACER project and Klimatorium act as temporary orchestrators. Strengths include inclusive co-creation involving diverse stakeholders and adaptive governance. Opportunities include better monitoring frameworks, capacity-building for small municipalities, broader stakeholder inclusion, unlocking technical innovation, and bridging strategic and operational changes.

Across all regions, common challenges involve fragmentation of initiatives, limited stakeholder inclusiveness beyond traditional actors (government, science), short-term project funding, and the need for stronger coordination and shared visions. Opportunities to accelerate transformation generally focus on enhancing multi-level governance, structured stakeholder engagement, integrated monitoring and learning systems, long-term financing mechanisms, and embedding NbS into strategic and operational frameworks to accelerate systemic transformation. This living assessment aims to guide strategic NBRACER activities and is expected to evolve with new insights and regional inputs over time.



Conclusion

NbS offer a powerful pathway for regions to adapt to climate change while generating multiple social, ecological, and economic benefits. The NBRACER process-supporting framework states that successful adaptation goes beyond individual short-term projects—it requires building transformative capacity across operational, strategic, and personal spheres, guided by inclusive, integrative, adaptive, and pluralist principles of transformative governance, enabling unlocking, stewarding, co-innovating and orchestrating capacities of regional actors. Experiences from European regions illustrate that collaboration among key actors (civil society, government, private sector and research institutes), structured stakeholder engagement, systemic orchestration, and continuous learning are key to scaling and sustaining NbS. While challenges such as fragmented initiatives, short-term funding, and uneven participation persist, the opportunities are clear: strengthening the multi-level interplay in governance, fostering co-innovation, investing in coherent monitoring and learning frameworks. Beyond providing practical guidance, the transformative governance framework also encourages regions to view climate adaptation as an ongoing process of institutional and societal change rather than a series of isolated projects. By embedding inclusiveness, integration, adaptability, and pluralism into decision-making, the framework helps regions build the long-term governance capacity needed to sustain and scale NbS under increasingly uncertain climate conditions.





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