

# Enhancing coastal resilience: cross-border collaboration and innovation in the Regions4Climate project

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## Introduction

The EU Mission on Adaptation to Climate Change, through its Adaptation Strategy, emphasizes “fast adaptation” as a core goal, advocating for a swift and thorough response to climate impacts. The Regions4Climate EU project (R4C, GA101093873) aims to collaboratively develop and demonstrate a socially just transition to climate resilience, involving twelve regions that are addressing their climatic threats by sharing experiences and developing innovative solutions to enhance climate resilience.

The regions in R4C are organized into three so-called Challenge Suites, each focusing on a different societal innovative theme: Faster Adaptation, Smarter Adaptation and Systemic Adaptation. Challenge Suite 1 (CS1) brings together the Basque Country, South Aquitaine, Tuscany, and the Azores. These regions are focusing on coastal protection and restoration, developing and implementing adaptation solutions to minimise climate-related risks and increase climate protection.

## Materials and methods

### Regions and their innovation actions

The main pillars are: (i) **coastal protection and restoration**, including biodiversity and considering opportunities for blue-carbon credits; (ii) **citizen education and engagement** in resilience building, to promote a smooth transformation; (iii) **multi-scale monitoring**, using advanced modelling techniques; and (iv) **multisectoral adaptation planning** as the basis for change. While the four cases have their own unique characteristics, they have all established individual actions

aligned with these dimensions.

**Basque Country:** This region in northeastern Spain, on the French border, is focusing on restoration actions at the Txingudi estuary. Approximately 5.5 hectares of saltmarsh will be restored to recover to revive the natural tidal dynamics and ecosystems. The project will contribute to strengthening local governance and planning structures, and to establish a monitoring program. The monitoring of extreme events and long-term changes starts to be upscaled to regional/cross-border scale.

**South Aquitaine:** Located also on the France-Spain border and neighbouring the Basque Country, the work conducted on this French region focuses on Saint Jean de Luz shoreline, which counts several urbanised and populated waterfronts where energetic storms from the Atlantic Ocean pose significant flooding risks. The innovation actions include developing an Adaptive Use Strategy for waterfronts based on real-time risk knowledge, enhancing local monitoring and forecasting of ocean storm impacts, and establishing sustainable, innovative coastal defence system management.

**Tuscany:** Central Italy’s region, particularly the municipality of Piombino, faces challenges with its dune systems due to coastal erosion and flooding during storms. The actions here aim to restore the coastal dune system to control erosion enhancing ecosystem services, create models for understanding coastal morpho dynamics, and develop resilience plans based on coastal monitoring data and stakeholders’ engagement. Tuscany’s previous project experiences provide insights into effective strategies for the R4C initiative.

**Azores:** A Portuguese autonomous region consisting of nine volcanic islands in the mid-Atlantic, the Azores face significant coastal erosion challenges, compounded by increasing tourism and population pressures on natural resources. The region’s goals include improving climate literacy through an app (Azorean Footprint) and developing a digital coastal vulnerability map to support decision-making.

### Monitoring resilience: common challenges and indicators

According to the European Commission (EC, n/d), Nature-based Solutions (NbS) are locally adapted, cost- and resource-efficient, systemic interventions, which can simultaneously provide environmental, social, and economic benefits and build resilience to climate change. The main goal of NbS implementation is to use nature to solve a specific challenge and generate optimal impacts and co-benefits for the environment, market, and society. In R4C, we assume NbS implemented at the local level, when successfully upscaled, contribute to

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minimising the climate risk at the regional level by potentially modifying its components: hazard, exposure, vulnerability (sensitivity and coping capacity), and response (IPCC, 2023).

One of the biggest challenges in the NbS implementation process is defining their effectiveness, that is, to assess their impacts and benefits, since they are usually local in scope, time-dependent, and socially constrained. Measuring these variables is not trivial, and a robust selection of KPIs (Key Performance Indicators) is necessary for that.

The primary role of monitoring in R4C is to inform decision-making processes at different scales and provide evidence of the impacts generated by the NbS. For that, a monitoring framework was proposed, which starts by defining a Regional Monitoring Team and a baseline, followed by identifying specific challenges and expected impacts, and finalising with the design of a set of KPIs and proceedings with the pre- and post-measurements. The final step is the impact assessment and, whenever possible, linking it with a reflexive monitoring process.

After considering a series of EU frameworks for monitoring effectiveness of NbS, the expert team decided to base the proposal on the exhaustive list of KPIs of the EC (2021). The presented indicators are scientifically accepted and cover a wide range of challenges and exemplify their related metrics.

The regions have recently defined their set of KPIs, and are currently starting the pre-monitoring, although each region's timeline may slightly differ. The process of selecting the most appropriate indicators and their corresponding metrics is based on some considerations:

- The selected indicators are based on the EC ones (EC, 2021) to assure robustness.
- The final set of KPIs leaves room for necessary customisations to better fit regional and local specificities.
- The same KPIs need to be measured with the same metrics, and in both pre- and post- scenarios in each innovation action in the Regions.
- The metrics were based on the SMART approach: Scientific, Measurable, Achievable, Relevant and Time-bound.
- Metrics to calculate the same KPI may differ from region to region.
- Some aspects were out of the project scope and, although relevant, were not considered (such as trade-offs, multicriteria, uncertainty, and impacts of behavioural change).

## Results and discussion

During the monitoring process, commonalities and complementarities will be analysed to foster knowledge exchange, promote cross-border actions among the regions, and generate lessons learnt (either positive or negative). By now, this comparison has been done only over the selected Societal Challenges and KPIs (Figure 1).

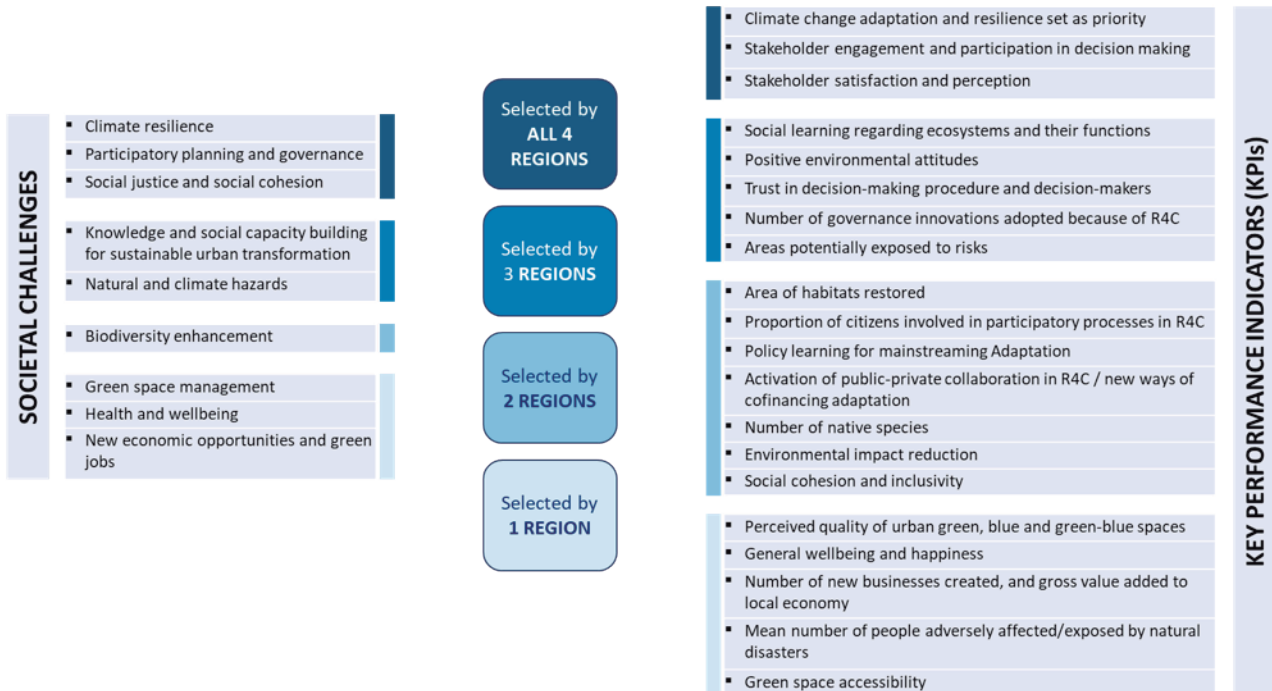


Figure 1. Selection of Societal Challenges and KPIs by the four R4C-CS1 regions.

Regarding the challenges, it is not surprising that the most common ones are focused on climate resilience – the primary goal of R4C – and that many of the selections cover, as expected, a wide spectrum of issues across social, environmental, and economic dimensions. In relation to the KPIs, besides climate change resilience and the typical environmental indicators, the regions opted for measuring social impacts, often linked with governance and planning.

It may be early to interpret without having the results, but some preliminaries assumptions based on this comparison show that generating impacts on social aspects is among the major interests of the R4C-CS1 regions

## Conclusions

In summary, the collaboration among these regions allows for the exchange of knowledge and experiences, enhancing the effectiveness of their actions. They are committed to developing cross-border strategies, including scalable and replicable outcomes that enhance regional climate resilience, contributing to the overarching goal of the EU Adaptation Strategy.

This communication offers an overview of those actions, as well as of the targeted results and related impacts on climate resilience, with special focus on the initial stage of their monitoring journey and expected realisations for the coming year.

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