

# Transformative Innovation for better Climate Change Adaptation – Case Study: Attica and North Aegean Regions, Greece

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## **Abstract**

The aim of this report is to investigate the potential for harnessing key features of Transformative Innovation to improve the design and the implementation of Climate Change Adaptation (CCA) strategies, based on empirical analyses. The study draws on the conceptual framework on this question previously defined for the JRC (European Commission, 2024), and the methodology for case studies articulated in the same report. The case study research comprises overall 14 case study reports covering 16 different territories from across the EU and beyond, casing various institutional contexts, a variety of climate risks within different biogeographical regions, different ranges of population sizes, and representing a diversity of approaches to CCA and transformative innovation<sup>1</sup>.

The framework takes the form of an analytical grid, structured into seven sections, each of them representing a key feature of the ‘transformative innovation’ approach where the features are understood as essential conditions for the design and implementation of CCA strategies with this high level of ambition. Each section sets out the main question(s) to be addressed in relation to its respective transformative innovation features.

This Report provides the findings for the regions of Attica and North Aegean regions, Greece, as at November 2023 and is the result of a collaboration between the Joint Research Centre (JRC), DG CLIMA and DG RTD.

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<sup>1</sup> A full list of the case studies is provided in Annex 2

## **Acknowledgements**

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## Executive summary

### Policy context

Adapting to climate change has become an increasingly urgent priority for the EU and its territories. Given this urgency, and the systemic nature of climate resilience, new transformative ways to accelerate adaptation are considered. Transformative Innovation (TI) is the focus of this report, particularly how it can help supporting and accelerating adaptation to climate change. The analysis in this report draws lessons for the two Greek regions of Attica and the North Aegean on how this approach may help them to increase climate resilience, and what can be done in addition, to further accelerate the Climate Change Adaptation (CCA). The analysis is based on a theoretical framework along seven dimensions designed previously for the JRC (European Commission, 2024), to compare TI and CCA. It is one out of a series of 14 case study reports comprising 16 different European territories, casing various biogeographical regions with a variety of climate risks, various institutional contexts, different ranges of population sizes, and demonstrating a diversity of approaches to transformative innovation and CCA.

### Main findings

#### Attica region:

With its array of stakeholders and a potential for innovative solutions, Attica finds itself well-poised to establish a robust and transformative CCA strategy. It has initiated strategies to mitigate climate change impacts, notably through efforts like CLIMATTICA, a nationwide network of Local Government Organizations for climate change. The region has also laid down policies that serve as a potential model for other regions. However, the policy portfolio has room for enhancement. It could be fortified through transformative CCA strategies, synergistic policy instruments, and fostering an innovative solution ecosystem. Moreover, crafting robust multi-level governance structures is imperative for ensuring successful CCA interventions.

Despite having a comprehensive knowledge base, there is a need for systematic organization to fully support CCA decision-making. Ensuring that the knowledge base remains relevant and evolves necessitates nurturing strategic capacities for continuous learning.

The case study offers insights into how a region can comprehensively approach CCA, integrating a *strategy that is both reactive and proactive*, and that focuses on mitigating risks while capitalizing on opportunities.

Although the region's approach is comprehensive, well organized, and participatory, and aligns with broader national and EU goals, it also presents challenges, particularly in *inter-agency coordination and effective implementation*.

Addressing institutional weaknesses, such as the need for *modern specifications in project design, and resolving institutional ambiguity at the municipal level*, should be prioritised. Additionally, financing regional CCA plans is perhaps the most pivotal in implementing them. Considering that so far most spending is going into mitigation rather than adaptation, prioritising project and infrastructure funding is essential based on their contribution to CCA efforts.

#### North Aegean region:

The region requires a transformative approach where strategies such as the regional CCA strategy (PeSPKA) are seamlessly melded with systemic, social, and administrative transformations. Ensuring that the strategies are not merely documented but are impactful, demands a commitment to strategic evolution, stakeholder engagement, and robust governance.

Addressing the region challenges necessitates strategically reimagining its policy portfolio, wherein resources are strategically reallocated, local capacities and collaborations are fortified, and a focus is placed on targeted CCA efforts and future infrastructure investments.

A broader stakeholder engagement is recommended, involving a continuous, iterative process of engagement, feedback, and adjustment to challenges.

Addressing identified gaps through structured development and operationalization of knowledge observatories to build a knowledge base and nurturing strategic capacities for continuous learning and adaptation, is also recommended.

The region's distinct insularity, compounded by its "dual regionalism", imposes unique communication, integration, particularly in sectors like tourism, agriculture, fisheries, and infrastructure. As evidenced by the PeSPKA, the strategies address areas like water and forest management, cultural heritage preservation, energy infrastructure, and agriculture. However, there are evident oversights, particularly in aligning planning and execution and ensuring the requisite participation of local entities and civil society in effective implementation.

Central issues include a weakened institutional framework and a significant disconnect between drafted policies and their real-world implementation, exacerbated by a need for more understanding and support from both societal and political realms. Additionally, geographical discontinuity and varying economic dynamics across the islands add another layer of challenges, necessitating a more centralized and synchronized approach to ensure cohesive progress across all islands.

While the region's primary resources stem from co-financed programs and national resources, prioritization is often skewed toward immediate regional concerns, such as immigration, rather than comprehensive climate action. Despite being significantly understaffed, smaller municipalities embody the potential for localized, innovative solutions. Still, a lack of broader interregional or international collaborations may hinder comprehensive, sustainable solutions in the long run.

The region's approach to stakeholder involvement and its current multi-level governance system displays several inefficiencies, with execution often deviating from the intended purpose due to issues like short-term electoral objectives and spatial disparity, resulting in significant project delays and lost opportunities. The region endeavours to stimulate its key economic sectors, solidify its scientific foundations, and foster strong business-science collaborations. Yet, the historical data and the 2021 Regional Innovation Scoreboard's findings suggest a sluggish progression in embracing innovation, indicating a noticeable gap in its knowledge infrastructure, which has implications for its strategic and decision-making capacities concerning the CCA strategy.

The path ahead for the North Aegean region involves navigating through a complex set of challenges and opportunities, that intertwines strategic, social, and administrative transformations, stakeholder engagement, robust governance, and a keen focus on sustainable development and effective CCA.



# 1 Introduction

Addressing the intricacies of Climate Change Adaptation (CCA) amid the diverse environmental, social, and economic landscapes of Greece's Attica and North Aegean regions necessitates a meticulous amalgamation of innovative strategies, policy-making, and tangible examples of adaptation actions. This report embarks on a journey to unravel the multifaceted undertakings and inherent frailties within the regional CCA plans in these distinct regions, weaving through their respective strategies, challenges, and transformative innovative practices, and embedding a keen emphasis on providing concrete examples and lessons learned from specific adaptation actions.

Navigating through the contours of attaining climate resilience, the imperative to embed innovation as a cornerstone in strategizing and executing CCA actions is brought to the fore. "Innovation policies aiming to address societal challenges will only be effective if advances in science, technology and innovation are combined with broader changes in economy and society" (European Commission, 2024). Integrating innovation within cohesion policies, including Smart Specialization Strategies (S3), emerges as pivotal, enhancing the efficacy and impact of CCA endeavours and leveraging platforms like Horizon Europe and LIFE to fortify initiatives aimed at mitigating and adapting to climate-induced challenges.

In the North Aegean region, palpable tension between planning and execution underscores the need to incorporate transformative innovation to navigate through CCA activities holistically, bridging the divide between strategic formulation and pragmatic application. Conversely, the Attica region, often heralded as a frontrunner in embracing innovation in CCA, offers insights into the orchestration of innovation actions and the generation of feedback loops through initiatives like IMPETUS and ARSINOE<sup>2</sup>, providing a fertile ground from which applicable knowledge and practical examples may be gleaned.

Moreover, a nuanced exploration of S3 priorities, particularly those directly addressing CCA, is essential. Understanding how these priorities align with and potentially catalyse innovative pathways toward climate resilience is crucial. Thus, this report offers a deeper insight into S3 priorities and furnishes a blueprint for other regions seeking to harness innovation in their CCA endeavours.

The glaring impacts of climate change, recently exemplified by the devastating forest fires experienced across various Greek regions, necessitate a thorough assessment of adaptation actions and the derivation of lessons learned. Concrete examples and good practices emerging from these experiences will serve for policy-makers and other regions, facilitating replicating or adapting these actions in diverse contexts.

Considering Greece's regionalised structure, a meticulous examination of how regional CCA plans, particularly in Attica, correlate with the national CCA plan and national S3 priorities is imperative. This

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<sup>2</sup> Cf. Reference section

includes thoroughly scrutinizing multilevel governance aspects, fostering interoperability between various governance levels, and providing a diagnostic approach to enhancing their synergy.

This report provides recommendations and insights from several interviewees on circumventing bottlenecks. Through the lens of innovation and transformative adaptation actions, it also seeks to unveil the interplay between CCA strategic planning, innovation, and practical implementation, providing a comprehensive resource for regions and policymakers navigating the complex landscape of climate change. It strives to weave together a narrative that reflects the unique pathways of the Attica and North Aegean regions and embeds practical examples, lessons learned, and strategies that could guide the CCA pathways of other regions navigating through the multifaceted challenges of climate change.

Chapter 2 of this report unfolds the case study of the Attica region, and Chapter 3 covers the North Aegean region. Each case study also includes a section on SWOT analyses<sup>3</sup> covering each of the seven dimensions of Transformative Innovation identified as essential conditions for the design and implementation of CCA strategies.

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<sup>3</sup> An overview table of the SWOT analysis for the two regions and for each dimension is provided in annex 3

## 2 Attica region

### 2.1 Presentation of the territory

*Attica Region's approach to CCA, serves as a model for integrated resilience strategies. While the region successfully focuses on mitigating risks and capitalizing on opportunities, it needs help in **inter-agency coordination** and seamless implementation. The strategy is intricately aligned with broader national and EU climate initiatives, ensuring a cohesive and impactful approach. Governance structures are in place to facilitate multi-level involvement, but the **complexity of these structures sometimes hinders optimal synergy among stakeholders**. Despite these challenges, the region emphasizes ongoing impact assessment and stakeholder participation, allowing for a dynamic and continuously improving strategy. The case study provides a comprehensive look at both the strengths and challenges of developing and implementing a robust climate adaptation plan, making the Attica Region a valuable case study for other regions grappling with the complexities of CCA.*

The Region of Attica has eight Regional Units. The population of the Attica region is approximately 35% of the total Greek population. Its surface is 2.9% (3,808.10 km<sup>2</sup>) of the Greek territory (Krommyda 2017, Paraskevopoulou 2020).

Hosting the capital Athens, Attica is the main centre of the country's administrative services and is a vital transit station for goods and a transportation hub of international influence. In the region of Attica, approximately 48% of the GDP of the Greek economy is produced, and it participates in the country's Gross Value Added by 4.35% in the primary sector, 33.38% in the secondary sector, and 47.20% in the tertiary sector.

**Figure 1.** The Attica Region



Numerous strategies are underway in Greece to tackle climate change, particularly in the Attica region. These strategies encompass a transition to renewable energy, focusing on solar and wind power, aiming to meet a 35% renewable energy share in the country's total energy use by 2030, as outlined in the National Energy and Climate Plan (OECD 2020). In Athens, the "Athens Green 2030" initiative has been introduced to augment urban flora and biodiversity while mitigating the urban heat island effect through green spaces and tree planting. Moreover, infrastructure is being revamped to be more resilient against climate change effects such as heatwaves and flash floods, with enhancements in public spaces and incorporating sustainable drainage systems. The nation has also fortified its fire management strategies to address the heightened risk of wildfires, incorporating early warning mechanisms and bolstering firefighting resources (ClimateADAPT, 2023). Furthermore, concerted efforts are being made to shield the coastline from climate-related repercussions through the restoration of natural defenses, the creation of marine sanctuaries, and regulated coastal development (C40cities 2017). Additionally, initiatives have been undertaken to better manage water resources by fostering water conservation and adopting advanced irrigation techniques.

The Municipality of Athens has participated in global climate initiatives since July 2014, when it joined the Covenant of Mayors to increase energy efficiency and renewable energy use to surpass the EU's emission reduction targets. In 2015, it aligned with the Compact of Mayors<sup>4</sup>, which later merged with the European Covenant to form the Global Covenant of Mayors for Climate & Energy in 2016. Athens' dedication to climate change is evident from its actions, such as creating the Office of Urban

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<sup>4</sup> [https://climateinitiativesplatform.org/index.php/Compact\\_of\\_Mayors](https://climateinitiativesplatform.org/index.php/Compact_of_Mayors)

Resilience and Sustainability, joining the Global Resilient Cities Network, and developing the Athens Resilience Strategy for 2030.

By 2017, Athens had systematically recorded emissions, created a Climate Action Plan, and implemented strategies for reducing emissions by 40% from 2014 levels and adapting to climate impacts. CDP's 'A' rating recognizes the city's climate efforts for four consecutive years and its commitment to achieving climate neutrality by 2050. This proactive stance includes forming specialized departments, engaging in international partnerships, and sharing best practices with other cities to address climate challenges effectively.

The EU Green Deal, aims at achieving the goal of a climate-neutral Europe by 2050. The objectives of the Green Deal are reflected a) in the European climate law<sup>5</sup> and in the recent strategy for adaptation to climate change that took place in March 2021, which sets revised and more ambitious goals compared to the 2013 strategy, and b) to the second pillar of climate change which is adaptation, and which mainly concerns the region of Attica. The main goal is to strengthen the adaptive capacity to minimize the effects of climate change until 2050, which is the milestone year. Next comes the national strategy, which has described this strategic orientation of Greece, intending to provide guidelines. However, the national strategy needs to analyse the feasibility of individual adaptation measures and actions and attempt to prioritize the proposed efforts and actions. The final selection, prioritization, and planning of appropriate actions and measures is the content and essence of regional adaptation plans based on local specificities.

CCA multilevel deployment is presented in Figure 2. The European Strategy has four main objectives: adaptation to be i) Smarter - ii) Swifter - iii) more Systemic and iv) Step-up international action on adaptation to climate change. The National Strategy describes the strategic orientation of the country and provides guidelines. Regional Plans select, prioritize, and plan appropriate actions and measures for adaptation.

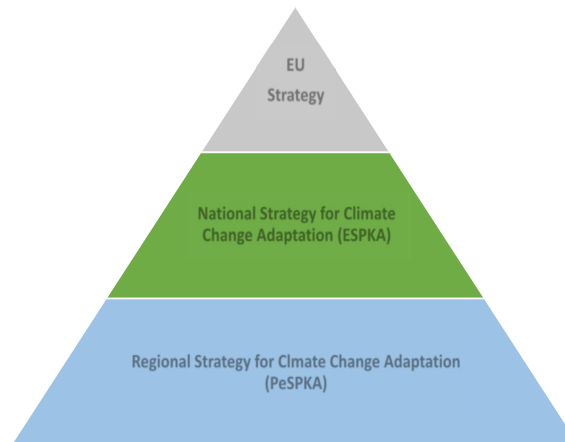
The Greek CCA National Strategy (ESPKA) sets the general objectives, guiding principles, and means of implementing a modern, effective, and developmental adaptation strategy. It provides for Regional CCA Planning without discouraging mitigation efforts through emission reduction policies.

The national strategy starts from Europe, comes to Greece, refers to the past, makes analyses, uses statistically processed and dynamic data, and arrives at the strategic priorities, which it organizes along specific axes. The development of the national strategy is more of a top-down than a bottom-up process.

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<sup>5</sup> [https://climate.ec.europa.eu/eu-action/european-climate-law\\_en](https://climate.ec.europa.eu/eu-action/european-climate-law_en)

**Figure 2.** CCA at European, national, and regional level



*Source: Paraskevopoulou (2022)*

In line with the national strategy, the Region of Attica is drawing up the Regional CCA Plan (PeSPKA, Attica Region 2022), which assesses:

- climate risks,
- the interaction of climate with socio-economic factors,
- how risk levels change with adaptation actions,
- the magnitude of impacts and prioritizes the steps required for threats and opportunities,
- the synergistic effect of different risks acting together, and
- the uncertainties, limitations and confidence levels involved in the assessments of different risks.

The PeSPKA geographically covers the entire Attica Region, studies intra-regional differences, and examines synergies with neighboring Regions. To identify the most appropriate adaptation actions, suitable indicators are evaluated for each of the 15 critical sectoral policies identified in the national strategy.

The region of Attica has drawn up the 2021 regional plan for adaptation to climate change, which has defined the immediate adaptation priorities, analysed the sectoral policies in all policy areas, and prioritized the measures and actions to be implemented.

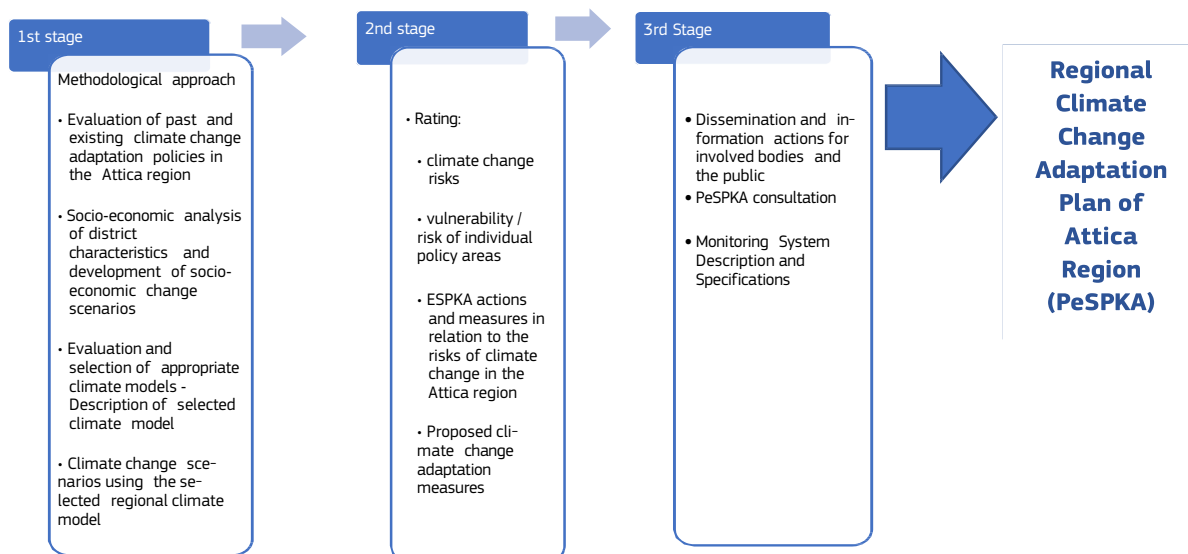
More specifically, the PeSPKA is an integrated plan that identifies and prioritizes the necessary measures and actions for adapting the Attica Region to climate change. As such, it analyzes the necessary sectoral policies in depth and decides on the feasibility of individual measures and adaptation actions at the local/regional level. The plan identifies and prioritizes the necessary adaptation measures and activities over seven years. The PeSPKA Attica also considers the ESPKA's possibilities for horizontal synergies with broader development and environmental policies. PeSPKA has been included in the Operational Program "Attica 2014-2020" in Priority Axis 05: "Promotion of Adaptation to Climate Change, as well as Risk Prevention and Management".

The Attica PeSPKA includes four sub-projects:

- Drafting of the Regional Plan for Adaptation to Climate Change (PeSPKA) of Attica, Budget 456,468 euros and duration of 18 months. The PeSPKA of Attica was approved by decision No. 179/2022 of the Regional Council of Attica, December 14, 2022 (ADA: 9ΨΨM7Λ7-Λ5Φ).
- Drafting of a Strategic Environmental Impact Study of the PeSPKA, Budget 40,984 euros and duration of 7 months. With the no. YPEN/DIPA/126682/8307, dated December 1, 2022, decision of the General Director of Environmental Policy of the Ministry of Environment and Energy (ADA: 9Π9Γ4653Π8-4ΤΙ).
- Installation of monitoring systems for spatial and sectoral vulnerability and the progress of implementation of the PeSPKA, Budget 471,200,000 euros and duration of 17 months.
- Development and installation of a pilot research system for early flood warning in "bufferzones", Budget 427,707.00 euros and duration of 5.5 months.

The stages based on which the PeSPKA of Attica is drawn up are described in Figure 3.

**Figure 3.** The PeSPKA in stages



Source: Paraskevopoulou (2020)

The PeSPKA includes:

- tools for measuring and monitoring primary and secondary environmental parameters,
- supply, and installation of instruments and equipment, such as sensors, stations and measuring instruments where the existing ones are not sufficient (e.g. meteorological station at altitude, or flow measurement sensors and stream water speed, etc.),
- systems for monitoring, evaluating and creating models for the evolution of the effects of climate change in individual sectors and regions of high importance,
- early notification system of the most critical risk, etc.,

- e) application programming interface, open-source software tools, subscription data access services.

Essential parameters for successful adaptation are participating and consulting all involved parties (administration, scientific community, productive bodies, and society) and reviewing, updating, and reorientating strategies and actions.

Therefore, CCA requires an integrated, interdisciplinary approach with cross-sectoral measures. The PeSPKA, its implementation, the monitoring of its performance, and the updating procedures require informed citizens and institutions with a strong adaptive capacity. At all stages of the implementation of the present PeSPKA, the participatory process has been ensured by all those involved.

## **2.2 Analysis against conceptual framework: Transformative Innovation for better Climate Change Adaptation**

In a separate conceptual framework report for territories (European Commission, 2024), seven key features of Transformative Innovation have been identified as essential conditions for the design and implementation of CCA strategies. These features can be summarised as follows:

- **Directionality:** defining goals and scope of strategic action, as well as articulating impacts, in a way which reflects societal challenges with wide appeal, formalised through endorsement at highest political level to secure engagement of all relevant authorities and stakeholders.
- **Articulating instrument portfolios and defining synergies between funding sources:** establishing all-encompassing instrument portfolios addressing the whole innovation cycle and the various aspects of CCA, paired with adequate funding resources.
- **Ensuring cross domain synergies:** favouring whole-of-government approaches to ensure greater horizontal coherence between various thematic policy areas (R&I, agriculture, environment, mobility, health etc.), resulting in coordinated mixes of instruments of different types.
- **Increasing breadth and depth of stakeholder involvement:** working towards social acceptance of new solutions and shaping of innovative developments, as well as improving public trust, opening up public debates, managing diverse and sometimes conflicting views over alternative pathways.
- **Setting up effective multi-level governance models:** maximising potential of vertical synergies, recognising complementary roles for various governance levels - local, regional, national and EU;
- **Making room for experimentation:** providing adequate spaces for risk-taking and creativity - ensuring a risk-tolerant environment to facilitate development of new and/or radical solutions.
- **Securing high levels of policy intelligence, learning and strategic capacity:** building strong evidence-based policy learning capacities, based on a solid knowledge base and special



skills to manage transitions, as necessary companions to the transformative innovation approach.

For each of these dimensions, a SWOT analysis has also been carried out to provide a complementary perspective<sup>6</sup>.

### **2.2.1 Directionality: Defining goals and expected impacts**

Like all Greek regions, the region of Attica has developed structures in charge of smart specialization and the implementation of strategy, its evaluation, and the Entrepreneurial Discovery Process (EDP). In the context of this structure, CCA actions are also being developed. In the case of Attica, it is an ad hoc structure created for this purpose.

The role of the Attica region is particularly crucial for the action of the other regions, which has to do with the size and specific weight of Attica (where the capital Athens is located), but also with the fact that the Attica region is, in a way, a guide/model in the new programming period 2021-2027 based on which the process of business discovery and the strategy by extension are implemented mainly in connection with the national S3 in place since 2022.

As mentioned in the introduction, the region has formulated the PeSPKA, the regional CCA plan, an action plan approved in 2022. In the context of implementing the PeSPKA, among others, it is examined whether interventions in innovative actions refer to the environmental sectors and, by extension, climate change issues mainly from the point of view of transformative innovation.

The PeSPKA is the primary regional tool for the implementation of policies related to the management of water resources, drought, water scarcity, coastal zones, the resilience of the built environment, the protection of biodiversity, the shielding of existing infrastructure (mainly road and anti-flood), for which the region of Attica presents a significant vulnerability.

CCA is also crucial for the long-term sustainability of the region's economy, as it can affect all productive sectors. The measures of the PeSPKA are generally horizontal and sectoral and are divided into short-term, medium-term, and long-term, i.e., according to the time of their implementation and assignment, and are prioritized as first and second priority. The priority of the Attica region for implementing the regional plan is to start with the projects concerning the policy sectors with the most significant vulnerability following the national strategy. The policy areas where the Attica region has the most significant vulnerability are water management, i.e., water resources, infrastructure and transport, health, and the built environment. Therefore, the region's goal is to holistically approach the risks of climate change and the opportunities created (especially in the tourism sector) to deal with climate crises, increasing the resilience and adaptive capacity of infrastructures and systems.

In the region of Attica, the strategy's ultimate goal is articulated through the general strategic plan for the current programming period 2021-2027.

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<sup>6</sup> An overview table of the SWOT analysis for the two regions and for each dimension is provided in annex 3

In operational program terms, the above are included in policy objective 1 (PO1) related to a competitive Europe, particularly the specific objective concerning entrepreneurship in general and the capacity for innovation in both the private and public sectors. A corresponding regional budget at the operational regional program level is channelled into making calls relevant to expertise and identifying priorities in which a smart region should invest.

There are eight smart specialization priority areas of the national S3 strategy, one of which is the environment. The region of Attica examines the correspondences of the national directions and priorities for the environment and climate change, in the light of smart specialization, i.e., finding innovative solutions and interventions in this area.

The region of Attica is also interested in the impact assessment of such actions, and how the interventions launched, the invitations made, and the choices made by the region are effective and successful. The region cares about its environmental footprint, looking at indicators and evidence.

The region has three strategic objectives for implementing its regional plan.

- A. The **first strategic objective** is to promote adaptation actions and projects in all policy areas.
  - This can be done by developing pilot applications or demonstration projects in appropriately selected areas with the possibility of their subsequent exploitation on a much larger scale.
  - Also, other actions concern standard investigations in areas of high vulnerability and competence of the Attica region, such as road infrastructure, flood protection projects, the built environment, and health (and this is a sector with high vulnerability for the Attica region) and of course through the directives, i.e., regional roadmaps for all policy areas to integrate climate change as a critical factor.
- B. The **second strategic objective** is to create a monitoring and evaluation mechanism for adaptation actions and projects.
  - This is done by creating a climate change observatory of the region, with the improvement of existing and the addition of new recording systems to the monitoring of critical parameters regarding the effects of climate change, on the components of the production system.
  - Also, this mechanism will include the development of tools and indicators regarding the monitoring of the progress achieved about the expected results from the implementation of the measures and actions of the PeSPKA.
  - Every regional plan is evaluated and revised every seven years. In other words, every seven years, there is an evaluation of whether the regional plan has been implemented.
  - Finally, this mechanism will also include an open platform on which the above data and the results of information and awareness actions will be gathered.
- C. The **third strategic objective** is information and awareness actions per policy area.

This is done through actions to inform and raise awareness of social actors and citizens with partnerships of the scientific community, public

administration, social actors and citizens, and, of course, the access of individuals and institutions to financial resources and climate data.

**Table 1:** Priorities of Attica PeSPKA (regional CCA strategy)

| Area of Intervention   | Priorities where the Attica Region focuses/specializes   | Analysis   |
|--|--|--|
| Waste management   | Development of methods and implementation of waste/residue treatment systems and their upgrading into value-added products)  | Reduction of waste and utilization of by-products. Sustainable processes for recycling fishery and aquaculture by-products to produce high added value products.   |
|  | Development and implementation of innovative technologies, infrastructures, and systems for waste management using digital tools to optimise collection and treatment processes. | Management of ship ballast water and waste within ports (Ballast Water Management, BWM).   |
| Air pollution  | Development of existing and new sensors and integrated systems for recording parameters related to air quality.  | Pilot infrastructure for atmospheric environment quality measurement in ports of the Attica Region.  |
|  | Development of methods and infrastructure for forecasting air quality and identifying pollutant sources using ground and satellite measurements                                  | Mapping and prediction of particulate pollution in the Attica Region using new remote sensing sensors from space and the ground.<br><br>Smart technologies for measuring, observing, and estimating the dispersion of atmospheric pollutants in combination with meteorological data in the coastal zone and near ports. |
| Protection, promotion and sustainable management of biodiversity | Bioprospecting and production of high added value products   | Utilization of Greek marine biodiversity. Search for bioactive molecules from the marine environment and production of high added value products.  |
| Circular Economy / Strategic, Business Models                    | Development of methods of useful applications of materials through recycling and recovery of raw materials.  | Development of recycling methods for Fiberglass products (old yachts, etc.)  |
|  | Development of circular economy and bioeconomy business models.  | Development of circular economy and bioeconomy business models that promote innovative technologies to improve treatments and processes in all phases  |

|  |  |   |
|--|--|---|
|  |  | (downstream and upstream) of the aquaculture value chain.   |
|  | Promoting sustainable technologies with a low environmental footprint by reusing resources in island and coastal areas.  | Pilot applications to promote sustainable technologies with a low environmental footprint with reuse of resources in island and coastal areas of the Attica Region  |
|  | Cross-sectoral approach of circular economy actions between the fields of specialization of the Attica Region  | Development of cross-sectoral circular economy models (smart use and product life extension, recycling and recovery of raw materials, bioeconomy, natural resource management, innovative collection systems for reuse of material/waste streams, etc.).  |
| Soil and Water Health  | Integrated Systems and Methods for monitoring water quality, pollution sources and Coastal and marine ecosystems of the Attica Region  | Integrated Systems and Methods: (1) monitoring the level and quality of surface of water by utilizing information collected from field sensors and water and air quality measurement stations at specific locations, and (2) studying the correlation of air quality levels with water quality.                     |
| Protection, promotion and sustainable management of biodiversity       | Development of decision-making tools for the protection, promotion and conservation of marine biodiversity and ecosystem services with an emphasis on the restoration of the coastal environment |   |
| Climate change mitigation and adaptation and natural disaster response | Strengthening the resilience of socio-economic activities in the coastal and marine environment against natural and human-made disasters   | Collection and analysis of a large amount of data and development of tools and applications to strengthen the resilience of socio-economic activities in the coastal and marine environment of the Attica Region against natural and man-made disasters, to ensure food security and to strengthen competitiveness. |
| Industrial Co-existence / Secondary Raw Materials                      | Cross-sectoral approach of industrial symbiosis actions between the fields of specialization of the Attica Region  | Promotion of cross-sectoral industrial symbiosis actions to protect the environment, public health and strengthen the productive restructuring and competitiveness of regional industry through energy and resource saving, water reuse in industry and the recovery & utilization of secondary raw materials.      |

Source: Thomaidis (2023).

Attica region's CCA goal includes the protection of society and the education of society against climate change to adapt or alleviate the problem of climate change. The goal is broad, aiming to cover several different sectors and fields, especially in the Creative Economy, Sustainable economy, and Blue economy, which are the policy priorities for the Region of Attica. In principle, policy, objectives, and strategy tend to touch on a broad dimension. Regarding whether the region of Attica is far from achieving this goal, we would say there is still much work to be done. However, undoubtedly, the principles are well placed to achieve the goal.

At the same time, it may not have happened yet, but there is an apparent effort to bring about social transformation and involve society in what we call priorities and funding for the CCA goal, mainly through the education of social actors and productive units. The vision aims to incorporate societal transformation by prioritizing critical topics such as digital transformation, green transition, climate change, and other emerging challenges (e.g., changes in significant sectors such as tourism and agro-food).

There is adequate political endorsement for the strategy, demonstrated through the commitment of various resources and strategy deployment through several actions (e.g. the EDP). The overall governance mechanisms have already been established since the previous programming periods.

Regarding the perspective or the point that this concerns S3 or S3 interventions, there is a binding strategy of smart specialization of the Attica region, which has confirmed that the environment is a national and regional priority. Priorities and interventions have now been specified, which, essentially in a binding manner to a point, will constitute invitations and, ultimately, funding for innovation actions, research, and anything to do with smart specialization in this field.

#### Recommendations

- *While robust and far-reaching, the comprehensive approach towards S3 and CCA in the region should be analyzed through systemic change, fully intertwining the environmental, societal, and economic dimensions.*
- *It should recognize the imperatives to avoid lock-ins to unsustainable trajectories and to meticulously carve new development paths that lead toward desired transformations.*
- *The formulation and implementation of Attica's strategies should actively phase out unsustainable models and instantiate more resilient ones, ensuring that the strategy not merely acts as a short-term repair but strategically aligns with long-term perspectives and objectives, extending to 2030, 2050, and beyond.*

Embracing a 'territorial climate resilience' concept demands a broad, prospective approach that transcends disaster resilience and encapsulates a long-term perspective, emphasizing social justice due to the uneven distribution of climate risks (European Commission, 2024). Attica's actions and priorities, illustrated in Table 1, should not only be ingrained in sector-specific interventions but must be intertwined to foster a holistic territorial resilience to climate change. This implies that the diversely targeted actions, ranging from waste management to biodiversity conservation, should be interconnected, ensuring that the strategic objectives not only address specific sector vulnerabilities

but also enhance the comprehensive resilience of the region, especially considering aspects of social equity and justice in response to the uneven distribution of climate risks.

Achieving systemic change necessitates high-level political endorsement, ensuring the engagement of all relevant authorities. Attica's strategy, while being comprehensive and detailing various strategic objectives and actions, should be underpinned by a clear framework and allocating responsibilities for steering, monitoring, and evaluating the strategy. Governance mechanisms should transcend implementation oversight and focus intently on pathways and processes toward achieving systemic change. This implies that while the current governance structures and mechanisms, established in previous programming periods lay a solid foundation, they must be evolved to focus on robust monitoring systems and steering capacities that ensure adherence to and the evolution of the strategy towards a more resilient Attica.

Thus, the region lays a foundation for building more resilient structures through its detailed strategies and action plans. However, systemic change, especially in CCA, necessitates an adaptive approach that goes beyond implementing planned strategies. It demands the continuous evolution of strategies in response to emerging challenges and opportunities, ensuring that Attica is resilient in the face of current climate challenges and remains adaptive and resilient in the face of future uncertainties and possibilities. This will entail an ongoing commitment to knowledge development, stakeholder engagement, strategic planning, and a robust governance mechanism.

**Box 1. Good Practices and Key Recommendations for Defining Goals and Expected Impacts**

**Summary of Key Good Practices**

- Development of smart specialization structures for strategy implementation and CCA.
- Creation of the PeSPKA, a regional action plan for CCA, approved in 2022.
- Prioritization of water management, infrastructure, health, and the built environment in climate adaptation strategies.
- Development of a climate observatory for Attica to monitor critical climate change parameters.
- Incorporation of climate change considerations into policy areas and funding initiatives.

**Summary of Key Recommendations**

- Engage in societal transformation by educating social actors and productive units about climate change.
- Ensure political endorsement and allocate resources for strategy deployment in key areas like digital and green transitions.
- Specify and implement smart specialization interventions that are environmentally focused.
- Pursue systemic change by intertwining environmental, societal, and economic dimensions in CCA strategies.
- Establish robust governance mechanisms that go beyond oversight to steer and monitor progress towards systemic change.

### 2.2.1.1 SWOT analysis on directionality

As mentioned above, a SWOT analysis was also carried out to provide a complementary perspective on each of the 7 dimensions of the conceptual framework.

**Table 2:** Attica - SWOT Analysis on directionality

|  |   |  |
|--|---|--|
| <b>Directionality:<br/>Defining Goals<br/>and Expected<br/>Impacts</b> | <b>Strengths</b>  | <b>Weak-<br/>nesses</b>  |
|  | <ul style="list-style-type: none"> <li>- Well-Defined Strategy</li> <li>- Smart Specialization</li> <li>- EDP</li> <li>- Policy and Planning</li> <li>- Governance Mechanisms</li> <li>- Political Endorsement</li> <li>- Pilot Projects and Innovations</li> </ul> | <ul style="list-style-type: none"> <li>- Significant Vulnerabilities</li> <li>- Complexity and Breadth of Goals</li> <li>- Implementation Scale</li> <li>- Achievement of Goals</li> <li>- Social Transformation</li> </ul>          |
|  | <b>Opportuni-<br/>ties</b>  | <b>Threats</b>   |
|  | <ul style="list-style-type: none"> <li>- Innovation in Environmental Management</li> <li>- Tourism</li> <li>- Cross-Sectoral Synergies</li> <li>- Digital Transformation</li> <li>- Public Engagement</li> </ul>  | <ul style="list-style-type: none"> <li>- Climate Change Impacts</li> <li>- Uneven Risk Distribution</li> <li>- Systemic and Long- term Challenges</li> <li>- Economic and Sectoral Impacts</li> <li>- Resource Allocation</li> </ul> |

#### **Strengths**

While addressing various climate adaptation challenges, the Attica region has embraced a well-defined strategy, exemplified by comprehensive action plans such as PeSPKA, which intricately addresses diverse facets of climate change adaptation. This and a commitment to smart specialization, particularly in environmental sectors, has honed a focused and structured approach toward implementing innovative and sustainable solutions. Notably, the EDP has been established to meticulously identify and prioritize areas for innovation and business development, ensuring that resources are strategically allocated to foster both economic and environmental resilience. The clarity in policy and planning, with delineated priorities extending until 2027, ensures a structured and strategic implementation of interventions, underpinned by established governance mechanisms, which have been refined from previous programming periods. Despite the myriad challenges, there is a palpable political endorsement, manifested through the committed resources and steadfast deployment of strategies. Furthermore, the region is intently focused on developing pilot projects and innovations, particularly in areas identified as vulnerable and critical, marrying technology and strategy to pave the way for a resilient future facing climate uncertainties.

#### **Weaknesses**

The Attica Region presents significant vulnerabilities in pivotal sectors such as water management, infrastructure, and health, necessitates a meticulously crafted and resilient strategy. While the region has articulated thorough goals, their complexity and breadth span an extensive array of sectors and fields, potentially stretching resources and diluting focus, raising concerns regarding the practical and scalable implementation across all planned areas. The acknowledgment that a substantial journey still lies ahead to fully realize the set goals underscores potential gaps in progress and accentuates the imperative for continuous evaluation and recalibration of strategies and actions. Furthermore, the region's ambitious aims for societal transformation, pivotal for achieving long- term resilience and

sustainability, might be met with varying degrees of resistance or encounter implementation barriers, necessitating a strategic blend of robust policy, community engagement, and adaptive management to navigate through the intricate tapestry of social, environmental, and economic dynamics.

### **Opportunities**

A promising scope emerges for forging innovative solutions that address immediate concerns and pave the way for sustainable practices. The tourism sector, a pivotal component of the region's economy, unveils numerous opportunities, enabling it to strategically adapt to climatic vicissitudes, safeguarding and potentially enhancing its revenue streams and socio-economic impact. Furthermore, cross-sectoral synergies, particularly within the circular economy and industrial symbiosis, heralds a promising avenue for innovative development. By deploying smart technologies and digital tools, the infusion of digital transformation underpins optimal resource management and action implementation, thereby enhancing efficiency and efficacy in strategic deployments. Lastly, with a strategy that encapsulates a distinct focus on information dissemination and awareness, there's a robust platform to foster public engagement, which in turn, can catalyze social inclusion in the adaptation processes, ensuring that the strategies implemented are not only robust but also resonate with and are embraced by the community it seeks to safeguard.

### **Threats**

The Attica Region grapples with CCA risks which percolates through various sectors, including, but not limited to, water resources, biodiversity, and infrastructure, presenting a panorama of challenges that necessitate meticulously crafted responses. A salient concern emerges from the uneven distribution of climate risks across the region, prompting not only environmental and economic considerations but also potential issues related to social justice. Amidst this, there is a pressing need to ensure that strategies and actions transcend mere short-term fixes and are aligned with long-term objectives, extending horizons to 2030, 2050, and even beyond, thereby embedding a systemic approach to addressing CCA challenges. Furthermore, the potential impacts of climate change on all productive sectors weave a complex web of risks to the long-term sustainability of the region's economy, necessitating strategies that are robust and adaptive to evolving economic and sectoral landscapes. Coupled with this is the imperative of ensuring that adequate resources are judiciously allocated to effectively implement the comprehensive strategies, ensuring that they are theoretically robust and pragmatically impactful in navigating the varied CCA challenges and uncertainties.

## **2.2.2 Articulating Policy Portfolios**

In the face of escalating climate challenges, the Attica region employs strategic instruments within its policy portfolio, notably the Regional Operational Programme 2021-2027, which encompasses diverse policy tools such as funding programs and incentives. Emphasis is placed on orchestrating synergies and avoiding maladaptation by aligning various instruments - funding lines, regulations, and support mechanisms

- to act in unison. The aim is to transition from localized CCA experiments to mainstreaming CCA across multiple programs, thereby facilitating large-scale deployment of systemic solutions.



In its pursuit of robust CCA, the Attica region has markedly received the lion's share of financing compared to other Greek regions in terms of regional public investment programs (see Figure 6. and Figure 7) from 2020-2023. A notable €1,227 million was allocated to Attica for regional public investment programs, substantially surpassing other regions like Central Macedonia and Thessaly, which received €945 million and €403 million, respectively. Furthermore, when it comes to subsidizing regions from the state, Attica again leads with an allocation of €409.5 million, while other regions such as Central Macedonia and Crete received €369.8 million and €245.4 million respectively. This predominant financial backing underpins Attica's integrative and multifaceted approach towards CCA, enabling the region to delineate a paradigm wherein the mitigation of risks and capitalization on emergent opportunities are pivotal, albeit occasionally constrained by challenges in inter-agency coordination and implementation. The substantial financial inflow into Attica underscores the region's significant role and responsibility in pioneering effective and sustainable CCA strategies, serving as a potential model, replete with learnings and insights for other regions navigating the complexities of climate adaptation.

Ecosystem instruments like clusters, innovation platforms, and living labs are pivotal, serving as platforms for information exchange and knowledge sharing among potential partners. Moreover, the formulation of an evidence base for action is integral. The policy portfolio is embedded in instruments facilitating localized data collection, establishing observatories and warning systems, and developing tools to comprehend and monitor climate threats and impacts. For instance, CLIMATTICA, initiated by Regional Mayor Giorgos Patoulis, strives to be a hub for public consultation, scientific and research support, and an information exchange platform, mainly targeting CCA actions.

More precisely, the region of Attica is leading a new effort to mitigate the effects of climate change by creating a non-profit organization called CLIMATTICA. It is a nationwide network of Local Government Organizations for climate change and the mitigation of its effects under the Network of Regions and Municipalities for Climate Change – CLIMATTICA, created in 2021 but with substantial start operations in 2023. Apart from the Attica Region, as founding members by decision of their Collective Bodies will participate the Regions of Crete and East Macedonia - Thrace, the FODSA of West Macedonia DIADYMA and the Municipalities: Ag. Anargyron, Ag. Varvaras, St. Paraskevi, Argos, Aspropyrgos, Achamon, Dionysos, Ithaki, Kea-Kythnos, Kozani, Kropias, Mandras-Idyllia, Megareon, Mykonos, Paiania, Palaio Faliron, Piraeus, Pylaia- Hortiatiss, Rafina-Pikermi, Salamina, Saronikos and Oropos. CLIMATTICA is a multi-participatory Network of Regions and Municipalities, a platform for information, exchange of information, data, knowledge, experiences, and good practices of potential partners, which will function and act as a reliable interface, both between the members of the environmentally sensitive space of local communities, as well as at the decision-making level.

The CLIMATTICA Network aims to be a public consultation center that will strengthen the dialogue between the involved bodies (local authorities, civil society, private and public sector bodies, experts, etc.). Among other things, it is designed to provide advisory, scientific, and research support to its members for the planning and implementation of actions to adapt to climate change, to contribute to the formulation of evidence-based policy proposals that it will submit to the relevant bodies at all levels, to promote innovative partnerships between agencies and to implement actions to inform and raise awareness among citizens. It aims to promote the philosophy of a positive ecological footprint and the economic, environmental, and social benefits of environmental awareness for all actors. Thus, the aim is for the Regions and Municipalities to have a model of cooperation for implementing sustainable policies, looking for the best possible answers to the challenges and needs

of the time, and drawing from experience and good practices. The cooperation and networking with Local Government Organizations (OTAs) and other agencies will work synergistically. They will strengthen the possibilities for effective adaptation to climate change and limit its effects on the natural and urban environment, economic and social activities, and ultimately on the everyday life of the citizens. The goal is for the Network to be embraced by all the Regions and all the Municipalities of Greece in a very short period.

While CCA is less regulated compared to climate change mitigation, it is paramount to amplify the “climate adaptation economy.” This involves integrating business-oriented innovation instruments into the portfolio, focusing on nurturing the private sector’s role in strategies generally perceived as predominantly public-led. A holistic approach to innovation is imperative, encompassing technological, non-technological, business model, and social innovations, ensuring the policy portfolio addresses the entire innovation cycle and broadens its impact.

The manifestation of climate change impacts often transcends administrative borders, necessitating equally expansive solutions. Inter-regional cooperation, though not systematically structured, has been pivotal in addressing issues of mutual interest, such as the case with the Asopos basin, which concerns both the Attica and Central Greece regions. The policy portfolio should facilitate and enhance these cross-border and international dimensions through dedicated instruments and ensure the seamless integration of existing joint instruments with territorial strategy. This could involve engaging in collaborative projects under Horizon Europe, participating in Interreg programs, forging EU partnerships and bilateral agreements, and adopting lead agency models.

The policy portfolio should encapsulate a balanced strategy that coordinates national and regional levels, ensuring that funding and programs are complementary rather than supplementary. Through coherent coordination between the national and regional strategies, funding can be efficiently deployed to bolster research infrastructures, as exemplified in previous programming periods involving interventions at national and regional levels in sectors like agri-food.

Given the deteriorating trends in climate change, the policy portfolio might necessitate further enrichment with actions zeroing in on specific needs and challenges, such as energy efficiency, new energy sources, and establishing a Climate Change Regional Council. Furthermore, the strategic priorities should ideally weave CCA into major priority areas like the Creative Economy, Sustainable Economy, and Blue Economy, ensuring a robust and strategic approach to addressing climate change’s multifold challenges.

**Box 2.** Good Practices and Key Recommendations for Articulating Policy Portfolios

### Summary of Key Good Practices

- Utilizing diverse policy tools and programs that encourage synergy and prevent maladaptation.
- Prioritizing a collaborative approach across sectors and regions to enhance CCA.
- Developing platforms like CLIMATTICA for public consultation and knowledge exchange on CCA.
- Involving multiple stakeholders, including local governments and private sector bodies, in climate action networks.
- Encouraging the participation of all Greek regions and municipalities in CCA initiatives for a unified approach.

### Summary of Key Recommendations

- Integrate business oriented innovation into CCA strategies to engage the private sector.
- Foster interregional cooperation and international partnerships for expansive climate adaptation solutions.
- Coordinate national and regional strategies to ensure that funding for CCA is complementary and targeted.
- Enhance research infrastructures and collaborative projects with coherent coordination between different governance levels.
- Align strategic priorities with major areas like the Creative Economy and Blue Economy for a comprehensive approach to climate challenges.

### 2.2.2.1 SWOT analysis on articulating policy portfolios

A SWOT analysis was also carried out to provide a complementary perspective on this dimension

**Table 3.** Attica - SWOT analysis on articulating policy portfolios

|   |  |   |
|---|--|---|
| <b>Articulating<br/>Policy Portfolios</b> | <b>Strengths</b>   | <b>Weak-<br/>nesses</b>   |
|   | <ul style="list-style-type: none"> <li>- Strategic Instruments and Policy Tools</li> <li>- Significant Financing</li> <li>- Ecosystem Instruments</li> <li>- CLIMATTICA Network</li> <li>- Integration of CCA</li> </ul>                                       | <ul style="list-style-type: none"> <li>- Inter-agency Coordination</li> <li>- Regulation of CCA</li> <li>- Systematic Structure for Cooperation</li> <li>- Balanced Strategy Coordination</li> </ul>  |
|   | <b>Opportunities</b>   | <b>Threats</b>  |
|   | <ul style="list-style-type: none"> <li>- Climate Adaptation Economy</li> <li>- Inter-regional Cooperation</li> <li>- Engaging in Collaborative Projects</li> <li>- Additional Strategic Priorities</li> <li>- Weaving CCA into Major Priority Areas</li> </ul> | <ul style="list-style-type: none"> <li>- Transcending Climate Change Impacts</li> <li>- Rapidly Changing Climate Trends</li> <li>- Effective Implementation across Borders</li> <li>- Maintaining a Holistic Approach</li> <li>- Alignment of National and Regional Strategies</li> </ul> |

### Strengths

In the Attica Region, a judicious deployment of strategic instruments and policy tools has been manifest, particularly evident in the discerning utilization of various policy tools and strategic instruments within the Regional Operational Programme 2021- 2027. The availability of significant

financing bolsters this, as the region is privy to markedly higher financial allocations than other Greek regions, channelling substantial resources into regional public investment programs and state subsidies. An innovative stride is seen in implementing ecosystem instruments, such as clusters, innovation platforms, and living labs, which foster a symbiotic nexus for knowledge sharing and information exchange. A notable exemplar is the establishment of the CLIMATTICA Network, a non-profit, multi-participatory network meticulously designed to mitigate climate change effects. This network serves as a conduit for sharing information and knowledge and supports member actions aimed at adept climate change adaptation. Furthermore, the region has successfully transitioned from localized CCA experiments to an integrative approach that mainstreams CCA across multiple programs, enabling large-scale deployment of systemic and transformative solutions. This integration of CCA amplifies the impact of adaptation strategies.

### **Weaknesses**

The challenge of effective inter-agency coordination emerges as a significant hurdle in the Attica region, potentially thwarting the smooth implementation and rollout of CCA strategies. This challenge is exacerbated by the context wherein CCA is less regulated than climate change mitigation, which can usher in potential inconsistencies or gaps in policy application and enforcement, creating a scenario where strategic actions might need to be aligned with regulatory frameworks. Moreover, a more systematically structured approach to inter-regional cooperation must be established. This void can stymie effective mutual problem-solving and knowledge exchange among regions, pivotal for crafting and refining robust CCA strategies. Furthermore, the need for balanced strategy coordination, which meticulously intertwines national and regional levels to ensure complementarity of funding and programs, is impeded by potential organizational and alignment challenges, necessitating a thorough reevaluation and recalibration of coordination mechanisms and strategic alignments to fortify the regional CCA strategy effectively.

### **Opportunities**

The Attica Region showcases many opportunities to sculpt a robust “climate adaptation economy”, mainly through the infusion of business-oriented innovation instruments and by amplifying the private sector’s pivotal role in CCA. A potential avenue for fostering resilience and sustainable development lies in exploring inter-regional cooperation, where shared challenges that cascade beyond administrative borders are addressed through collective, mutually beneficial initiatives. This cooperative spirit can further permeate the international sphere, with the region actively engaging in collaborative projects under Horizon Europe, participating in Interreg programs, and establishing EU partnerships and bilateral agreements, enriching its strategic and operational capabilities. Moreover, the policy portfolio presents a canvas for further enrichment by integrating additional strategic priorities, such as homing in on energy efficiency, exploring new energy sources, and potentially establishing a Climate Change Regional Council to guide and oversee strategic CCA initiatives. A holistic and impactful approach to CCA can be realized by weaving it into major priority areas, such as the Creative Economy, Sustainable Economy, and Blue Economy, ensuring that strategies and actions are not siloed but integrally embedded within the region’s broader economic and developmental framework.

### **Threats**

The region finds itself at a juncture where expansive and meticulously coordinated solutions are paramount. These impacts, which often cascade beyond administrative borders, necessitate an

interwoven, collective approach to devise and implement resilient and adaptive strategies to the rapidly changing climate trends. Effective implementation across diverse administrative and regional territories requires a delicate orchestration of policies, actions, and collaborations that can seamlessly navigate through the varied, sometimes conflicting, territorial priorities and regulations. Moreover, maintaining a holistic approach to innovation— encompassing technological, non-technological, business models, and social innovations—demands a vigilant and adaptive governance model that safeguards the effectiveness and integrity of strategies throughout the entire innovation cycle. Aligning national and regional strategies further stands out as a pivotal task, ensuring that the deployment of funding and enhancement of research infrastructures occur synergistically, preventing potential overlaps or misalignments, and optimizing resource utilization across all governance levels. In this intricate tapestry of strategic planning and implementation, the Attica Region must navigate a landscape as complex and dynamic as the climate trends it seeks to mitigate and adapt to.

### **2.2.3 Ensuring Cross-Domain Synergies**

In the Attica region, a paradigm shift towards whole-of-government approaches is essential to navigate the multifaceted impacts of climate change. Establishing strategies that permeate traditional silos, especially those emerging from divisions between Ministries' portfolios, is paramount. Formal and informal mechanisms should be instated to ensure coherence across various policies (e.g., R&I, agriculture, environment, mobility, health) within pertinent thematic arenas.

Establishing functional cross-ministerial and cross-department structures and cooperation mechanisms is crucial to counteract the 'siloesation'<sup>7</sup> of policies and facilitate information exchange. In the Attica region, where efforts are made to develop synergies among various bodies, including those that produce innovation and chambers of industry, this approach must encompass government, industry, society, and the academic/scientific community (the quadruple helix model). These mechanisms will not only catalyse the alignment of respective actions, seeking synergies. Still, they will also enhance the feasibility of executing joint actions and, perhaps, managing joint budgets across various policy domains.

The potent impact of interdisciplinary research is underscored by its capacity to provide innovative CCA solutions that necessitate the amalgamation of various disciplines, such as natural science, engineering, and behavioural sciences. Being home to a robust and advanced research system across diverse topics, the Attica region must further leverage this by supporting multidisciplinary research in emerging areas like green technologies and green energy. Breaking down the disciplinary organization barriers within universities and research institutions and addressing institutional path dependencies that hinder this type of research is vital.

Interdisciplinary research should be tied to local value chains across various sectors to nurture more resilient, localized, and endogenous innovation networks. A horizontal program for interdisciplinary research in the Attica region would serve as a crucial mechanism to enable collaborative research across several innovation topics, especially those related to CCA.

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<sup>7</sup> Compartmentalisation of policies due to silo thinking

Such networks can foster collaborations between universities, research organizations, and business firms across the Quadruple Innovation Helix (see Carayannis et al., 2012; Carayannis and Rakhmatullin, 2014) and the Quintuple Innovation Helix (see Carayannis and Campbell, 2009, 2010, 2012), providing endogenous solutions to significant challenges. “The ‘quadruple helix’ - is a central feature for design and implementation of TI strategic approaches and individual interventions” (European Commission, 2024).

The pursuit of connecting research and innovation to productivity within the Attica region, mainly focusing on the maturity of the production base to foster innovative and competitive products, needs to adhere to the norms, rules, and requirements of specific productive classes and sectors. This form of clustering, which identifies basic economic units within sectors and positions them against the expected results from research and innovation, should be more strategically incorporated into policy to serve the criticism of individual economic sectors as well as the economy as a whole.

The region of Attica has engaged in collaborations with academic institutions, For instance, the region of Attica develops collaborations with academic institutions such as the National and Kapodistrian University of Athens for issues of excellence, entrepreneurship, and innovation, or the University of Piraeus for blue economy issues. However, a formalized policy that directs its movement in coordination with universities or research centres needs to be included. The rich Greek scientific knowledge, especially within the recently passed climate law, should not remain confined to universities but should be integrally connected with those who plan, implement, and practice policies. Thus, a structured policy that facilitates and mandates such collaborations, ensuring that academic and research knowledge is tightly interwoven with policy planning and implementation, is imperative.

**Box 3.** Good Practices and Key Recommendations for Ensuring Cross-Domain Synergies

### Summary of Key Good Practices

- Breaking down traditional silos between Ministries’ portfolios for policy coherence.
- Establishing cross ministerial and departmental structures for better policy alignment and information exchange.
- Engaging government, industry, society, and the academic community in synergy driven initiatives.
- Leveraging advanced research systems for multidisciplinary research in areas such as green technologies.
- Fostering collaborative networks among universities, research organizations, and businesses.

### Summary of Key Recommendations

- Integrate interdisciplinary research with local value chains to boost resilience and innovation.
- Implement a horizontal program for interdisciplinary research to tackle CCA challenges.
- Connect research and innovation with productivity, focusing on the maturity of the production base.
- Strategically incorporate clustering of economic units within sectors to align with research and innovation outcomes.
- Formalize policies to coordinate academic and research collaborations with policy planning and implementation.

### 2.2.3.1 SWOT analysis on Ensuring cross-domains synergies

A SWOT analysis was also carried out to provide a complementary perspective on this dimension

**Table 4.** Attica - SWOT analysis on ensuring cross-domain synergies

|  |  |   |
|--|--|---|
| <b>Ensuring Cross Domain Synergies</b> | <b>Strengths</b>   | <b>Weaknesses</b>   |
|  | <ul style="list-style-type: none"> <li>- Interdisciplinary Research</li> <li>- Collaborations with Academic Institutions</li> <li>- Research and Innovation Connection</li> <li>- Cross-Sector Synergies</li> </ul>                            | <ul style="list-style-type: none"> <li>- 'Silosation' of Policies</li> <li>- Formalized Policy Absence</li> <li>- Barrier in Interdisciplinary Research</li> <li>- Lack of Cross- Department Structures</li> </ul>  |
|  | <b>Opportunities</b>   | <b>Threats</b>  |
|  | <ul style="list-style-type: none"> <li>- Whole-of-Government Approaches</li> <li>- Quadruple Helix Model</li> <li>- Interdisciplinary Research Program</li> <li>- Localized Value Chains</li> <li>- Policy and Academic Integration</li> </ul> | <ul style="list-style-type: none"> <li>- Persistent Policy Silos</li> <li>- Institutional Path Dependencies</li> <li>- Alignment with Productive Sectors</li> <li>- Effective Execution of Joint Actions</li> </ul> |

### Strengths

In the pulsating heart of Greece, the Attica Region, a powerhouse of interdisciplinary research has the potential to provide innovative CCA solutions. This research vitality is further invigorated by extant

collaborations with esteemed academic institutions, such as the National and Kapodistrian University of Athens and the University of Piraeus, fostering a fertile ground where academic prowess and practical application converge. A deliberate, concerted effort is palpable in connecting research and innovation to tangible productivity within various regional sectors, bridging the oft-encountered gap between theoretical knowledge and its practical application. Furthermore, the region has astutely crafted cross-sector synergies, developing a symbiotic relationship between bodies producing innovation and chambers of industry, thereby facilitating a holistic, multifaceted approach to addressing the challenges and opportunities CCA presents. Thus, the Attica Region is a paradigm of intertwining research, innovation, and practical application, weaving them into a cohesive strategy aimed at sustainable development and adaptation.

### **Weaknesses**

Among the challenges, particularly noted in the 'silosation' of policies, where traditional silos potentially foster a lack of coherence across various policies and ministries, thereby hindering a unified approach toward addressing multifaceted challenges. This is further compounded by the absence of a formalized policy that specifically mandates and directs collaborations with universities and research centers, creating a void in establishing structured, symbiotic relationships between policymakers and academia. Moreover, potential organizational barriers within universities and research institutions might hinder interdisciplinary research, limiting the seamless integration of varied expertise and knowledge domains in crafting comprehensive solutions. The lack of robust cross-department structures exacerbates this scenario, where the potential absence of functional cross-ministerial and cross-department cooperation mechanisms might impede the streamlined execution of policies and initiatives across different governmental and administrative entities. These challenges underscore the need for a systemic reevaluation and restructuring of the region's policymaking, research, and implementation frameworks to ensure cohesion, collaboration, and efficacy in addressing the region's needs and aspirations.

### **Opportunities**

Adopting whole-of-government approaches is pivotal to address the impacts of climate change, ensuring that strategic responses and interventions are synchronised across various governmental departments and sectors. This approach is complementarily bolstered by a Quadruple Helix Model, which robustly intertwines government, industry, society, and the academic/scientific community, fostering a synergistic ecosystem that propels innovative, multifaceted solutions for climate change adaptation. Furthermore, establishing a horizontal program for interdisciplinary research is integral, enabling collaborative research across numerous innovation topics and ensuring that varied, specialized knowledge bases are coalesced to develop comprehensive, holistic strategies. This approach is further enriched by tying interdisciplinary research to local value chains across varied sectors, nurturing more resilient and localized innovation networks that bolster the regional economy and enhance adaptive capacities. Moreover, structuring policy that facilitates and mandates collaborations between academic/research knowledge and policy planning and implementation ensures that strategies are empirically grounded, contextually relevant, and practically implementable, thereby enhancing the efficacy and sustainability of the region's adaptive interventions.

### **Threats**



In the Attica Region, persistent policy silos emerge as a conspicuous hurdle, inhibiting the seamless translation and implementation of strategies across various domains, potentially dampening cross-sectoral synergies' efficacy. This is further complicated by institutional path dependencies, which, while providing a structured framework, may inadvertently restrict the dismantling of organizational barriers within research institutions, potentially limiting the scope and dynamism of interdisciplinary research and innovation. Moreover, ensuring that clustering and research alignment comprehensively adhere to the norms, rules, and requirements of specific productive classes and sectors becomes imperative to ensure that strategic initiatives are aligned with and directly beneficial to the region's diverse, productive sectors. This underscores the need for strategic alignments that are theoretically robust, practically relevant, and implementable across the region's varied economic domains. Furthermore, ensuring the feasibility and effective execution of joint actions, particularly in managing joint budgets and resources across various policy domains, emerges as a pivotal component in ensuring that strategic initiatives are not only well-planned but also pragmatically executable and sustainably manageable within the intricate operational context of the Attica Region.

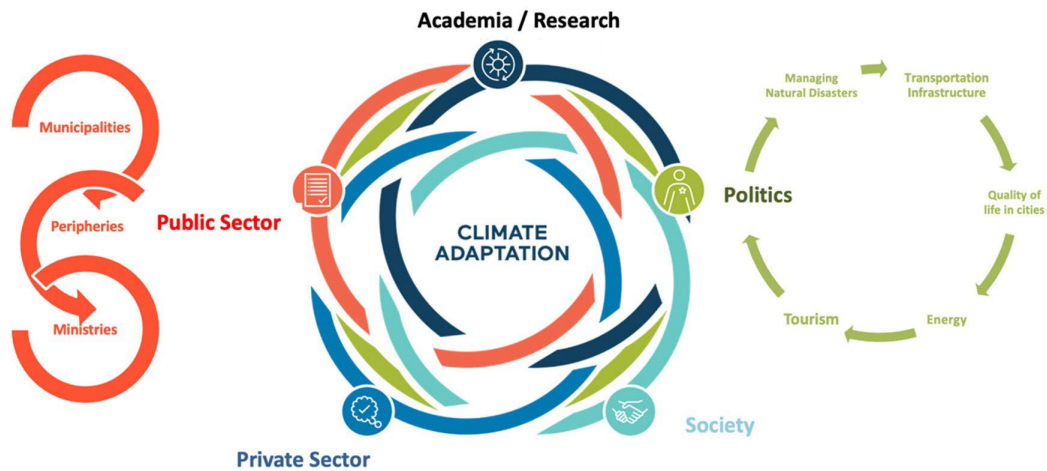
#### **2.2.4 Broadening and Deepening Stakeholder Involvement**

Incorporating stakeholders, encompassing academia, business communities, and various organizations, is pivotal in crafting comprehensive and effective strategies for CCA in Attica. However, ensuring that the stakeholder engagement is broadened and deepened necessitates a thorough and systemic methodology. Stakeholders' contributions, which include insights into prevailing trends, market structures, challenges, and opportunities, are vital. Nonetheless, the long-term goal is to establish a sustained, mutually beneficial cooperation that transcends a single engagement, extending towards a consistent, reliable collaboration.

Implementing transformative strategies toward climate resilience requires mobilizing a diverse array of actors beyond the conventional boundaries of research and innovation. This 'multiple helix' should include citizens, professionals impacted by climate-induced risks (such as farmers and health professionals), and organizations responsible for managing key systems and implementing solutions, such as water agencies and conservation bodies. Special emphasis should be placed on involving citizens and end-users to ensure the social acceptance of new solutions and to combat inertia. Additionally, ensuring the active participation of vulnerable groups is paramount to developing 'socially-just' CCA strategies.

Developing truly transformative strategies necessitates an innovative methodology that ensures a comprehensive and diverse selection of stakeholders, fostering an environment conducive to free-thinking and bold solution development. Adequate capacities to guide negotiations, manage conflicting views, mobilize local environmental knowledge, and navigate socio-cultural factors are crucial for the owners of the strategy. This involves creating adequate spaces and adopting new methods for public debate, thereby establishing conditions conducive to genuine co-creation with society (Figure 4).

**Figure 4.** Synergies and stakeholder engagement



Source: Paraskevopoulou (2022).

Deep and steady business involvement is vital, given that transformative adaptation requires substantial funding, including private investment, in climate-resilient solutions. The costs of non-action on climate adaptation are substantial and escalating, affecting not only public authorities responsible for land planning and infrastructure but also economic actors and entire sectors that may be profoundly impacted by climate change.

In the context of Attica, stakeholder engagement strategies have expanded, involving more actors across various thematic areas, and aligning with the national strategy. However, while stakeholders' contributions have provided valuable feedback during the strategy's implementation, further institutionalization might be necessary to organize the multi-level collection of knowledge and information on pertinent issues from stakeholders.

Addressing the gap between planning and implementing large-scale interventions is fundamental, necessitating the consideration of project maturation times. The concept of project maturation, which involves evolving from small pilot applications to large-scale projects, is crucial. This phased approach ensures that strategies, once implemented on a larger scale, are both effective and conducive to the regional context.

**Box 4.** Good Practices and Key Recommendations for Broadening and Deepening Stakeholder Involvement

|  |
|--|
| <p><b>Summary of Key Good Practices</b></p> <ul style="list-style-type: none"> <li>– Broadening and deepening stakeholder engagement with a systemic methodology.</li> <li>– Including a diverse range of actors from all sectors in the 'multiple helix' approach to ensure inclusive CCA strategies.</li> <li>– Emphasizing the involvement of citizens, end users, and vulnerable groups to ensure social acceptance and equity in CCA strategies.</li> <li>– Encouraging robust business involvement and private investment for funding climate resilient solutions.</li> <li>– Expanding stakeholder engagement strategies to align with the national strategy and provide valuable feedback during implementation.</li> </ul> <p><b>Summary of Key Recommendations</b></p> <ul style="list-style-type: none"> <li>– Develop innovative methodologies for transformative strategies that promote comprehensive stakeholder engagement.</li> <li>– Strengthen capacities for managing negotiations, conflicting views, and socio cultural factors in strategy development.</li> <li>– Further institutionalize stakeholder engagement for a structured multi level knowledge and information collection.</li> <li>– Address the gap between planning and implementing by considering project maturation times and scaling up from pilot applications to large scale projects effectively.</li> </ul> |
|--|

**2.2.4.1 SWOT analysis on stakeholder involvement**

A SWOT analysis was also carried out to provide a complementary perspective on this dimension

**Table 5: Attica** - SWOT Analysis on broadening and deepening stakeholder involvement

| <b>Broadening and Deepening Stakeholder Involvement</b> | Strengths  |  | Weaknesses   |   |
|---|--|--|--|---|
|   | Attica   | North Aegean   | Attica   | North Aegean  |
|   | <ul style="list-style-type: none"> <li>- Diverse Stakeholder Involvement</li> <li>- Engagement Strategies</li> <li>- Transcendent Cooperation</li> <li>- Acknowledgment of Diverse Actors</li> </ul>             | <ul style="list-style-type: none"> <li>- Methodological Approach</li> <li>- Stakeholder Engagement</li> <li>- Digital Platforms</li> <li>- Alignment with RIS3</li> </ul>                                      | <ul style="list-style-type: none"> <li>- Depth of Stakeholder Involvement</li> <li>- Implementation Gap</li> <li>- Insufficient Institutionalization</li> <li>- Limited Citizen Involvement</li> </ul> | <ul style="list-style-type: none"> <li>- Implementation Challenges</li> <li>- Limited Ongoing Engagement</li> <li>- Variable Adaptation Across Islands</li> </ul>                           |
|   | Opportunities  |  | Threats  |   |
|   | Attica   | North Aegean   | Attica   | North Aegean  |
|   | <ul style="list-style-type: none"> <li>- Transformative Strategies</li> <li>- Socially Just CCA Strategies</li> <li>- Private Investment</li> <li>- Project Maturation</li> <li>- Genuine Co-Creation</li> </ul> | <ul style="list-style-type: none"> <li>- Continuous Stakeholder Engagement</li> <li>- Innovative Collaborations</li> <li>- Enhanced Digital Participation</li> <li>- Localized Strategy Development</li> </ul> | <ul style="list-style-type: none"> <li>- Escalating Costs</li> <li>- Conflicting Views</li> <li>- Socio-Cultural Navigation</li> <li>- Market and Environmental Changes</li> </ul>                     | <ul style="list-style-type: none"> <li>- Disparity in Island Development</li> <li>- Resource Constraints</li> <li>- Misalignment of Collaborations</li> <li>- Engagement Fatigue</li> </ul> |

## **Strengths**

In the Attica Region, a holistic and inclusive CCA strategy has been molded by involving diverse stakeholders, spanning academia, businesses, and various organizations. The engagement strategies facilitate thorough and wide-reaching stakeholder involvement and align with overarching national strategies, ensuring a coherent and synergized approach across some policy and action levels. A unique feature of the region's strategic approach is its emphasis on transcending cooperation beyond isolated or single engagements, fostering a sustained, collaborative environment wherein varied stakeholders can continually contribute towards evolving strategies and actions. Moreover, acknowledging and actively including diverse actors, including citizens, professionals, and organizations, in a multi-helix approach underscores recognizing the multifaceted nature of climate change challenges and solutions.

## **Weaknesses**

While various stakeholders are integrated into the planning and strategizing process in the Attica Region, there's a palpable lack of depth in the stakeholder involvement and collaboration, potentially diluting the comprehensiveness and applicability of formulated strategies. The gap between planning and actual implementation of large-scale interventions is conspicuous, possibly due to a myriad of factors, including resource constraints, logistical challenges, or misalignments between strategy and practical applicability. Additionally, there's a discernible insufficiency in institutionalization to coherently organize multi-level knowledge and information collection from stakeholders, which could lead to fragmented or inconsistent policy and strategy development. Coupled with this, there might be a limited involvement or focus on citizens and end-users in current strategies, which could potentially neglect vital insights and needs from those most directly impacted by climate change, thereby limiting the effectiveness and acceptability of deployed strategies and actions.

## **Opportunities**

The region is poised to carve out transformative pathways in CCA by potentially developing transformative strategies through innovative methodologies, ensuring that the initiatives undertaken are innovative, scalable, and replicable across different contexts. A fundamental aspect of this entails ensuring socially just CCA strategies, where the active participation of vulnerable groups is paramount to devise equitable and inclusive interventions, thereby addressing the varied needs and challenges of all societal sectors. Engaging the business sector to usher in substantial funding and private investment in climate-resilient solutions becomes imperative, ensuring that strategies are both environmentally sustainable and economically viable. Moreover, adopting a concept of project maturation, which evolves from small pilot applications to large-scale projects, ensures that interventions are progressively scaled to have a broader impact and reach. Complementing all these, establishing conditions conducive to genuine co-creation with society, through adequate spaces and new methods for public debate, will underpin the development and implementation of strategies deeply rooted in the needs and aspirations of the community, ensuring sustained support and collaboration.

## **Threats**

In the Attica Region, the stakes are high, with substantial and continually escalating costs associated with non-action on climate adaptation, presenting a compelling economic case for proactive

interventions and strategy deployment. However, navigating through the complexities of stakeholder engagement introduces challenges, particularly in managing conflicting views and mobilizing local environmental knowledge. This is pivotal to ensuring strategies are deeply rooted in localized expertise and insights. Furthermore, addressing socio-cultural factors while engaging stakeholders and guiding negotiations becomes crucial to ensure that strategies are inclusive, equitable, and culturally sensitive, thereby ensuring broad-based support and collaboration. Adding to the complexity, prevailing trends, market structures, and environmental changes present dynamic challenges to CCA strategies, necessitating a flexible, adaptive approach to the multifaceted challenges posed by market and environmental dynamics, ensuring that strategies remain relevant and effective in the face of changing contexts.

### **2.2.5 Setting Up Effective Multi-Level Governance Models**

The region of Attica embraces a governance model resonant with the national strategy, involving various levels, entities, and communication channels, while also recognizing the importance of tailoring approaches to specific regional needs, adhering to the principle that "one size does not fit all." (a) Regional Governor and Councils: Occupying a higher echelon, the Regional Governor, regional council, and the regional Research & Innovation (R&I) council delineate policy frameworks and overall regional strategies. (b) Innovation and Management: The Innovation Centre, alongside innovation platforms and management authorities, forms the subsequent level, ensuring the strategy's actionable translation. (c) Coordination Unit: Formerly under the Ministry of Development and now transitioned to the Ministry of Finance, the coordination unit for implementing the National Smart Specialization Strategy (RIS3) orchestrates diverse elements of this governance method.

The Region of Attica shoulders the overarching responsibility for decision-making, establishing policy frameworks, and comprehensive regional strategies. The Regional Development Fund plays a pivotal role in the design and implementation, coordinating the activities of the Region of Attica's Innovation Centre. The Innovation Centre holds a vital coordinating position in executing the EDP and assorted engagement, design, and implementation activities. The Operational Unit centralizes the design of policy measures, basing them on EDP outputs, depicted policy priorities, and available policy tools. Finally, the Regional R&I Council provides integral input, high-level guidance, and coordination across the EDP's three focus groups (Creative Economy, Sustainable Economy, and Blue Economy).

Moreover, the Unit for the Programming, Coordination, and Monitoring of the Smart Specialization Strategy is vital in enhancing synergies between territorial governance levels and fostering inter-regional collaborations, coordination, and information exchange on lessons learned.

In addition, the participation of Athens in the Covenant of Mayors since 2014, alongside its commitment to the Compact of Mayors, exemplifies its proactive role in EU multi-level governance models. These signatories underscore Athens' collaboration within EU strategic networks, which is further advanced through its involvement in EU Horizon projects, aiming to enhance the greening of the Athens metropolitan area. This engagement showcases the city's integrated approach to sustainability, aligned with broader EU climate and environmental objectives.

Ensuring effective CCA interventions necessitates the astute articulation between varying governance levels - local, regional, national, and EU - each with distinct mandates and leverage. At a local level, while often the focal point of CCA interventions, it must be cohesively situated within broader strategic, legal frameworks, and policy portfolios at the regional and national levels. At the EU level,

it provides a crucial strategic and legal framework, climate strategy reporting requirements, and enabling conditions for using EU Funds.

**Box 5.** Setting Up Effective Multi- Level Governance Models

**Summary of Key Good Practices**

- The adoption of a multi level governance model that aligns with national strategies while catering to specific regional needs.
- Establishment of clear roles for the Regional Governor, regional councils, and R&I council in policy framework development.
- The Innovation Centre’s role in coordinating the Entrepreneurial Discovery Process (EDP) and related activities.
- Centralized design of policy measures by the Operational Unit based on EDP outputs and policy priorities.
- Regional R&I Council’s high level guidance and coordination across key economic focus groups.

**Summary of Key Recommendations**

- Maintain clear delineation of responsibilities across different governance levels for effective CCA interventions.
- Foster inter regional collaboration and coordination to enhance governance and share lessons learned.
- Integrate local CCA actions into broader strategic and legal frameworks at regional, national, and EU levels.
- Utilize EU funds effectively by adhering to strategic, legal, and reporting requirements set

**2.2.5.1 SWOT analysis on Multi-level governance**

A SWOT analysis was also carried out to provide a complementary perspective on this dimension

**Table 6.** Attica - SWOT analysis on multi-level governance

|   |  |   |
|---|--|---|
| <b>Setting Up Effective Multi-Level Governance Models</b> | <b>Strengths</b>   | <b>Weaknesses</b>   |
|   | <ul style="list-style-type: none"> <li>- Structured Governance</li> <li>- Decision-making Responsibility</li> <li>- Diverse Units</li> <li>- Innovation Center</li> </ul>            | <ul style="list-style-type: none"> <li>- Transition of Coordination Unit</li> <li>- One-size-fits-all Avoidance</li> <li>- Complexity in Multi- Level Governance</li> </ul> |
|   | <b>Opportunities</b>   | <b>Threats</b>  |
|   | <ul style="list-style-type: none"> <li>- Enhancing Synergies</li> <li>- Inter-Regional Collaborations</li> <li>- EU Level Engagement</li> <li>- Incorporate Diverse Input</li> </ul> | <ul style="list-style-type: none"> <li>- Legal and Policy Alignment</li> <li>- EU Compliance</li> <li>- CCA Interventions</li> </ul>  |

**Strengths**

In the Attica Region, a structured governance model is the backbone of its operational and strategic framework, providing a defined hierarchy and clear responsibilities that facilitate coordinated actions and decisions. Within this governance model, apparent decision-making authority is vested in the region, ensuring that strategic and operational decisions are guided by a unified, centralised authority. Various units, each focusing on different aspects such as innovation, management, and coordination, enable specialized, focused approaches towards the region's challenges and strategies. Moreover, the Innovation Center is a pivotal hub for coordinating and executing the EDP and as a nexus for various stakeholder engagement activities, ensuring that innovation and entrepreneurship are nurtured and guided within a structured, supportive environment.

### **Weaknesses**

In the Attica Region, the transition of the coordination unit from one Ministry to another poses a potential risk for functional disruptions, potentially derailing the steady progression and implementation of policies and initiatives. This shift could instigate a period of adjustment and realignment, which might temporarily hinder the effectiveness and responsiveness of the coordination unit. Furthermore, the region challenges avoiding a "one-size-fits-all" approach in its strategies and initiatives. Tailoring strategies to meet the specific needs of diverse localities within the region, each with unique challenges and contexts, demands a nuanced, flexible approach. Additionally, the complexity inherent in ensuring smooth multi-level governance can pose challenges, potentially creating bottlenecks and inefficiencies that must be meticulously managed and navigated to ensure coherent, coordinated action across all levels of governance.

### **Opportunities**

In the Attica Region, leveraging the programming, coordination, and monitoring unit is pivotal to enhancing synergies between territorial governance levels, ensuring that efforts at various administrative strata are harmonized and mutually reinforcing. This involves creating structured interfaces for information exchange, strategic alignment, and coordinated action to navigate CCA efforts' multifaceted challenges and opportunities. Furthermore, the region recognizes the criticality of fostering inter- regional collaborations, necessitating enhanced coordination and information exchange between regions to share knowledge, insights and perhaps, co-develop solutions to shared challenges. Engaging with the EU level is also vital, ensuring that regional strategies align with EU strategic directions and legal frameworks and that they effectively leverage available EU funding mechanisms. Additionally, incorporating diverse inputs from the Regional R&I Council into the EDP ensures that strategies are informed, nuanced, and reflective of varied stakeholder insights and expertise.

### **Threats**

In the Attica Region, maintaining a congruent alignment with broader strategic, legal frameworks, and policy portfolios across all governance levels is fundamental to ensuring that regional strategies are compliant and synergistic with wider, overarching policy directions. This encompasses aligning with national strategies and ensuring that regional efforts are supplementary and complementary to them, enhancing interventions' overall efficacy and impact. Compliance with the EU's strategic and legal framework, as well as adhering to its reporting requirements, is imperative to not only secure vital funding and support but also to ensure that regional efforts are in harmony with EU-wide initiatives and directions. Particularly for CCA interventions, it is pivotal that efforts at the local level are not isolated initiatives. Instead, they should be cohesively embedded within broader strategic frameworks,

ensuring that local actions contribute towards, and are supported by, overarching strategies and resources, enhancing their sustainability, impact, and scalability.

### **2.2.6 Providing room for experimentation**

The region of Attica has cultivated an environment that prioritizes experimentation and innovation through its Experiment-Driven Design (EDP) process and utilizing focus groups. While infrastructure like living labs and innovation hubs is poised to facilitate innovation in various thematic areas, implementing CCA remains paramount. The design thinking and stakeholder engagement intrinsic to Attica's approach potentially serve as prolific platforms for creating bespoke, interdisciplinary CCA solutions.

However, a discernible challenge emerges from a propensity to pursue innovation purely for novelty. Innovations must be pioneering but also practicable, efficient, and scalable for CCA initiatives. A prosperous CCA strategy necessitates transcending mere innovation and delivering competitive products or solutions with tangible real-world applications. This demands a transition from a generic focus on innovation to a more nuanced approach, meticulously aligned with policy priorities, including CCA, to yield tangible and impactful results.

The region's emphasis on stakeholder engagement is commendable, fostering a collaborative environment that could be instrumental in developing widely accepted and effective CCA solutions. This collective approach could be pivotal in navigating social and political obstacles to CCA experimentation and ensuring that diverse perspectives and needs are incorporated into adaptive strategies.

While mechanisms for funding and support are established, with policies and interventions formulated to stimulate innovative actions, financial support through avenues like grants or public-private partnerships could be crucial for experimental CCA projects. Annual marathon innovation hackathons also present a unique opportunity for the swift prototyping and testing of CCA solutions, given that CCA themes are incorporated into these events.

Despite the aforementioned strengths, aligning experimental solutions with policy priorities is crucial. If CCA is not prioritised within the region's policy agenda, it could present a substantial barrier to effective experimentation in this domain. Consequently, a key objective should be to ensure the integration of CCA into policy planning and priority-setting, enabling it to leverage the region's existing innovation ecosystem.

While the region of Attica boasts a solid framework for encouraging experimentation and innovation, its efficacy in promoting CCA solutions will significantly depend on aligning CCA with existing thematic areas, policy priorities, and stakeholder needs. Strategies to overcome barriers to CCA experimentation should encompass ensuring this alignment, concentrating on practical and measurable outcomes, and exploiting existing funding and support mechanisms.

Creating an environment that facilitates creativity and is tolerant of risk is pivotal for developing and implementing CCA strategies, which often necessitate 'out-of-the-box' solutions to address the uncertain futures of territories impacted by climate-induced hazards. Transformative CCA strategies encompass planning for future-proof solutions that embody a degree of risk and uncertainty. Exploring



new methodologies that accommodate risk-taking and failure acceptance in policy instruments and innovative types of risk-tolerant finance is vital.

Regulatory sandboxes or innovative public procurement models are among the available mechanisms. Establishing modular protected spaces, or niches, for experimentation to trial new and sometimes competing solutions are crucial to adopting transformative approaches to CCA. This approach starkly contrasts with the strategy of short-term incremental CCA interventions, which rely on known solutions.

**Box 6.** Good Practices and Key Recommendations for Providing Room for Experimentation

**Summary of Key Good Practices**

- Fostering an environment of experimentation and innovation through Experiment-Driven Design and focus groups.
- Utilizing living labs and innovation hubs to facilitate the creation of interdisciplinary CCA solutions.
- Engaging stakeholders effectively to integrate diverse perspectives into adaptive CCA strategies.
- Emphasizing the need for innovations to be practicable, efficient, and scalable, beyond mere novelty.

**Summary of Key Recommendations**

- Ensure that CCA strategies go beyond innovation for novelty and focus on delivering competitive, real world applications.
- Integrate CCA into policy planning and priority setting to leverage the region's existing innovation ecosystem.
- Utilize financial support mechanisms, such as grants and public private partnerships, for experimental CCA projects.
- Explore regulatory sandboxes and innovative public procurement models to trial new CCA solutions in protected spaces.

**2.2.6.1 SWOT analysis on providing room for experimentation**

A SWOT analysis was also carried out to provide a complementary perspective on this dimension

**Table 7.** Attica - SWOT analysis on providing room for experimentation

|   |   |  |
|---|---|--|
| <b>Providing Room for Experimentation</b> | <b>Strengths</b>  | <b>Weaknesses</b>  |
|   | - Emphasis on Innovation<br>- Infrastructure<br>- Stakeholder Engagement<br>- Existing Funding Mechanisms             | - Innovation for Novelty<br>- Policy Alignment<br>- Risk Tolerance   |
|   | <b>Opportunities</b>  | <b>Threats</b>   |
|   | - CCA Priority Integration<br>- Leveraging Hackathons<br>- Embracing Risk in CCA Strategies<br>- Regulatory Sandboxes | - Barriers to CCA Experimentation<br>- Political and Social Obstacles<br>- Lack of Practical and Measurable Outcomes |

**Strengths**

The Attica Region places a pronounced emphasis on fostering a dynamic innovation ecosystem, mainly through the EDP process which prioritizes experimentation and innovative approaches to addressing challenges. The region boasts infrastructure such as living labs and innovation hubs, which serve as catalytic environments for sparking innovation, facilitating collaborations, and enabling the practical application of experimental ideas and prototypes. Furthermore, a collective approach toward stakeholder engagement cultivates a collaborative environment and fosters a sense of collective ownership and acceptance of CCA solutions among diverse stakeholders. This approach ensures the devised strategies and solutions are innovative, pragmatic, and socially viable. Moreover, the region benefits from established funding and support mechanisms, which financially enable innovative actions, providing a lifeline for experimentation and the practical implementation of innovative solutions.

### **Weaknesses**

While commendable for pursuing new ideas and solutions, the innovation landscape may sometimes delve into innovation for its own sake without ensuring the practicality and scalability of the developed solutions. This propensity towards novelty can create a disconnection between innovative endeavors and tangible CCA outcomes. Furthermore, there may exist a potential need for more alignment between the experimental solutions developed through innovative processes and the policy priorities, particularly in the context of CCA. Aligning innovation with policy objectives and ensuring that innovative solutions are novel and pragmatically aligned with policy goals and regional needs is paramount. Additionally, navigating the delicate balance between fostering creativity and maintaining risk tolerance can be complex. While encouraging creativity and unorthodox solutions is crucial, it is equally vital to ensure that CCA strategies are grounded in practicality and capable of delivering impactful and sustainable outcomes in the face of the multifaceted challenges posed by climate change.

### **Opportunities**

Integrating CCA into the policy planning and priority-setting framework represents a pivotal move towards ensuring the region's strategies and actions are comprehensively aligned with its climate objectives. The utilization of annual innovation hackathons fosters a culture of swift prototyping and testing of CCA solutions and ignites a collaborative spirit among innovators, policymakers, and stakeholders. This approach to rapid, collaborative solution development can be particularly impactful in the CCA space, where timely, innovative solutions are paramount. Additionally, the region is developing methodologies that embrace risk and accept failure within policy instruments, recognizing that the path to innovative solutions often involves learning from what doesn't work. This is further amplified by employing regulatory sandboxes and innovative public procurement models, which provide a structured yet flexible environment for trialing and refining new CCA solutions, facilitating a practical, risk-tolerant approach to innovation that is both dynamic and responsive to the emerging challenges of climate change.

### **Threats**

Aligning CCA experimentation with existing thematic areas, policy priorities, and stakeholder needs represents a complex task. Ensuring that experimentation and innovative CCA strategies are coherent with established frameworks and accepted by varied stakeholders necessitates a careful, considered approach. The region must also navigate various social and political challenges to CCA experimentation and implementation. These challenges, ranging from resistance to change to

differing stakeholder priorities, require adept management to ensure that innovative CCA strategies are developed and adopted effectively. Furthermore, the potential gap between innovative actions and tangible, impactful results in the real world is a pertinent concern. Innovative strategies and experimental projects must be carefully designed and managed to ensure that they translate into practical, measurable outcomes that genuinely enhance the region's adaptive capacity and resilience to climate change.

### **2.2.7 Securing High Levels of Policy Intelligence, Learning and Strategic Capacity**

While the existing knowledge base in environmental monitoring, waste management, ecosystem management, and data analytics is broad and profound, bridging the gap between possessing information and applying it in a structured, actionable manner presents a challenge. Technologies like particulate pollution monitoring and predictive models for air quality are established; moreover, the utility of the existing knowledge for developing and implementing a CCA strategy needs to be improved by the absence of a well-organized system to make this knowledge actionable. A structured approach towards systematizing, recording, and mapping the available information is imperative to amplify its efficacy in decision-making. Thus, investing in systematizing this knowledge—by recording practices, mapping skills, and technologies applications and establishing a centralized repository accessible to decision-makers—can facilitate streamlined strategy development, ensuring readily available, accurate, and comprehensive data.

Traditional knowledge and experience, especially regarding skills and technologies, risk fading over time if not documented and integrated into a formal learning process. The necessity for reskilling and upskilling, especially in emerging technologies and practices, signals that the existing capacities may need to be improved to sustain an effective CCA strategy. Upgrading these capacities might involve instituting targeted training programs to bridge skill and knowledge gaps, establishing partnerships with educational and research entities to refresh the knowledge base with the latest advances, and exploring public-private collaborations to financially and structurally support these initiatives, ensuring the knowledge base not only remains robust but also evolves.

Translating global data on climate impacts into locally pertinent knowledge is vital to comprehend a territory's baseline situation in terms of climate vulnerability and to bridge the adaptation knowledge gap. Developing an evidence base that amalgamates behavioral sciences with knowledge from climate scientists and other specialists will facilitate understanding social factors affecting vulnerability, and aid in creating anticipatory and orchestration capacities to co-create future adaptation pathways.

Moving beyond sectoral approaches and understanding complex interactions between multiple and cascading risks and responses is crucial for monitoring the overall climate resilience of a territory. Creating frameworks that capture the functioning of impact pathways will enable assessments of whether the transformation is genuinely occurring, providing insights into the systemic dimension of strategies.

Engaging in ambitious CCA strategies necessitates transformative learning capacities, including the ability for long-term planning amid uncertainty. While various sources of information, good practice cases, and support bodies are available, more than local authority capacities to exploit them for a specific territory are often needed. Thus, ensuring that smaller local authorities can access and utilize

available knowledge bases, like the Mission CCA Implementation Platform or the Climate-ADAPT knowledge base, is vital.

**Box 7.** Good Practices and Key Recommendations for Securing High Levels of Policy Intelligence, Learning and Strategic Capacity

**Summary of Key Good Practices**

- Systematizing, recording, and mapping environmental knowledge to make it actionable for decision making.
- Establishing a centralized knowledge repository to ensure data is readily accessible to decision makers.
- Documenting traditional knowledge and integrating it into formal learning to prevent its loss over time.
- Investing in targeted training programs to bridge skill and knowledge gaps in CCA strategies.

**Summary of Key Recommendations**

- Translate global climate impact data into locally relevant knowledge to understand and address climate vulnerability effectively.
- Develop evidence bases that combine behavioral sciences with technical climate knowledge for comprehensive adaptation planning.
- Create frameworks to monitor complex interactions between multiple risks and responses to assess overall climate resilience.

### 2.2.7.1 SWOT analysis on Policy Intelligence, Learning and Strategic Capacity

A SWOT analysis was also carried out to provide a complementary perspective on this dimension

**Table 8.** Attica – SWOT analysis on policy intelligence, learning and strategic capacity

|   |   |   |
|---|---|---|
| <b>Securing High Levels of Policy Intelligence, Learning and Strategic Capacity</b> | <b>Strengths</b>  | <b>Weaknesses</b>   |
|   | - Robust Knowledge Base<br>- Advanced Technologies<br>- Global Climate Impact Data                    | - Knowledge Application<br>- Systematization of Knowledge<br>- Skills and Capacity                    |
|   | <b>Opportunities</b>  | <b>Threats</b>  |
|   | - Structured Knowledge Management<br>- Training and Partnerships<br>- Localized Knowledge Application | - Fading Traditional Knowledge<br>- Insufficient Local Authority Capacities<br>- Complex Interactions |

#### Strengths

The region boasts profound knowledge in various critical domains, such as environmental monitoring, waste management, ecosystem management, and data analytics, which forms a solid foundation for informed policymaking and strategy development. Furthermore, established pollution monitoring technologies and predictive air quality models enhance the region’s capacity to understand, monitor, and respond to environmental changes and challenges effectively. Additionally, global data

availability, which can be localised for specific territorial applications, further enriches the region's knowledge base. This availability facilitates a nuanced understanding of global climate impacts at a local level, enabling the development of targeted, relevant CCA strategies grounded in both global and local contexts.

### **Weaknesses**

Despite this substantial knowledge base in various environmental and technological domains, challenges persist in applying this knowledge in formulating and executing structured, actionable strategies for CCA. The difficulty in translating extensive knowledge into actionable interventions is exacerbated by the absence of a well-organized system to make knowledge actionable and to preserve and integrate traditional knowledge into current and future strategies. Moreover, potential gaps in skills and capacities, especially in emerging technologies and practices, could further hinder the effective implementation of knowledge-based CCA strategies. The region may need to focus on bridging these gaps, ensuring that knowledge is acquired, preserved, and translated into practical, effective actions and policies, thereby enhancing its adaptive capacities and resilience to climate change impacts.

### **Opportunities**

A strategic approach towards structured knowledge management is pivotal in enhancing Attica's adaptive capacity and resilience against climate change impacts. By investing in a centralized repository, the region aims to systematize, record, and map available information, ensuring that knowledge is not only preserved but also accessible and actionable. This is complemented by the establishment of training programs and the forging of partnerships with educational and research entities, which facilitates the continuous development of skills and capacities necessary for effective CCA. Furthermore, the region is dedicated to translating global climate impact data into locally pertinent and actionable knowledge, ensuring that CCA strategies are tailored to the specific needs and vulnerabilities of the Region. Through these approaches, the region endeavors to ensure that knowledge management and capacity-building actively contribute to the robustness and efficacy of its CCA strategies and actions.

### **Threats**

The risk of fading traditional knowledge poses a significant challenge, underscoring the imperative to document and integrate such knowledge and skills into formal processes to ensure they are preserved and utilized in CCA strategies. Moreover, the limited capacities of local authorities to exploit available knowledge bases and good practice cases raise concerns regarding the effectiveness and efficiency of strategy implementation at the local level. The region also contends with the intricacies of understanding and managing complex interactions between cascading risks and responses, which demands a well-coordinated approach to navigate CCA implications on various sectors and communities. The holistic management of these issues necessitates a structured, integrated strategy that melds traditional knowledge with modern scientific insights and ensures local authorities are adequately equipped to leverage available knowledge and practices in CCA actions.

## 2.3 Conclusions for the Region of Attica

In the journey towards climate change mitigation and adaptation, the Attica region demonstrates commendable initiatives, notably through efforts like CLIMATTICA. The region has initiated strategies to mitigate climate change impacts and has also woven a tapestry of policies and approaches that serve as a potential model for other regions. However, even with these noteworthy initiatives, the policy portfolio has room for enhancement. It could be fortified through transformative CCA strategies, synergistic policy instruments, and fostering an innovative solution ecosystem.

Attica, endowed with many research institutions and concomitantly facing diverse challenges, stands at a pivotal juncture. The region can reimagine its policy portfolio towards a more holistic, interdisciplinary, and collaborative approach in its CCA endeavors. Integrating policies that ensure cross-domain synergies, embrace interdisciplinary research, enhance local innovation networks, and tightly knit academia with policy implementation provides a pathway through the complexities and multifaceted challenges of climate change, fostering a resilient and sustainable framework.

A critical aspect of developing and realizing effective, sustainable, and socially just CCA strategies is ensuring that stakeholder involvement is comprehensive, profound, and systematically integrated into strategic planning and implementation processes. With its array of stakeholders and a vibrant potential for innovative solutions, Attica finds itself well-poised to establish a robust and transformative strategy for climate change adaptation.

Moreover, crafting robust multi-level governance structures is imperative for ensuring successful CCA interventions. This involves creating exemplary communications to ensure smooth transitions, potentially enabling the co-creation of changes informed by diverse governance-level inputs. Strategies must be well-planned, effectively implemented, and sustainable long-term, recognizing and respecting each region's unique needs and peculiarities.

Despite having a comprehensive knowledge base, there is a palpable need for systematic organization and updating to fully support CCA decision-making. Ensuring that the knowledge base remains relevant and evolves necessitates *nurturing strategic capacities for continuous learning*. Aligning efforts in these areas with the general directions for CCA strategies can pave the way toward a more robust, dynamic, and transformative CCA strategy.

The case study of the Attica Region offers invaluable insights into how a region can comprehensively approach climate change adaptation, integrating a *strategy that is both reactive and proactive*, and that focuses on mitigating risks while capitalizing on opportunities.

Even though the region's approach is comprehensive, well organized, and participatory, and it aligns with broader national and EU goals, it also presents its *challenges, particularly in inter-agency coordination and effective implementation*.

Addressing institutional weaknesses, such as the need for *modern specifications in project design, building, and maintenance, and resolving institutional ambiguity at the municipal level*, must be prioritized. Additionally, financing regional CCA plans is perhaps the most pivotal in implementing them. Considering that so far most spending is going into mitigation, not adaptation (European Commission, 2024), prioritizing project and infrastructure funding is essential based on their contribution to CCA efforts..

Conclusively, while the Attica Region navigates through the CCA challenges, its approach to CCA—despite the challenges in coordination and implementation—offers a framework that other regions might consider emulating. This approach, underscored by its strong *emphasis on stakeholder involvement, continuous assessment, and alignment with broader goals*, positions it as an instructive model worthy of consideration by other regions venturing through the complex CCA and mitigation landscape.

With respect to the multi-dimensional SWOT analysis of the region, key messages include:

- the intertwining of innovative practices and policy initiatives, notably through engagements like IMPETUS<sup>8</sup> and ARSINOE<sup>9</sup>, has carved out a paradigm that weaves together risk mitigation, opportunity capitalization, and sustainable development.
- The region demonstrates a commitment to embedding innovative solutions to tackle the challenges of climate change. However, beneath these innovative endeavors lies a web of challenges, particularly in inter-agency coordination and implementation, which periodically thwarts the transformation of strategy into tangible, impactful outcomes.

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<sup>8</sup> <https://climate-impetus.eu/>

<sup>9</sup> <https://arsinoe-project.eu/>. Among its 9 case studies ARSINOE covers the Attica region with: 1/ [Greening the Athens metropolitan area](#) and 2/ [the Piraeus seaport](#)

### 3 North Aegean Region<sup>10</sup>

*The North Aegean region, during its 2021-2027 programming period, has undertaken varied approaches to spatial policy, stakeholder involvement, governance models, experimentation in Climate Change Adaptation (CCA), and strategic capacity enhancement. While the region emphasizes the uniqueness of each island's development pattern, it prioritizes stakeholder engagement through platforms and in-person consultations. However, the multi-level governance system must be more consistent, especially in clarifying roles between various governance levels, leading to bottlenecks and inefficient project implementation. Furthermore, despite having a natural setting that encourages experimentation, the region's limited progress in innovation metrics underscores the need for robust initiatives, such as strengthening scientific foundations and enhancing business-science cooperation. The most pressing concern, however, lies in the region's underdeveloped knowledge base and strategic capacity. While the necessity of observatories for monitoring and knowledge dissemination has been acknowledged, the region has yet to actualize these mechanisms. This gap complicates decision-making, especially in CCA strategies, and emphasizes the need for a proactive approach to knowledge management and capacity building. Overall, the North Aegean's efforts reflect a mixed landscape of progress and challenges, underscoring the need for strategic, cohesive, and proactive measures to foster sustainable development.*

#### 3.1 Presentation of the territory

The North Aegean Region encompasses the northeastern section of the Aegean archipelago. It consists of five major islands, accompanied by several smaller ones, which are scattered at varying distances from one another. This arrangement lacks significant geographical unity. The North Aegean Region's defining feature is its insularity and "dual regionalism." This refers to its position as a non-central region within the country's eastern boundaries and as a distant region of the EU at its outer edges. Such a position often hinders its integration into prevailing communication and exchange networks.

Law 3852/2010 (New Architecture of Regional Government and Decentralized Administration - Kallikratis Program) establishes the North Aegean Region, which includes the Prefectures of Lesbos, Samos, and Chios. The basis of the Region is Mytilini. The new administrative structure is composed of the following:

- the Regional Unit of Lesbos, including the Municipality of Lesbos,
- the Regional Unit of Lemnos, including the Municipalities of Lemnos and Ag. Efstratios,

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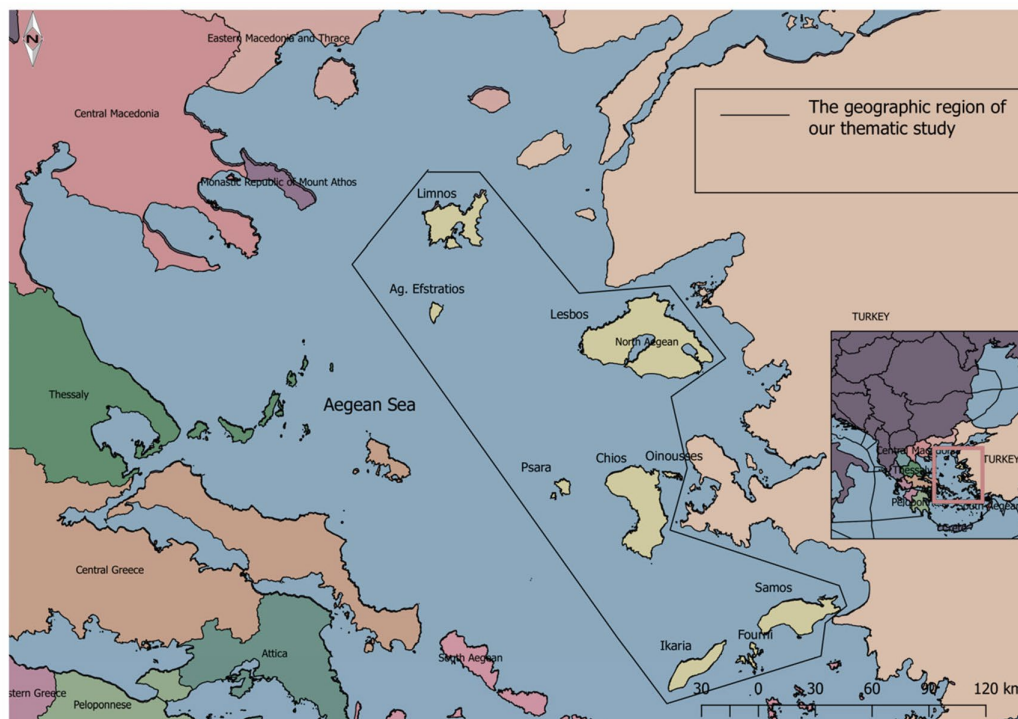
<sup>10</sup> For this second case study, we conducted six in-depth interviews with six experts and stakeholders in the field of transformative innovations for climate change adaptation, specifically within the region of North Aegean and municipalities that belong to the region. To gain a comparative understanding of North Aegean's standing relative to other Greek regions, additional thirteen in-depth interviews were carried out with stakeholders from areas including Attica, South Aegean, Crete, and Central Macedonia, and also two interviews at the National level. Complementing these interviews, desk research was also undertaken



- the Regional Unit of Chios based in Chios, including the Municipalities of Chios, Psara, and Oinoussa,
- the Regional Unit of Samos, including the Municipality of Samos, and
- the Regional Unit of Ikaria, including the Municipalities of Ikaria and Fourni.

The North Aegean Region spans 3,836 km<sup>2</sup>, making up 2.9% of Greece's total land area. This region is a mosaic of islands, each distinct in its topography and land use. While Samos stands out as the most mountainous, Ikaria is characterized by its steep slopes, and Lemnos is predominantly flat. Lesvos, on the other hand, presents a more balanced landscape. The region is defined by its mountainous and semi-mountainous terrains, which collectively cover over 68% of its area.

**Figure 5.** The North Aegean Region



The region's islands range in size and significance. Large islands like Lesvos, Chios, Samos, Limnos, and Ikaria contrast sharply with smaller ones like Agios Efstratios and Oinousses. Beyond these, the region is dotted with uninhabited islands and rocky islets. Its coastline stretches over 1,335 km, but only 36 km is usable. This limitation, mainly due to the vast expanse of its three main islands, poses a challenge for mass tourism development, distinguishing it from other Aegean regions like Cyclades.

Culturally, the North Aegean is a treasure trove. Traditional settlements and historic city centers stand as testaments to its rich heritage. As of 2011, the region's population was pegged at 198,894 residents, reflecting a 3.5% decline over the preceding decade. Half of these residents live in urban areas, with major urban centres being the prefecture capitals. Economically, the North Aegean contributes about 0.8% to Greece's GDP. The economic pulse varies across islands; while Lesvos boasts the highest GDP per capita, Samos felt the brunt of the 2009 economic downturn.

The region's economic backbone is the tertiary sector, with tourism as its linchpin. Following this is the secondary sector, where construction holds sway, and the primary sector, dominated by agriculture

and fisheries. As climate change casts its shadow, the region braces for impact like much of Europe. Sectors from agriculture to fisheries, health, and infrastructure are anticipated to bear the brunt, underscoring the urgency for adaptive measures at both regional and national levels.

Developing a CCA strategy is a national and regional obligation from the Framework Convention on Climate Change (UNFCCC, 1992), EU commitments, and the Paris Agreement on climate change. In April 2016, the Ministry of Environment and Energy completed the National Strategy for Adaptation to Climate Change (ESPKA). According to article 43 of Law 4414/2016, the regions must develop a Regional Plan for Adaptation to Climate Change (PeSPKA).

The primary purpose of ESPKA is to contribute to strengthening the country's resilience against the effects of climate change. For this reason, there is a need to create the prerequisites so that the (public and private) decisions for the formation of the production and consumption fabric of the Greek society are taken with sufficient information and long-term targeting, facing the risks and exploiting the opportunities arising from the climate change.

The ESPKA is a text of strategic orientation aimed at drawing up guidelines. Due to its nature, however, it does not extensively analyse the necessary sectoral policies, it does not provide an opinion on individual adaptation measures and actions at the local/regional level, nor does it attempt to prioritize them.

The main objectives of ESPKA are:

- The systematization and improvement of the process of making (short-term and long-term) decisions related to adaptation.
- Linking adaptation to promoting a sustainable development model through regional/local action plans.
- The promotion of adaptation actions and policies in all sectors of the Greek economy with an emphasis on the most vulnerable.
- Creating a mechanism for monitoring, evaluating, and updating adaptation actions and policies.
- The strengthening of the adaptive capacity of Greek society through information and awareness activities.

The PeSPKA, on the contrary, is an integrated plan that identifies and prioritises the necessary adaptation measures and actions following Regulation 1303/2013/EU and shows the guidelines for implementing the NSRF programs.

The purpose of the Region's strategy is to limit its vulnerability to the effects of climate change. To do this, an assessment and understanding of the changes expected to occur in the coming decades and an assessment of the risks involved for the environment, society, and the economy are made.

The PeSPKA must identify and prioritize adaptation options based on risks, assess the required measures that need to be taken, their timing and costs, at least at a strategic level since climate change, on the one hand, cannot be predicted precisely and, on the other hand, it is a process of decades.

- The strategy should help to create and strengthen the structures of the Region that will be called upon to deal with the problem and develop a system for monitoring the situation and the evolution and possible revision of the adaptation program in the future.
- The vulnerability analysis, the prioritization and selection of measures and actions, the time planning, and the investigation of their financing/implementation are the principal axes of the PeSPKA.
- The same applies to implementing indicators and other tools for monitoring progress and implementing adaptation measures.

The North Aegean PeSPKA (North Aegean Region 2019a, 2019b) was the first PeSPKA environmental approval in Greece by the Ministry of Energy and the co-competent ministries.

The importance of the environmental approval of the North Aegean PeSPKA lies in the fact that it highlights the actions that must be implemented to adapt the region to the effects caused by climate change, considering that some of the proposed measures are in the implementation of the Basin Management Plan River Runoff of the Aegean Islands and the Flood Risk Management Plan. In contrast, others are already included in the Technical Program of the North Aegean Region or the corresponding Regional Operational Program.

The areas where CCA measures are proposed concern the proper management of water and forests, the protection of biodiversity and wetlands, the reduction of buildings' energy needs and the increase of their resistance to extreme climate events, the assurance of stability of electricity supply, protection of cultural heritage monuments, flood, landslide and erosion risk management, transport, tourism, agriculture, fisheries, and aquaculture and for human health (North Aegean Region 2021).

Some adaptation measures for the Northern Aegean are the preservation of terraces, appropriate water management, immediate intervention, and interventions in burnt forests after fires (soil cover-restoration), the emphasis on agroforestry systems, and the connection of aid to farmers with soil protection measures and carbon sequestration. The values of the terraces in stopping water erosion were especially underlined, and measures were formulated that should be implemented to prevent the great abandonment in today's Aegean.

The North Aegean PeSPKA rightly references water management projects (surface and underground), calls for better management of irrigation networks and irrigation water, and the need to limit irrigation concerning crop needs. It proposes measures to restore and protect areas at risk of inundation, retention dams, and Ecological Corridors. However, it places a significant emphasis on large watertight reservoir projects that do not enrich the underground aquifer, have high evaporation, and are likely to be empty in the season when irrigation is needed. It also emphasizes a few large dams that cost too much for the benefits, rather than many small retention dams that enrich the aquifer and facilitate reforestation.

The North Aegean PeSPKA should be based as a priority on increasing resilience with productive reforestation, retention dams, agroforestry systems, and upland maintenance, measures that, in addition to reducing floods, droughts, and inundation, contribute to increasing the local production base (Chatziioannou et al. 2023). This change in priorities advocates the revision of the PeSPKA.

A critical shortcoming in the North Aegean PeSPKA is the need for a precise management mechanism (Monitoring - Updates - Improvements) and support for the participation of local bodies and civil

society for good environmental practices at the local level. This creates a discrepancy between planning and implementation, which can reach the point where implementation effectively negates strategic planning.

Regarding vulnerabilities (Vayiani 2023) in the North Aegean, aquatic ecosystems are highly vulnerable to the impacts of climate change, mainly due to decreased rainfall, increased evaporation, and phenomena like coastal aquifer boiling. Coastal areas, too, face significant threats from sea level rise and erosion, making them highly vulnerable. Similarly, biodiversity and forest ecosystems are at risk due to their dependence on environmental factors and the projected intensity of regional climate changes. Tourism, another vital sector, faces challenges from changing climate conditions, such as temperature fluctuations, extreme weather events, and coastal erosion, marking its vulnerability as a medium.

Rising water temperatures and CO<sub>2</sub> concentrations influence the fisheries and aquaculture sector. Alongside rising sea levels and changing precipitation patterns, the sector's vulnerability is a medium. The agricultural sector, pivotal for food production, is affected by local climate variables and extreme weather events like droughts and floods. Its vulnerability is average. Human health is also of concern, as increased temperatures and extreme weather can lead to severe health issues and even fatalities. The vulnerability for this sector in the North Aegean Region is average.

The built environment, comprising our buildings and infrastructure, is impacted by climate change, especially temperature fluctuations and extreme weather events. This sector's vulnerability is a medium. Similarly, the transport sector, essential for mobility and commerce, faces challenges from extreme weather and sea level rise, with a medium vulnerability rating. Conversely, cultural heritage elements, such as historical monuments and museum collections, might be affected by extreme weather changes, but their vulnerability in the North Aegean Region is relatively low.

Lastly, the energy infrastructure, critical for sustaining modern societies, might be impacted by sea level rise and extreme weather conditions. However, given the region's infrastructure location and the expected climate change intensity, this sector's vulnerability could be higher. Overall, the various sectors present a range of vulnerabilities, emphasizing the importance of proactive adaptation and mitigation strategies.

Thus, based on the National Strategy for Adaptation to Climate Change (NSCA), the North Aegean Region has the lowest vulnerability (2), after the Attica Region (1), while indicatively, the highest levels of vulnerability are found in the Regions of Western Macedonia (13), Central Greece (12) and Peloponnese (12).

### **3.2 Analysis against conceptual framework: Transformative Innovation for better Climate Change Adaptation**

The North Aegean region case study is structured around the seven Transformative Innovation dimensions defined in a separate conceptual framework report for territories (European Commission, 2024), identified as essential conditions for the design and implementation of CCA strategies:

- **Directionality:** defining goals and scope of strategic action, as well as articulating impacts, in a way which reflects societal challenges with wide appeal, formalised through endorsement at highest political level to secure engagement of all relevant authorities and stakeholders.
- **Articulating instrument portfolios and defining synergies between funding sources:** establishing all-encompassing instrument portfolios addressing the whole innovation cycle and the various aspects of CCA, paired with adequate funding resources.
- **Ensuring cross domain synergies:** favouring whole-of-government approaches to ensure greater horizontal coherence between various thematic policy areas (R&I, agriculture, environment, mobility, health etc.), resulting in coordinated mixes of instruments of different types.
- **Increasing breadth and depth of stakeholder involvement:** working towards social acceptance of new solutions and shaping of innovative developments, as well as improving public trust, opening up public debates, managing diverse and sometimes conflicting views over alternative pathways.
- **Setting up effective multi-level governance models:** maximising potential of vertical synergies, recognising complementary roles for various governance levels - local, regional, national and EU;
- **Making room for experimentation:** providing adequate spaces for risk-taking and creativity - ensuring a risk-tolerant environment to facilitate development of new and/or radical solutions.
- **Securing high levels of policy intelligence, learning and strategic capacity:** building strong evidence-based policy learning capacities, based on a solid knowledge base and special skills to manage transitions, as necessary companions to the transformative innovation approach.

For each of these dimensions, a SWOT analysis has also been carried out to provide a complementary perspective<sup>11</sup>.

### 3.2.1 Directionality: Defining Goals and Expected Impacts

Concerning the climate change target, a whole strategy is similar to the one implemented nationally. However, the problem with implementing such strategies at a regional level in the North Aegean region is that their implementation needs to be improved. One area for improvement concerns the institutional framework and, more specifically, the services that are called to implement this strategy. In the North Aegean, the environment directorate and, in general, the competent services are weak in the sense that they usually consist of one executive who is either uninterested or has so much work that it doesn't meet its goal. The second weakness is related to social adaptation because to be

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<sup>11</sup> An overview table of the SWOT for the two regions and for each dimension is provided in annex 3

implemented, all of this requires both understanding from society and preparation and support of this strategy from society. This process, until today, has yet to go down to society. Even the PeSPKA is a considerable text that was drawn up, all the consultation procedures that the law says were applied to it. Still, in the end, it has remained in the office in terms of its actual adaptation by society but also by the services and those who plan interventions and projects. For the actions and solutions to be effective, people must take personal responsibility to use them and to endorse and disseminate the information about PeSPKA. The program can't be carried out independently without this individual effort. The structures in Greece, especially after the implementation of the fiscal adjustment and austerity programs, are so weakened that the competent agencies, while they should have the implementation of the PeSPKA as an absolute priority, do not do so. At the official level, the problem is related to issues of understaffing and under-functioning of the structures. On a broader level, the problem is that usually, the emphasis is placed on quick results, which, however, go differently than the in-depth resolution of the various problems. That is if there is a need to design a project that has the possibility of adapting to climate change, but there needs to be more understanding. There is no one to understand and demand from the periphery; what is done is to design a project in the old way that does not ensure the effectiveness of this.

Implementing such actions and policies is not a process that you write, do, and then adapt. Still, it is a dynamic process closely related to social adaptation. It needs awareness-raising actions, presentation of best practices, and continuous work so that it can be perceived and raised in society among the citizens, and then these actions can be effective. It, therefore, constantly requires actions to raise awareness, cooperation, coordination, and communication between the various stakeholders in such processes, such as the essential actors in the quadruple (see Carayannis et al., 2012; Carayannis and Rakhmatullin, 2014) or quintuple helix framework (see Carayannis and Campbell, 2009, 2010, 2012); state, the private sector, academia, society, and environment. *"The 'quadruple helix' - is a central feature for design and implementation of TI strategic approaches and individual interventions"* (European Commission, 2024).

The entire programmatic period in the North Aegean region attempted to do this: to understand and activate the quadruple helix concept in the North Aegean, of course, with good and bad results. An innovation mechanism has already been funded in the North Aegean region, and there is also an intention to adapt the quadruple helix to local conditions. However, since the region is an island region, the concept of regional policy and strategy often needs to be revised with the discontinuity of space. It may be that the procedures are being completed in Mytilini, which is the largest island in the region. Still, in smaller and more isolated islands, the administration, which is a part of the helix, may need help to coordinate such actions due to weaknesses or lack of existence (Kizos et al. 2023). Thus, in the Northern Aegean region, some islands have economic dynamics, but at the same time, they are fragile in terms of adaptation to climate change.

The administration system of both A and B grades in the North Aegean region needs to improve at the level of executives and politicians. The transition to RIS is also mainly related to the spatial policies implemented by the region. About 1/3 of the resources go to the integrated spatial programs (there are spatial ones for the urban zone, non-urban zone, and small islands). The reason why the region's strategies go through these mechanisms is because, in these mechanisms, there is a specific governance system. In the spatial programs for the non-urban area, there are the leader groups, in the urban zones, there are the urban authorities, and in the small islands, the region is now making governance systems. This is how the resources for entrepreneurship and innovation are given to these mechanisms so that more effort can be supported in this way. Of course, there are groups of

actions in all the region's islands to deal with the problem of geographical discontinuity. The aim is to integrate other things besides entrepreneurship into these actions, such as the environment in the broadest sense. Thus, for the new programming period, RIS is trying to precisely do this, to continue this structural plan of the quadruple helix and to transform it into micro- strategies of the spatial program of the Northern Aegean.

The North Aegean PeSPKA identifies and prioritizes the necessary adaptation measures and actions and shows the program's implementation guidelines. The purpose of the strategy of the North Aegean region is to limit its vulnerability to the effects of climate change. To carry out the PeSPKA, an assessment and understanding of the changes expected to occur in the coming decades and an assessment of the risks involved for the environment, society, and the economy were made. Therefore, the PeSPKA identifies and prioritizes adaptation options based on risk, assesses the required measures to be taken, and determines the timetable and an indicative cost for each measure at the strategy level. Given that climate change, on the one hand, cannot be predicted precisely and, on the other hand, it is a decades-long process, the PeSPKA is therefore a strategy text that essentially very generally commits the region to the necessary actions it should take, which are prioritized. So, it gives a guideline to the competent bodies, based on public services, to implement projects in the direction of adaptation to climate change. Therefore, the North Aegean Region finances only actions that will be included in the PeSPKA.

There seems to be no clear political support for the CCA strategy. Adapting the North Aegean region to climate change is not part of the politicians' consciousness for this, and they do not strengthen the mechanisms to support such strategies. At the same time, actions and strategies are not promoted if there is no compulsion or if someone from the region does not persistently request it.

Thus, navigating the complex landscape of climate change adaptation, the North Aegean region grapples with considerable challenges that underscore the urgency of a systemic change, which dovetails both the societal and environmental dimensions. A crucial aspect of implementing the regional climate change strategy—mirroring national initiatives—is addressing the highlighted weaknesses: the suboptimal institutional framework and the gap in social adaptation. The region, characterized by its fragmented geographical continuity and disparities in economic dynamics across its islands, necessitates a tailored, locally relevant approach that transcends mere strategic planning to actualize strategies in a meaningful, impactful manner. This implies that implementing strategies, such as PeSPKA, should not be confined to mere policy documentation but should permeate through administrative actions and societal practices, recognizing the nuances of the regional context.

Moreover, moving beyond the textual existence of strategies like PeSPKA, ensuring these strategies are embedded within social practices and administrative actions is imperative. This demands a dynamic process intricately tied to social adaptation, necessitating continuous awareness-raising, showcasing best practices, and consistent work to enhance societal and stakeholder perception and awareness. A systemic approach to strategy implementation—integrating the quadruple or quintuple helix framework—requires a fusion of efforts across the state, private sector, academia, society, and the environmental domain. The North Aegean region's endeavors to activate the quadruple helix concept, albeit with mixed results, signify a step towards amalgamating various stakeholders in a unified, strategic direction. Nonetheless, the heterogeneity and geographical discontinuity of the region underscore the necessity to adapt strategies and implementation mechanisms to the local contexts, ensuring relevance, feasibility, and impact.

Considering systemic change, securing robust political endorsement, and establishing a comprehensive governance framework becomes pivotal to ensuring the implementation and evolution of strategies toward achieving true territorial climate resilience. This encompasses more than disaster resilience, involving a prospective approach that encapsulates long-term perspectives and embodies social justice, recognizing the disproportionate distribution of climate risks. Despite the discernible challenges and the extant operational and political weaknesses in the North Aegean region, the governance mechanisms must evolve to foster adherence to strategic plans and actively steer towards a resilient future. This entails a commitment to ensuring the strategic objectives are actioned, continuously evaluated, and evolved, ensuring they remain relevant, impactful, and conducive to fostering a climate-resilient North Aegean region.

**Box 8.** Good Practices and Key Recommendations for Directionality

**Summary of Key Good Practices**

- Engagement in comprehensive strategy planning like the North Aegean PeSPKA, prioritizing necessary adaptation measures.
- Implementation of the quadruple helix model to incorporate state, private sector, academia, society, and the environmental domain.
- Acknowledgment of the need for strategies to be more than just documents but also to be embedded in social practices and administrative actions.
- Recognition of the regional disparities and the importance of tailoring strategies to local conditions.

**Summary of Key Recommendations**

- Improve the institutional framework and services that are tasked with strategy implementation to ensure effectiveness.
- Enhance social adaptation and personal responsibility in society for the endorsement and dissemination of CCA strategies.
- Address understaffing and under functioning within official structures to better support CCA strategy implementation.
- Ensure political support for CCA strategies is solid and visible, with a persistent request for action from regional authorities.

**3.2.1.1 SWOT analysis on directionality**

A SWOT analysis was also carried out to provide a complementary perspective on this dimension

**Table 9.** North Aegean region - SWOT analysis on directionality



|  |  |  |
|--|--|--|
| <b>Directionality:<br/>Defining Goals<br/>and Expected<br/>Impacts</b> | <b>Strengths</b>   | <b>Weak-<br/>nesses</b>  |
|  | <ul style="list-style-type: none"> <li>- Strategic Foundations</li> <li>- Diverse Geography</li> <li>- Institutional Structures</li> </ul>                                   | <ul style="list-style-type: none"> <li>- Institutional Weaknesses</li> <li>- Social Adaptation</li> <li>- Implementation Challenges</li> </ul>             |
|  | <b>Opportuni-<br/>ties</b>   | <b>Threats</b>   |
|  | <ul style="list-style-type: none"> <li>- Dynamic Adaptation Process</li> <li>- Utilization of the Quadruple/Quintuple Helix Model</li> <li>- Localized Strategies</li> </ul> | <ul style="list-style-type: none"> <li>- Political Support</li> <li>- Geographical and Administrative Discontinuity</li> <li>- Short-Term Focus</li> </ul> |

### **Strength**

The North Aegean Region, with its unique and diverse geography encompassing many islands, naturally presents a myriad of contexts and opportunities for deploying localized strategies in addressing climate and environmental challenges. Strategic foundations, notably exemplified by overarching strategies and programs like PeSPKA, ensure that the region's efforts are internally coherent and meticulously aligned with national-level initiatives and goals. This alignment is critical in synchronizing localized actions with broader objectives, maximizing impact and resource utilization. Moreover, specific institutional structures provide a foundational framework for governance, enabling the region to navigate the complexities of resource allocation and strategy implementation. These structures, while pivotal, also underscore the continuous need for refining and enhancing mechanisms to ensure that as the landscape of challenges evolves, the institutional frameworks adapt and innovate in tandem, ensuring sustained resilience and progression.

### **Weaknesses**

Institutional weaknesses, particularly within environmental directorates, underscore a limited effectiveness in addressing climate challenges. A concurrent hurdle emerges in the form of social adaptation, where there exists a discernible low engagement and comprehension amongst society regarding strategic climate initiatives and their potential implications, emphasizing the need for enhanced communication and participatory approaches in policy formulation and execution. Furthermore, the region grapples with notable implementation challenges, wherein articulated strategies frequently remain unimplemented due to an amalgam of barriers including, but not limited to, staffing and the functional operation of governance structures.

### **Opportunities**

The prospect of cultivating a dynamic adaptation process stands out as a pivotal element in ensuring the sustained relevance and efficacy of strategies, providing a mechanism that not only adapts to evolving contexts but also embeds a continuous loop of societal engagement and awareness-raising, thereby fostering a co-creative and inclusive approach to strategy development and implementation. Moreover, the further utilization of the Quadruple/Quintuple Helix Model presents a substantial opportunity to leverage multi-stakeholder frameworks, thereby enhancing the integrative development of strategies by knitting together various actors from academia, industry, government, and civil society, and, potentially, the environment. Such a model can ensure the strategies are robustly constructed with multi-dimensional insights and reflect the various stakeholder needs and perspectives. Additionally, the tailoring of strategies to meet the specific contexts and needs of different regional islands underscores a bespoke approach to strategic development, ensuring that

the unique vulnerabilities, capacities, and opportunities within each context are adequately addressed, thereby enhancing the overall efficacy and impact of the strategies deployed across the diverse geographic and socio-economic landscapes of the region.

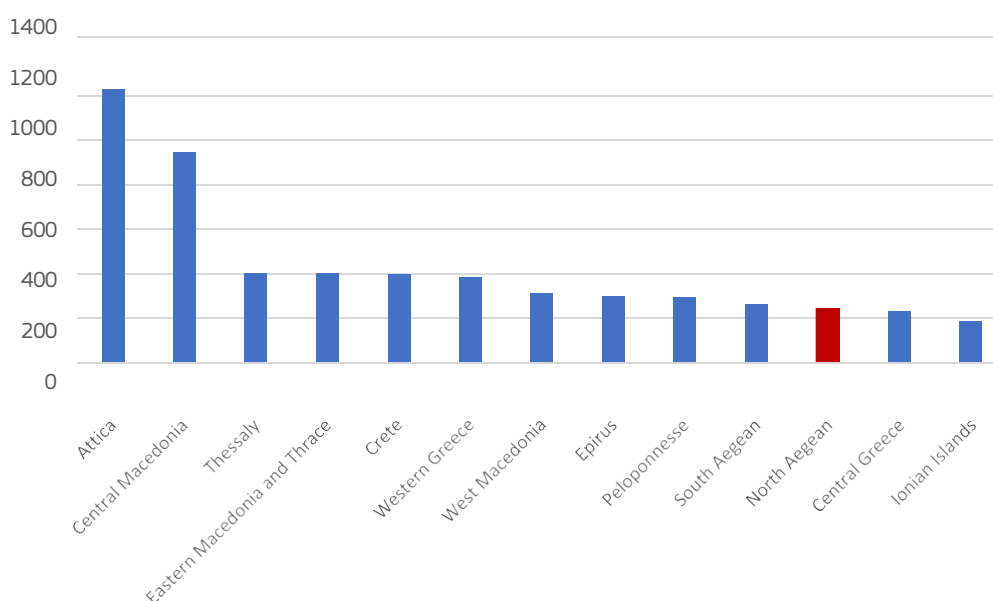
### **Threats**

In the North Aegean Region, the pathway towards effective CCA strategies is somewhat mired by several notable challenges. A lack of robust political endorsement and support for CCA strategies presents a significant roadblock. This is intricately interwoven with the challenges spawned by geographical and administrative discontinuity across the region, where the inherent fragmentation and disparities amongst the islands necessitate a nuanced, locality-specific approach to ensure that strategies are resonant with the unique challenges and dynamics encountered in each area. Furthermore, a prevailing short-term focus, which underscores quick results and immediate solutions, may inadvertently neglect the systemic and root causes of climate-induced challenges, casting a veil over the deeper, more entwined issues that require meticulous and comprehensive strategies. Therefore, sculpting a resilient future for the North Aegean Region in the face of climate change necessitates a recalibration of political, administrative, and strategic frameworks to foster a holistic, long-term, and geographically attuned approach to CCA.

### **3.2.2 Articulating Policy Portfolios**

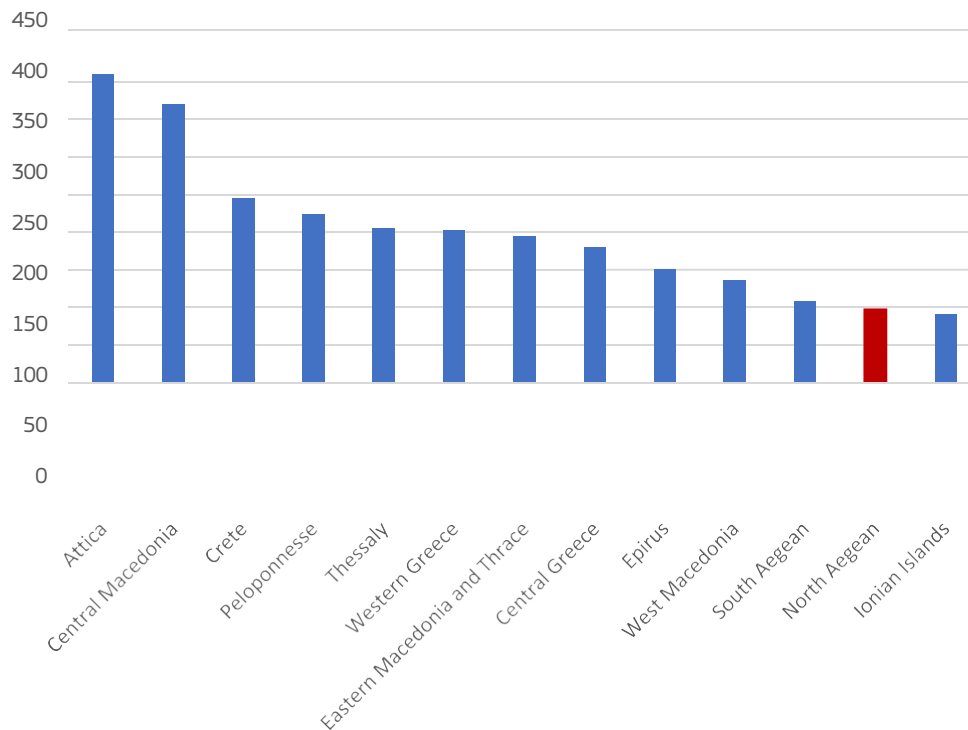
The North Aegean region, with its policy portfolio influenced significantly by both co- financed programs and national resources, has often pivoted its resource allocation to address pressing issues, most notably, immigration, thereby channelling funds primarily toward priority sectors. Despite this, between 2020 and 2023, the region was among the lowest recipients of regional public investment programs (Figure 6) and state subsidies for regions (Figure 7).

**Figure 6.** Regional public investment programs – Total 2020-2023 (million euros)



**Source:** Kathimerini (2023).

**Figure 7.** Subsidizing regions from the state – Total 2020-2023 (million euros)



Source: Kathimerini (2023).

A reinterpretation of the portfolio might involve a strategic resource allocation rebalance, ensuring that immediate and long-term issues, including CCA, are concurrently addressed.

With smaller municipalities like Agios Efstratios constrained by limited resources and staff, bolstering local capacities, and fostering collaborative endeavours become crucial. Partnerships with public entities, neighbouring municipalities, external partners, and private individuals have proven beneficial in addressing various operational challenges, from waste transport to wastewater treatment. Embedding a structured framework for such collaborations in the policy portfolio can enhance operational efficiency and facilitate knowledge and resource sharing among regional entities.

In contrast to the generalized approach, a more nuanced, demand-side/business-side CCA strategy might be incorporated into the policy portfolio. Agios Efstratios is a noteworthy example, aspiring to achieve energy independence and reducing its energy footprint by 85% through Renewable Energy Systems (RES) utilization<sup>12</sup> and the EPANEK program. This localized, targeted approach addresses the municipality's specific needs and is a viable model for other similar-sized regional entities. Hence, policies can be tailored to facilitate the replication of such models, ensuring broader implementation across the region.

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<sup>12</sup> In this project, a district heating network has been provided, which means that now the residents who already have central heating will have the possibility to warm themselves with hot water, which will be heated in very large boilers in the island's hybrid station, the creation and construction of electric vehicle charging station which is already ready and the supply of electric vehicles, as well as the energy upgrade of all municipal buildings.

While the region's current program does not facilitate financing for large-scale infrastructure and RES investments, the anticipated interconnection of 8 of the 9 North Aegean islands by 2030 presents new possibilities<sup>13</sup>. Until then, the policy portfolio might pivot towards supporting smaller RES units and energy communities, emphasizing reducing local-level energy consumption. Furthermore, policies facilitating large-scale investments post-interconnection should be considered, ensuring the region can capitalize on this development when it transpires.

The lack of interregional or international integrations in the North Aegean region's policy portfolio signifies a missed opportunity for collaborative endeavours and knowledge exchange on a larger scale. Introducing policies that facilitate and encourage such integrations can enhance the region's capacity to address various challenges, including CCA, through shared knowledge, resources, and collaborative projects.

**Box 9.** Good Practices and Key Recommendations on Articulating Policy Portfolios

**Summary of Key Good Practices**

- Focusing on both immediate and long term issues, including climate change adaptation (CCA), when rebalancing resource allocation.
- Enhancing operational efficiency through structured collaborations between smaller municipalities and various partners.
- Tailoring CCA strategies to address specific local needs, as seen in the energy independence efforts of Agios Efstratios.

**Summary of Key Recommendations**

- Consider incorporating demand side and business side CCA strategies into the policy portfolio for a more localized approach.
- Pivot policy towards supporting smaller renewable energy source (RES) units and energy communities to reduce local level energy consumption until larger scale infrastructure can be developed.
- After the anticipated interconnection of North Aegean islands, facilitate policies for large scale investments to leverage new opportunities.
- Introduce policies to foster interregional and international collaborations, enhancing the region's capacity to address various challenges, including CCA, through shared knowledge and projects.

**3.2.2.1 SWOT analysis on articulating policy portfolios**

A SWOT analysis was also carried out to provide a complementary perspective on this dimension

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<sup>13</sup> Due to the fact that the islands of the North Aegean are not interconnected with the continental grid, large-scale investments such as investments in Renewable Energy Systems (RES) with a power of, for example, 100 or 200 megawatts, cannot be made for technical reasons, i.e., for the stability of the system. What the public sector, specifically ADMIE, which is the body responsible for the networks, foresees is the interconnection of 8 of the 9 islands of the North Aegean (all except Agios Efstratios) which are expected to be interconnected by 2030.

**Table 10.** North Aegean region - SWOT analysis on articulating policy portfolios

|                                       |   |   |
|---------------------------------------|---|---|
| <b>Articulating Policy Portfolios</b> | <b>Strengths</b>  | <b>Weaknesses</b>   |
|                                       | <ul style="list-style-type: none"> <li>- Existing Policy Framework</li> <li>- Experiences in Collaborations</li> <li>- Local Initiatives</li> <li>- Recognition of Resource Allocation</li> </ul>   | <ul style="list-style-type: none"> <li>- Resource Limitations</li> <li>- Limited Capacity</li> <li>- Lack of Larger-Scale Funding</li> <li>- Inconsistent Policy Implementation</li> </ul>                                |
|                                       | <b>Opportunities</b>  | <b>Threats</b>  |
|                                       | <ul style="list-style-type: none"> <li>- Strategic Rebalancing</li> <li>- Structured Collaborative Framework</li> <li>- Replicating Successful Models</li> <li>- Utilizing Future Developments</li> <li>- Interregional/International Collaborations</li> </ul> | <ul style="list-style-type: none"> <li>- Overemphasis on Immediate Issues</li> <li>- Vulnerability Due to Limited Resources</li> <li>- Social and Administrative Inertia</li> <li>- Geographical Discontinuity</li> </ul> |

### **Strengths**

The North Aegean region lays claim to a solid existing policy framework, with a well-defined policy portfolio that renders a sturdy foundational framework upon which further strategies and initiatives can be built. This foundation is augmented by collaborative experiences, as demonstrated through partnerships, especially notable in smaller municipalities like Agios Efstratios. These collaborations pave the way for a blend of synergies that amalgamate varied skills, resources, and expertise. Furthermore, the region has showcased an ability to spearhead local initiatives, with instances of localized CCA strategies, such as RES utilization in Agios Efstratios, spotlighting inherent capacities for innovative, localized solutions that cater to specific municipal needs and contexts. Moreover, there's a recognition of the necessity for judicious resource allocation, with a cognizant awareness of the imperative to balance resources between addressing immediate concerns and strategically planning for long-term issues, including CCA.

### **Weaknesses**

In the North Aegean region, the challenge of resource limitations is palpable, particularly evidenced by the area being one of the lower recipients of regional public investment and state subsidies, which inherently constricts its financial capacity to undertake comprehensive initiatives. Smaller municipalities, like Agios Efstratios, struggle with restricted resources and staffing, which can inhibit the efficient and effective implementation of policies and projects, especially those related to CCA and sustainable development. Adding to the fiscal strain is the current absence of support for financing large-scale infrastructure and investments from existing programs, constricting the potential for expansive, impactful initiatives. Furthermore, inconsistent policy implementation across the region, particularly in smaller and more isolated islands, underscores a pressing need to reconcile strategic planning with pragmatic, on-the-ground actualization, ensuring that policies are not merely theoretical frameworks but are translated into tangible, beneficial outcomes for the communities they aim to serve.

### **Opportunities**

The region harbours the potential to address its challenges through a series of strategic and collaborative initiatives. Foremost, a strategic rebalancing of resource allocation could pivot towards concurrently addressing immediate and future-oriented concerns, ensuring a holistic approach to

regional development and problem-solving. To further enhance operational efficiency and knowledge exchange, embedding a structured framework for collaborations within the policy portfolio could pave the way for more systematic and impactful cooperative endeavours, particularly across various regional entities. Successful localized strategies, such as those observed in Agios Efstratios, present a viable model that could be replicated and tailored to other similar-sized entities within the region, ensuring a more inclusive implementation of innovative solutions. Moreover, the region could strategically position itself to capitalize on future developments, such as the anticipated interconnection of islands by 2030, by pivoting towards supporting smaller RES units and facilitating larger-scale investments once the interconnection transpires. Furthermore, the region could explore and forge new interregional and international collaborations, thereby establishing a network for knowledge and resource sharing, which could enhance its capacity to address various challenges, including CCA, through collaborative projects, and mutual support on a larger, more impactful scale.

### **Threats**

The North Aegean Region, amidst its archipelagic geography, grapples with a delicate balancing act, negotiating between immediate, pressing issues like immigration and the long-term, pervasive challenge of CCA. A palpable overemphasis on addressing immediate concerns has the potential to inadvertently siphon crucial resources and focus away from establishing and propelling forward-looking CCA initiatives. This diversion is particularly impactful in smaller municipalities like Agios Efstratios, where the vulnerability stemming from constrained resources and staff poses a tangible barrier to adequately conceptualizing and implementing robust CCA strategies. Compounding this is the possible social and administrative inertia, where potential resistance or lack of proactive engagement from societal and administrative entities could stymie the momentum of strategic initiatives. Further complexity is introduced by the geographical discontinuity inherent to the region, presenting a multifaceted challenge in implementing policies and strategies consistently and equitably across all islands.

### **3.2.3 Ensuring Cross-Domain Synergies**

Despite the commendable research efforts, particularly related to the environment and oceanography by institutions like the University of the Aegean, more research needs to be done into the market and policymaking. The North Aegean region, geographically remote from the primary decision-making and power centers, needs help sustaining its research output, which relies heavily on the NSRF to finance research actions. A strategic redirection is essential to effectively channel this research into practical, policy, and market applications, thereby ensuring that the knowledge generated does not stagnate but contributes to the region's developmental endeavours.

The North Aegean's alignment with the RIS3 presents an opportunity to enhance cross-sectoral functional connections and leverage specialized productive sectors and branches to bolster business competitiveness and extroversion at national and international levels. While respecting ERDF priorities and focusing primarily on strengthening existing public research bodies and private companies, interventions should be mindful of the pivotal role played by the University of the Aegean in developing research products pertinent to the North Aegean Region's productive/economic tissue.

The unique challenges faced by the North Aegean, attributed to its geographical isolation, could potentially be mitigated through the strategic integration of digital nomads<sup>14</sup> into the region. Not only does this demographic offer a sustainable source of revenue for local businesses, but their skill sets, experiences, and perspectives also present an untapped reservoir of innovative potential that could be harnessed to address the region's challenges, particularly concerning CCA.

While the municipality of Mytilini has seen a surge in digital nomads, attributed mainly to the influx of researchers, NGO members, and freelancers due to the refugee situation, a noticeable disconnect exists between their actions and activities related to climate change adaptation. A structured approach, which appreciates their contribution and strategically aligns their actions with CCA activities, is recommended.

**Box 10.** Good Practices and Key Recommendations for Ensuring Cross-Domain Synergies

**Summary of Key Good Practices**

- Leveraging research from institutions like the University of the Aegean to inform market and policy applications.
- Enhancing cross sectoral connections to improve business competitiveness and extroversion.
- Recognizing the role of the University of the Aegean in developing research that supports the region's economic sectors.

**Summary of Key Recommendations**

- Redirect strategic focus to ensure that research output is effectively channeled into practical, policy, and market applications.
- Integrate digital nomads into the regional strategy to tap into their potential for innovation and contribution to climate change adaptation (CCA).
- Develop structured approaches to align the contributions of diverse groups, including digital nomads, with regional CCA activities.

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<sup>14</sup> The benefits of integrating digital nomads include (a) Sustainable and Consistent Economic Input: Unlike seasonal tourists, digital nomads provide a more steady and predictable economic input due to their prolonged stays, benefiting local businesses and services. (b) Enhancing Digital Infrastructure: The inclusion of digital nomads necessitates advancements in digital infrastructure, which, while catering to their needs, also propels the region towards digital literacy and enables the growth of online businesses. (c) Fostering an Innovative Environment: Digital nomads, often embodying many skills and knowledge, can facilitate workshops and seminars, cultivating an innovative environment and fostering a learning culture within the region. (d) Promoting Sustainable Practices: Given their tendency towards environmental consciousness, digital nomads could propel local businesses towards adopting sustainable practices and contribute to preserving the islands' natural beauty. (e) Collaborations for Climate Change Adaptation: By incentivising digital nomads specializing in environmental sciences and sustainability, the region could foster collaborations that yield innovative CCA solutions tailored for island ecosystems. (f) Global Mindset and Cultural Exchange: Interactions between digital nomads and locals enrich the region's cultural fabric and instill a global mindset, making locals more receptive to new ideas, particularly CCA-related.

### 3.2.3.1 SWOT analysis on ensuring cross domain synergies

A SWOT analysis was also carried out to provide a complementary perspective on this dimension

**Table 11.** North Aegean region - SWOT analysis on cross domain synergies

|  |   |   |
|--|---|---|
| <b>Ensuring Cross Domain Synergies</b> | <b>Strengths</b>  | <b>Weaknesses</b>   |
|  | <ul style="list-style-type: none"> <li>- Rich Research Base</li> <li>- Alignment with RIS3</li> <li>- Influx of Digital Nomads</li> <li>- Global Mindset</li> </ul>   | <ul style="list-style-type: none"> <li>- Integration Challenges</li> <li>- Geographical and Administrative Isolation</li> <li>- Dependency on NSRF</li> <li>- Disconnect between Research and CCA Actions</li> </ul>    |
|  | <b>Opportunities</b>  | <b>Threats</b>  |
|  | <ul style="list-style-type: none"> <li>- Strategic Integration of Research</li> <li>- Enhancing Cross-Sectoral Synergies</li> <li>- Harnessing Digital Nomad Potential</li> <li>- Collaborations for CCA</li> <li>- Digital Infrastructure Development</li> </ul> | <ul style="list-style-type: none"> <li>- Unsustainable Research Output</li> <li>- Inconsistent Economic Input</li> <li>- Mismatch of Strategies and Local Needs</li> <li>- Isolation Impact on Collaboration</li> </ul> |

#### **Strengths**

The North Aegean Region stands as a testament to the invaluable contributions of institutions like the University of the Aegean, which have pioneered environmental and oceanographic research. Furthermore, the region's strategic alignment with the national RIS3 unfurls a coherent framework that enhances cross-sectoral functional connections and bolsters business competitiveness at national and international echelons, providing a structured pathway towards sustainable development. In a serendipitous blend of local and global, the influx of digital nomads, interspersed with researchers, NGO members, and freelancers, particularly in Mytilini, not only infuses the region with a diverse array of skills and knowledge but also heralds potential economic fortification through their extended stays and engagement with local businesses.

#### **Weaknesses**

Despite its research endeavours, particularly in environmental and oceanographic studies, the region grapples with integration challenges, wherein a conspicuous discrepancy hinders the translation of research findings into pragmatic market solutions and policy formulations. This is further accentuated by its geographical and administrative isolation, whereby its remote location from principal decision-making centres constricts its direct influence and engagement in pivotal discussions and determinations. This predicament is deepened by its heavy dependency on the National Strategic Reference Framework (NSRF) to finance its research actions, potentially limiting its flexibility and autonomy in directing its research trajectories and applications. Furthermore, a discernible disconnect is observed between the research conducted by digital nomads and NGOs and strategic CCA actions. This indicates a critical need for a structured approach that deliberately aligns research activities and findings with CCA strategies and actions, ensuring the knowledge generated is harnessed effectively to fortify the region's adaptive capacities and strategies against climate change implications.

#### **Opportunities**

The strategic integration of research into practical, policy, and market applications emerges as a paramount initiative, aiming to ensure that the substantial research efforts, particularly in



environmental and oceanographic domains, are effectively channelled into tangible, impactful interventions. This is intricately tied with the enhancement of cross-sectoral synergies through the alignment with the RIS3, which provides a structured framework for developing research products that are pertinent to the region's economic and productive tissue, thereby ensuring that research outputs are not only relevant but also actionable within the regional context. Furthermore, the region harnesses the potential of digital nomads, utilizing their diverse skills and knowledge to foster innovative environments, drive sustainable practices, and enhance the region's digital infrastructure. This facilitates the growth and development of online businesses and enhances the region's digital literacy, thereby widening the scope and impact of digital transformation initiatives. Moreover, the region leverages collaborations for CCA, particularly by tapping into the expertise of digital nomads specializing in environmental sciences. This enables fostering collaborations that yield innovative, tailored CCA solutions, ensuring that the region's adaptive strategies are empirically grounded and innovatively and practically implementable across its diverse geographical and socio-economic contexts.

### **Threats**

In the North Aegean Region, sustaining a consistent and impactful research output poses a significant challenge, exacerbated by geographical and financial constraints that potentially stymie the ongoing momentum of innovation. While providing a transient boost in economic input, the influx of digital nomads underscores an emerging need for a more structured, strategic approach to harness their expertise and economic potential, ensuring a more consistent and long-term benefit to the local economy and innovation landscape. Moreover, a potential mismatch between broader strategic frameworks, such as RIS3, and the specific, nuanced needs of the local context highlights a critical need to ensure that overarching strategies are adeptly tailored to address and cater to localized needs and challenges. Furthermore, the geographical isolation of the region may hinder the formation and sustenance of interregional or international collaborations, potentially limiting the scope of knowledge exchange, shared initiatives, and collaborative innovations, thereby underscoring the need for innovative solutions to facilitate collaborative endeavours despite geographical limitations.

### **3.2.4 Broadening and Deepening Stakeholder Involvement**

In navigating the intricacies of spatial planning and strategizing for the 2021-2027 programming period, the North Aegean region has adopted a specific methodology since 2021. Recognizing the development pattern of each island it accentuates the need for individualized program designs and spatial policies. This methodology utilizes three spatial policy tools and incorporates a series of workshops, meetings, and consultations, aiming to involve stakeholders from various sectors.

Harnessing the insights and expertise of stakeholders is pivotal for formulating and implementing effective CCA strategies. Engaging a 'multiple helix' of actors, which includes traditional research and innovation actors and citizens, professionals, and organizations managing critical systems, is crucial. This ensures that the strategies developed are innovative, socially just, and inclusive, particularly considering the different challenges and development patterns across the islands in the North Aegean region.

The iteration of workshops and consultations reveals pronounced outcomes on smaller islands and a seemingly smoother adaptation on larger islands like Mytilini. However, an ongoing awareness and

engagement process is vital, involving regular interactions and policy adjustments based on semi-annual discussions and evaluations amongst those involved in governance systems.

In the pursuit of synergizing businesses with research bodies, the North Aegean region aims to foster collaborations wherein beneficiary companies work alongside research entities (irrespective of their geographical location) in aligning with the priority areas outlined by the regional dimension of the RIS3. Ensuring that the research works and technological innovations from these collaborations explicitly coincide with and contribute to the stipulated objectives and anticipated business outcomes is essential.

The North Aegean region has developed digital tools such as the platforms <https://www.e-pepba.gr> and <https://postare.gr> to facilitate online consultations with various stakeholders and citizens, respectively, strengthening the participative aspect of decision-making processes in the region. These platforms provide a virtual space where many ideas can be presented, ensuring that the designed programs are adaptable and optimized for the highest possible effectiveness in each case.

Despite resource availability, implementing specific programs, such as the intelligent forest monitoring system, has been hindered due to understaffing and, perhaps, a need for more coherent planning and implementation strategies. There is no precise analysis of stakeholders' roles and contributions concerning transformative challenges. Addressing these weaknesses by ensuring that the planning, willingness, and capability to execute programs are present, even in the face of obstacles, is imperative to prevent the non-implementation of funded projects.

**Box 11.** Good Practices and Key Recommendations for Broadening and Deepening Stakeholder Involvement

**Summary of Key Good Practices**

- Adoption of a specific methodology for spatial planning that recognizes the unique needs of each island within the North Aegean region.
- Utilization of three spatial policy tools alongside workshops, meetings, and consultations to engage a broad range of stakeholders.
- Implementation of the 'multiple helix' approach to ensure that CCA strategies are innovative, inclusive, and consider the different regional challenges.
- Regular iteration of workshops and policy adjustments based on semi annual evaluations to ensure smooth adaptation and effective governance.

**Summary of Key Recommendations**

- Continue fostering collaboration between businesses and research bodies, aligning with the regional dimension of the RIS3 to ensure research and innovation directly contribute to regional objectives.
- Utilize digital platforms for online consultations to enhance the participative aspect of decision making processes and ensure program adaptability and effectiveness.
- Address the understaffing and planning issues to ensure the effective implementation of funded programs, such as the intelligent forest monitoring system.
- Perform a precise analysis of stakeholders' roles and contributions to overcome challenges and prevent non implementation of funded projects.

### 3.2.4.1 SWOT analysis on stakeholder involvement

A SWOT analysis was also carried out to provide a complementary perspective on this dimension

**Table 12.** North Aegean region - SWOT analysis on stakeholder involvement

|   |  |   |
|---|--|---|
| <b>Broadening and Deepening Stakeholder Involvement</b> | <b>Strengths</b>   | <b>Weaknesses</b>   |
|   | <ul style="list-style-type: none"> <li>- Methodological Approach</li> <li>- Stakeholder Engagement</li> <li>- Digital Platforms</li> <li>- Alignment with RIS3</li> </ul>                                      | <ul style="list-style-type: none"> <li>- Implementation Challenges</li> <li>- Limited Ongoing Engagement</li> <li>- Variable Adaptation Across Islands</li> </ul>                           |
|   | <b>Opportunities</b>   | <b>Threats</b>  |
|   | <ul style="list-style-type: none"> <li>- Continuous Stakeholder Engagement</li> <li>- Innovative Collaborations</li> <li>- Enhanced Digital Participation</li> <li>- Localized Strategy Development</li> </ul> | <ul style="list-style-type: none"> <li>- Disparity in Island Development</li> <li>- Resource Constraints</li> <li>- Misalignment of Collaborations</li> <li>- Engagement Fatigue</li> </ul> |

#### **Strengths**

The North Aegean Region has exemplified a nuanced methodological approach to spatial planning and strategizing since 2021, ensuring that strategies and policies are tailored to the unique development patterns of each island within the region. Moreover, stakeholder engagement is fortified through workshops, meetings, and consultations, ensuring that a broad spectrum informs policy formulation and strategy development of perspectives and expertise from various sectors. Using digital platforms for online consultations further ensures that participation is inclusive, accessible, and wide-reaching, allowing for a more comprehensive collection of insights and inputs. Furthermore, the strategic alignment with the RIS3 ensures that collaborations, particularly between businesses and research bodies, are innovative and coherently aligned with national-level efforts.

#### **Weaknesses**

The region faces a unique set of challenges, particularly when it comes to the implementation of formulated strategies and programs. As observed in instances like the intelligent forest monitoring system, implementation challenges are apparent and can be attributed to factors such as understaffing and potentially incoherent planning and implementation strategies, which hinder the transition from strategic planning to practical execution. Furthermore, while initial consultations and stakeholder engagements may have been conducted, maintaining a consistent and ongoing engagement process may present significant challenges due to geographical, resource, or logistical issues. Variable adaptation outcomes across the islands compound this, with pronounced successes on smaller islands and smoother adaptations on larger ones like Mytilini, signifying an inconsistency in stakeholder involvement outcomes and potentially highlighting disparities in resource allocation, stakeholder engagement, or strategy applicability across different geographical contexts.

#### **Opportunities**

The regional focus can pivot towards establishing a continuous, structured stakeholder engagement process, ensuring that the devised strategies and policies are dynamically adaptive and reflective of evolving needs and challenges. This involves regular interactions and policy adjustments based on periodic discussions and evaluations among all stakeholders, ensuring that the CCA strategies remain relevant, effective, and comprehensive. Fostering innovative collaborations, especially between businesses and research entities, and ensuring that these collaborations align with regional and

national strategic priorities, will be pivotal to ensuring that the CCA strategies are not only innovative but also aligned with broader developmental goals and objectives. Enhancing digital participation through further optimizing and promoting digital platforms will facilitate wider reach and more dynamic stakeholder engagement, ensuring that the insights and contributions of all relevant stakeholders are cohesively integrated into the planning and implementation processes. Moreover, developing strategies that are localized and specifically tailored to the unique challenges and development patterns of each island within the region will ensure that the strategies are not only relevant but also effective in addressing the specific challenges faced by each locality, thereby ensuring a more holistic and inclusive approach to CCA across the entire region.

### **Threats**

The North Aegean Region disparities in developmental outcomes loom large due to the challenges and development patterns across the islands, necessitating a finely nuanced approach to ensuring no locality is left behind. Resource constraints, particularly regarding staffing, pose a significant barrier, potentially limiting the effectiveness of program implementation and demanding innovative solutions to navigate resource-limited contexts effectively. Additionally, there is a tangible risk of potential misalignment between the outcomes of collaborations and the stipulated objectives and anticipated business outcomes, necessitating clear, structured collaboration frameworks that ensure alignment and coherence. Stakeholders might experience engagement fatigue if the consultation processes are too frequent or if they do not perceive tangible outcomes from their involvement, making it pivotal to ensure that stakeholder engagement is not only meaningful and productive but also cognizant of the capacities and limitations of all involved parties, thereby ensuring sustained, meaningful involvement and collaboration.

### **3.2.5 Setting Up Effective Multi-Level Governance Models**

Primary and secondary regional governments play crucial roles in the established multi-level governance system. However, post-electoral scenarios typically witness an internalization phase, where authorities at each governance level grapple with their respective challenges.

A persistent weakness lies in the operational focus of level A regional governments, which primarily act as executive bodies managing daily issues. While intended to strategize and implement policies in conjunction with level A, Level B regional governments often shift towards a beneficiary role. This shift is typically geared towards project execution for electoral gains rather than strategic policy formation and implementation.

When considering the central level, clear multi-level governance is evident. However, a significant challenge for the North Aegean region is its geographical distance from primary decision-making centres, predominantly in the Attica region.

The lack of continuity across governance levels A, B, and the Central Administration, especially post-elections, wastes valuable time reestablishing and reinitiating projects.

Furthermore, smaller municipalities, such as the Municipality of Agios Efstratios, often grapple with blurred lines of responsibility. For instance, while stream cleaning is the responsibility of the North Aegean region, geographical challenges result in this task defaulting to the Municipality. Similarly, while district forest services are responsible for maintaining forest areas, the duty often falls to the

Municipality due to logistical challenges. This manifests a paradigm where power is concentrated, and responsibilities are decentralized, causing municipalities to face challenges with regions, and regions to encounter issues with the Central Administration.

Considering that effective CCA strategies necessitate articulate coordination across local, regional, national, and EU governance levels, the following considerations should be integrated: (a) While CCA interventions often concentrate at the local level, they must be coherently embedded within national/regional strategic and legal frameworks. (b) The EU level provides pivotal strategic reference, legal frameworks, and reporting requirements and enables the use of EU Funds.

A robust multi-level governance structure is vital for ensuring successful CCA interventions. This involves exemplary communication to ensure seamless transitions and potentially enable the co-creation of changes informed by inputs from different levels of governance.

To counteract the identified challenges and align with general directions for effective multi-level governance: (i) Implement mechanisms to ensure the continuity of projects across electoral cycles and leadership changes, safeguarding against the loss of time and resources. (ii) Establish clear, actionable guidelines for role and responsibility demarcation at every governance level, ensuring clarity and accountability. (iii) Facilitate enhanced cooperation between all governance levels and stakeholders, ensuring that strategic planning and daily operations are effectively managed and executed. (iv) Empower local municipalities by providing them with the necessary resources, support, and autonomy to manage and execute tasks efficiently despite geographical and logistical challenges.

Incorporating these elements will facilitate the crafting of a governance model that is not only adaptive and reflective of the unique needs of each region but also effective in the pragmatic implementation and sustainability of long-term strategies.

**Box 12.** Good Practices and Key Recommendations for Setting Up Effective Multi-Level Governance Models

**Summary of Key Good Practices**

- Establishment of clear multi level governance for strategic policy formation and implementation.
- Recognition of the distinct roles of regional governments, with Level A focusing on daily issues and Level B on project execution.
- Acknowledgment of the geographical challenges faced by smaller municipalities in managing responsibilities.

**Summary of Key Recommendations**

- Implement mechanisms to ensure continuity of projects across electoral cycles and leadership changes to avoid time and resource loss.
- Establish clear, actionable guidelines for role and responsibility demarcation at every governance level for better clarity and accountability.
- Enhance cooperation between all governance levels and stakeholders to manage strategic planning and daily operations effectively.
- Empower local municipalities with necessary resources and support to manage tasks efficiently despite geographical and logistical challenges.

### 3.2.5.1 SWOT analysis on Multi-level governance models

A SWOT analysis was also carried out to provide a complementary perspective on this dimension

**Table 13.** North Aegean region - SWOT analysis on multi-level governance

|  |  |   |
|--|--|---|
| <b>Setting Up Effective Multi- Level Governance Models</b> | <b>Strengths</b>   | <b>Weaknesses</b>   |
|  | <ul style="list-style-type: none"> <li>- Multi-Level Governance</li> <li>- EU-level Influence</li> <li>- Local Focus</li> </ul>  | <ul style="list-style-type: none"> <li>- Inconsistent Operational Focus</li> <li>- Geographical Distance</li> <li>- Lack of Continuity</li> <li>- Blurred Responsibilities</li> </ul>           |
|  | <b>Opportunities</b>   | <b>Threats</b>  |
|  | <ul style="list-style-type: none"> <li>- Structured Continuity</li> <li>- Clarified Roles and Responsibilities</li> <li>- Enhanced Collaboration</li> <li>- Local Empowerment</li> </ul> | <ul style="list-style-type: none"> <li>- Disjointed Implementation</li> <li>- Resource Constraints</li> <li>- Strategic Misalignment</li> <li>- Political and Bureaucratic Obstacles</li> </ul> |

#### **Strengths**

In the North Aegean Region, a multi-level governance system spans primary and secondary governments, providing a layered approach toward governance. The strategic reference, legal frameworks, reporting requirements, and funding from the EU level exert a pivotal influence, providing financial support and strategic and legal guidance that ensures that regional strategies are aligned with broader, EU-level objectives and standards. Additionally, a distinct local focus permeates through the region's strategies and actions, with an understanding and acknowledgment of local issues evident in the initiatives of municipalities, some of which take proactive actions beyond their designated responsibilities. This bottom-up approach ensures that strategies and actions are rooted in local contexts and needs, ensuring relevance and effectiveness across the diverse localities within the region.

#### **Weaknesses**

The North Aegean Region needs to improve its operational focus. Level A governments primarily act as executive bodies and manage daily issues. Level B, intended to strategize and implement policies in conjunction with Level A, often shifts towards a project execution/beneficiary role. This inconsistency potentially dilutes strategic policy formation and implementation, diverting focus towards shorter-term project execution primarily aimed at electoral gains. Geographical distance from primary decision-making centers, predominantly in the Attica region, compounds the challenges, potentially creating disconnects and delays in decision-making and implementation processes. A palpable lack of continuity, especially post-elections, further disrupts projects and initiatives, wasting valuable time in re-establishing and reinitiating projects. At the same time, smaller municipalities grapple with blurred lines of responsibility and logistical challenges, often taking on roles that are officially the responsibility of larger administrative bodies due to pragmatic needs and constraints.

#### **Opportunities**

The North Aegean Region has been actively seeking to implement mechanisms safeguarding project continuity across electoral cycles and leadership changes. This includes establishing protocols and

structures that ensure ongoing projects are not disrupted during transitions, and preserving the investments of time, resources, and efforts already expended. Moreover, developing clear guidelines to demarcate roles and responsibilities at each governance level is recognized as crucial. Such clarity ensures that all governance entities know their mandates, responsibilities, and expectations, thus fostering accountability and effective functioning. Enhanced collaboration between all governance levels and stakeholders is also a focal point, with efforts to ensure that strategic planning and daily operations are seamlessly managed and executed. Lastly, a pronounced emphasis is placed on local empowerment, ensuring that local municipalities are provided with the necessary resources and support and the autonomy to manage and execute tasks efficiently.

### **Threats**

The risk of disjointed policy implementation looms in the North Aegean Region due to potentially blurred responsibilities and a lack of coordination among different governance entities. This disjointedness can lead to inefficiencies, diminished impact of interventions, and, potentially, the suboptimal use of resources and efforts. Smaller municipalities may grapple with resource constraints when assuming additional responsibilities, especially those traditionally under regional purviews. This is exacerbated by potential strategic misalignment across different levels of governance, where conflicting or misaligned policies and strategies might hinder the effective translation of strategies into actionable initiatives on the ground. Moreover, political, and bureaucratic obstacles might emerge, posing significant barriers to restructuring governance models. Navigating these potential barriers would require strategic negotiation, alignment of interests, and, perhaps, the restructuring or redefining of governance mechanisms to ensure that they are conducive to the effective implementation of CCA strategies and actions

### **3.2.6 Providing Room for Experimentation**

The North Aegean region, while fostering a terrain conducive to innovative Climate Change Adaptation (CCA) efforts, has faced significant challenges in integrating these innovations into regular production cycles. Evidence from the Regional Innovation Scoreboard 2021 suggests that the region has seen a steady, albeit slow, improvement in innovation metrics over the past ten years. Nonetheless, limited innovation activities, value chain development, and exports reveal a gap and ample room for growth in creating an environment more open to experimental practices.

Concerted efforts are underway to navigate barriers to experimentation in CCA within the North Aegean. Essential policy interventions being pursued include: (a) Prioritizing the establishment of a robust scientific base, spearheaded by the University of the Aegean and other research entities, aiming to bolster critical economic sectors in the North Aegean, rendering them innovative, competitive, and enticing for top-tier human resources. (b) The region focuses on fortifying start-ups, particularly in ICT, organic food, and social and circular economies, through alliances with research laboratories, incubators, and innovation centers. (c) Initiatives to develop value chains with robust input-output relationships in sectors where the North Aegean holds a comparative advantage are underway, aiming to retain the maximum added value of exported products within the local economy. (d) A notable emphasis is amplifying cooperation between the business and scientific communities by leveraging available industrial research and innovation funds. (e) From 2021-2027, the RIS3 initiative will primarily function at the national level, redefining the role of the regions.

Moreover, the North Aegean region proactively addresses challenges like safeguarding its natural environment, advancing the blue economy, endorsing cross-border cooperation, reducing energy consumption, and ensuring effective risk management against climate change impacts.

While the North Aegean region encounters hurdles in nurturing experimentation, specific efforts and strategies are being deployed to enhance innovation and confront barriers, especially in the realm of CCA.

Despite these initiatives, the region still grapples with fostering a culture of experimentation in CCA. To address the challenges presented by climate hazards, it is critical to create environments that encourage creative risk-taking and innovative solutions. This means planning for resilient futures that can handle uncertainty and risks. Mechanisms such as regulatory sandboxes and innovative public procurement models are essential to test new and varying solutions, pointing to a strategic pivot from short-term incremental approaches to comprehensive, transformative, and forward-looking CCA strategies. These strategies must be not only innovative but also practical, adaptable, and scalable.

Daily management of current CCA activities in the North Aegean has provided limited scope for experimentation. Future strategies should incorporate an experimental approach to bolster aspects of CCA management, ensuring that adaptive measures can evolve and integrate seamlessly into the region's socio-economic fabric.

**Box 13.** Good Practices and Key Recommendations for Providing Room for Experimentation

**Summary of Key Good Practices**

- Strengthening a scientific base with institutions like the University of the Aegean to support critical economic sectors.
- Focusing on fortifying startups and innovation in sectors where the North Aegean holds a comparative advantage.
- Amplifying cooperation between business and scientific communities to maximize the value of local economic activities.

**Summary of Key Recommendations**

- Prioritize the development of robust input output relationships to enhance the value of exported products within the local economy.
- Utilize RIS3 initiatives to redefine regional roles and enhance the competitive and innovative capacity of the regions.
- Proactively address environmental challenges and promote sustainable practices like the blue economy and cross border cooperation.
- Embed risk tolerant environments and regulatory sandboxes to foster creativity and trial innovative CCA solutions.

**3.2.6.1 SWOT analysis on providing room for experimentation**

A SWOT analysis was also carried out to provide a complementary perspective on this dimension



**Table 14.** North Aegean region - SWOT analysis on providing room for experimentation

|   |  |   |
|---|--|---|
| <b>Providing Room<br/>for Experimentation</b> | <b>Strengths</b>   | <b>Weaknesses</b>   |
|   | <ul style="list-style-type: none"> <li>- Multifaceted Terrain</li> <li>- Scientific Foundations</li> <li>- Improving Innovation</li> <li>- Policy Interventions</li> </ul> | <ul style="list-style-type: none"> <li>- Limited Value Chains</li> <li>- Restrained Exports</li> <li>- Barrier to Embedding Innovations</li> <li>- Limited Experimentation</li> </ul> |
|   | <b>Opportunities</b>   | <b>Threats</b>  |
|   | <ul style="list-style-type: none"> <li>- RIS3 Initiative</li> <li>- Cross-Border Cooperation</li> <li>- Empowering Start-ups</li> <li>- Nurturing Value Chains</li> </ul>  | <ul style="list-style-type: none"> <li>- Resource Limitations</li> <li>- External Economic Factors</li> <li>- Climate Risks</li> <li>- Policy Continuity</li> </ul>                   |

### **Strengths**

The North Aegean Region presents a multifaceted terrain, offering a diverse geographical and sectoral landscape conducive to various experimental approaches for CCA. The varied contexts and challenges across the region enable exploring a wide array of CCA solutions. The region benefits from established scientific foundations, notably through research entities like the University of the Aegean. While the region has seen a gradual improvement in innovation indicators and has made some advancements in technological and scientific domains, it recognizes the substantial potential and need for enhancing its innovative capacities. Through various policy interventions, which aim to bolster scientific bases, empower start-ups, cultivate value chains, and enhance business-science collaboration, the region is working towards embedding innovation within its strategic and operational frameworks, ensuring that its approaches to CCA are not only scientifically robust but also innovative and adaptable to the evolving climate change scenario.

### **Weaknesses**

The region’s innovation ecosystem faces distinct challenges, particularly regarding developing value chains, as it grapples with restrained activities in innovation and limited value chains, potentially curtailing innovative solutions’ development and growth. Moreover, with limited export activities and low regional multipliers, the potential economic impact of innovative products and services is further constrained, limiting the broader economic benefits that could be derived from innovative activities. Additionally, the region needs help embedding innovative solutions within production processes, which may inhibit innovative CCA solutions’ practical application and scaling. Furthermore, there are hurdles in nurturing and realizing experimental projects and initiatives, which may stem from various barriers, including financial, regulatory, and capacity-related challenges. Therefore, while the region possesses a foundation upon which to build its innovative capacities, overcoming these barriers and optimizing its innovative ecosystem is crucial for ensuring that innovative CCA solutions are developed and implemented within the region’s operational and strategic frameworks.

### **Opportunities**

The RIS3 initiative represents a valuable lever that could be utilised to enhance regional innovation and competitiveness, particularly in the realm of CCA. The initiative provides a framework for the region to streamline its innovation activities and enhance its competitive positioning in crucial economic sectors. Additionally, the region is poised to enhance its innovative capacities through international and cross-border collaborations, providing opportunities for knowledge exchange, shared

initiatives, and collaborative problem-solving in addressing shared climate challenges. The North Aegean also presents a potentially fertile ground for start-ups in various domains, leveraging alliances and support systems to foster an environment conducive to entrepreneurial activities. Furthermore, there are notable prospects to develop strong value chains, particularly in sectors where the North Aegean holds a comparative advantage. By nurturing these value chains, the region can ensure that it retains the maximum added value of its products and services, thereby bolstering its economic sustainability and resilience in the face of the climate change challenges.

### **Threats**

The North Aegean Region grapples with its own challenges, including limited resources that might constrain the scale and scope of experimental projects. These resource limitations necessitate careful planning and prioritization to ensure that available resources are allocated to maximize their impact on the region's CCA objectives. Global and national economic factors, which might influence the regional economy and innovation potential, also present a noteworthy challenge, requiring the region to adopt adaptive strategies that can navigate through economic uncertainties. Additionally, ongoing, and future climate risks might divert attention and resources away from experimental and innovative projects, necessitating a strategic approach that balances immediate climate responses with long-term innovative strategies. Finally, the potential disruptions or changes in policy directions, especially post-elections or during political shifts, underscore the need for a structured governance framework that ensures policy continuity and sustained progress toward the region's CCA objectives, irrespective of the prevailing political landscape.

### **3.2.7 Securing High Levels of Policy Intelligence, Learning and Strategic Capacity**

The North Aegean region faces a critical challenge in developing and applying a robust knowledge base. While the need for observatories—intended to serve as pivotal mechanisms for collecting, analysing, and disseminating relevant knowledge—has been recognized, their establishment and operationalization remain pending. The absence of a robust knowledge repository hampers informed decision-making, particularly regarding the CCA strategy, underlining the necessity to proficiently construct and utilize a knowledge base.

Despite acknowledging its necessity, the North Aegean region witnesses a gap in developing strategic capacities essential for continuous learning and dynamic response to challenges. While notable, the sporadic, incident-triggered efforts observed to upgrade these capacities do not suffice to induce the systemic change required, highlighting the urgency for a more structured, proactive strategy focusing on knowledge base consolidation and strategic capacity enhancement.

Establishing a robust, policy-oriented, and territory-specific evidence base is paramount. This entails translating global climate data into locally relevant knowledge, supporting the territory's baseline situational understanding of climate vulnerability. It involves blending behavioural sciences with knowledge produced by various specialists to comprehend social factors affecting vulnerability, thus aiding in co-creating future adaptation pathways.

Moreover, developing new frameworks for monitoring and evaluation, which incorporate a systemic dimension, is essential. Such frameworks, beyond specific fields of intervention, should capture the

overall climate resilience of a territory by understanding the complex interactions between numerous, cascading risks and responses.

In addition, engagement in ambitious CCA strategies necessitates the development of transformative learning capacities, which encompass the ability for long-term planning amidst uncertainty. While resources for learning are available, the capacities to utilize them for a specific territory are often lacking, and thus, strengthening these capacities becomes pivotal.

**Box 14.** Good Practices and Key Recommendations for Securing High Levels of Policy Intelligence, Learning and Strategic Capacity

**Summary of Key Good Practices**

- Recognition of the need for observatories to collect, analyse, and disseminate knowledge pertinent to CCA.
- Efforts to translate global climate data into locally relevant knowledge for better situational understanding.
- The blending of behavioural sciences with specialist knowledge to comprehend social factors affecting vulnerability.

**Summary of Key Recommendations**

- Develop a structured strategy focusing on the consolidation of the knowledge base and enhancement of strategic capacities.
- Establish a robust, policy oriented, and territory specific evidence base to support dynamic responses to climate vulnerabilities.
- Create new monitoring and evaluation frameworks that incorporate systemic risk and response interactions.
- Strengthen transformative learning capacities within the region to support long term planning amidst uncertainty and change.

**3.2.7.1 SWOT analysis on securing high levels of policy intelligence, learning and strategic capacity**

A SWOT analysis was also carried out to provide a complementary perspective on this dimension

**Table 15.** North Aegean region - SWOT analysis on policy intelligence, learning and strategic capacity

|   |   |  |
|---|---|--|
| <b>Securing High Levels of Policy Intelligence, Learning and Strategic Capacity</b> | <b>Strengths</b>  | <b>Weaknesses</b>  |
|   | - Recognition of Need<br>- Available Resources<br>- Prior Efforts                                   | - Lack of Established Observatories<br>- Inconsistent Efforts<br>- Underutilized Resources |
|   | <b>Opportunities</b>  | <b>Threats</b>   |
|   | - Localized Knowledge Application<br>- Engaging Specialists<br>- Developing Transformative Learning | - Persistent Gaps<br>- Complex Climate Challenges<br>- Limited Local Capacity              |

## **Strengths**

Acknowledging the importance of knowledge bases and observatories for informed decision-making signifies the need for a robust, structured approach to knowledge management in CCA efforts. Despite potential challenges, available resources and knowledge in the region can be harnessed for strategic capacity building and learning, providing a foundation for further efforts. Moreover, albeit sporadic, past, and ongoing efforts to upgrade strategic capacities and knowledge bases indicate a pre-existing foundation and a trajectory toward enhanced strategic capacity. These efforts, while notable, underscore the necessity for a more structured, consistent approach to knowledge management and strategic capacity-building in the region's CCA initiatives.

## **Weaknesses**

The incomplete establishment and operationalization of observatories hamper informed decision-making and strategy development. Furthermore, sporadic, and incident-triggered efforts towards upgrading strategic capacities need more consistency and structure to induce systemic change, highlighting the urgency for a more structured, proactive strategy focusing on knowledge base consolidation and strategic capacity enhancement. Even though resources and knowledge are available, they are not being fully and effectively utilized for strategic planning and learning, indicating a need to enhance capabilities to proficiently construct and utilize a knowledge base, ensuring that available resources are harnessed effectively to bolster the region's CCA strategies and actions.

## **Opportunities**

The North Aegean Region envisions localized knowledge application as a pivotal facet in developing a CCA knowledge base. By translating global climate data into locally relevant and actionable knowledge, the region aims to ensure that strategies and actions are directly applicable to the specific contexts and vulnerabilities of its diverse islands. Engaging specialists from various domains, along with integrating insights from behavioural sciences, aids in crafting a holistic understanding of climate vulnerability and the social dynamics that influence it. Moreover, the region perceives the development of transformative learning capacities, which encompass the ability for long-term planning amidst uncertainties, as crucial in navigating the complexities and challenges posed by climate change.

## **Threats**

The North Aegean Region grapples with persistent gaps in knowledge and strategic capacities, potentially undermining its CCA strategies' effectiveness. Potential limitations in local capacities to effectively utilize available resources and knowledge for tailored CCA strategies underscore the necessity to enhance local capabilities through training, resource allocation, and the establishment of supportive frameworks. Addressing these challenges requires a cohesive, well-orchestrated approach that ensures both knowledge and capacities are optimized to enhance the region's adaptability and resilience against the impacts of climate change.

### 3.3 Conclusions for North Aegean Region

Confronting the challenges and opportunities that permeate the North Aegean region requires a transformative approach, where robust strategies and initiatives, such as PeSPKA, are seamlessly melded with systemic, social, and administrative transformations. Nestled amidst its challenges, the region finds itself at a critical juncture where the path to a resilient future is paved with strategic, social, and political endeavours. Ensuring that the strategies are not merely documented but are impactful, demands an unwavering commitment to strategic evolution, stakeholder engagement, and robust governance.

Addressing the challenges that the region faces necessitates strategically reimagining its policy portfolio, wherein resources are strategically reallocated, local capacities and collaborations are fortified, and a keen focus is placed on targeted CCA efforts and future infrastructure investments. The region is poised with both challenges and opportunities, necessitating a recalibration of strategies to ensure research is effectively parlayed into practice, cross-sectoral connections are fortified, and the innovative potential of avenues, such as digital nomads, is strategically leveraged. This, in turn, enables the construction of a robust framework that addresses the region's unique challenges and propels it toward sustainable development and effective climate change adaptation.

A deeper and broader stakeholder engagement is paramount, ensuring methodologies adopted and strategies formulated are inclusive, innovative, sustainable, and effectively implemented. This involves a continuous, iterative process of engagement, feedback, and adjustment, ensuring strategies developed are robust and adaptable to climate change's ever-evolving contexts and challenges.

While the region is endowed with a recognition of the need for a solid knowledge base and strategic capacities, the actualization of these elements lingers in the realm of the potential. Addressing identified gaps through structured development and operationalization of knowledge observatories to build a knowledge base and nurturing strategic capacities for continuous learning and adaptation, is imperative.

Considering its geographical, cultural, and economic characteristics, the region presents diverse CCA challenges and opportunities. The region's distinct insularity, compounded by its "dual regionalism," imposes unique communication, integration, and developmental prospects challenges, particularly in vital sectors like tourism, agriculture, fisheries, and infrastructure. As evidenced by the North Aegean PeSPKA, the strategies address pivotal areas like water and forest management, cultural heritage preservation, energy infrastructure, and agriculture. However, there are evident oversights, particularly in aligning planning and execution and ensuring the requisite participation of local entities and civil society in effective implementation.

Despite its geographical layout and inherent challenges, the region has underscored the intricate complexities of implementing a cohesive CCA strategy. A granular analysis uncovers central issues: a *weakened institutional framework and a significant disconnect between drafted policies and their real-world implementation*, exacerbated by a need for more understanding and support from both societal and political realms. Additionally, geographical discontinuity and varying economic dynamics across the islands add another layer of challenges, necessitating a more centralized and synchronized approach to ensure cohesive progress across all islands.

The region's policy portfolio unveils challenges and innovative solutions for addressing CCA. While the region's primary resources stem from co-financed programs and national resources, prioritization is

often skewed toward immediate regional concerns, such as immigration, rather than comprehensive climate action. Despite being significantly understaffed, smaller municipalities embody the potential for localized, innovative solutions. Still, a lack of broader interregional or international collaborations may hinder comprehensive, sustainable solutions in the long run.

The region's approach to stakeholder involvement and its current multi-level governance system displays several inefficiencies and challenges, with execution often deviating from the intended purpose due to issues like short-term electoral objectives and spatial disparity, resulting in significant project delays and lost opportunities. The region's endeavours to stimulate its key economic sectors, solidify its scientific foundations, and foster strong business-science collaborations are commendable. Yet, the historical data and the 2021 Regional Innovation Scoreboard's findings suggest a sluggish progression in embracing innovation, indicating a noticeable gap in its knowledge infrastructure, which has profound implications for its strategic and decision-making capacities concerning the CCA strategy.

The path ahead for the North Aegean region involves navigating through a complex maze of challenges and opportunities, demanding a multifaceted approach that intertwines strategic, social, and administrative transformations, stakeholder engagement, robust governance, and a keen focus on sustainable development and effective climate change adaptation. The region's journey towards a resilient future, adapted to the imminent climate challenges and uncertainties, will lie on its ability to make impactful strategies, ensuring they are more than mere documentation but are embedded in its progression towards a sustainable and resilient future.

With respect to the multi-dimensional SWOT analysis of the region, key messages include:

- The North Aegean region unfolds a narrative divergent to the Attica region. Here, the emphasis on adaptive spatial planning, multi-level governance, and strategic capacity enhancement, particularly during the 2021-2027 programming period, is conspicuous.
- Despite a natural inclination toward experimentation and a diverse methodology, aimed at navigating each island's unique development pattern and stakeholder engagement framework, the region contends with substantial barriers.
- A pivotal barrier is the underdeveloped knowledge base and strategic capacity, which, despite being recognized, have not been sufficiently underpinned by implementing structures, such as observatories, which would enable the systematic management and utilization of knowledge.

## 4 Overall remarks for both regions

Both regions exhibit shared concerns and strategies. There's a palpable emphasis on *robust governance, effective stakeholder engagement, and a clear need to bridge the gap between policy formulation and practical implementation*. The imperative for adaptive planning and ensuring that strategies are attuned to local contexts and developmental patterns is also discernible. Furthermore, a commitment to strategic evolution and continuous learning, ensuring that strategies are not merely documented but are lived, evolved, and impactful, is evident.

Moreover, while the *national plan, ESPKA, establishes strategic orientation and guidelines, it intentionally refrains from diving deep into sectoral policies or prioritizing individual adaptation measures and actions at the regional or local level*. This strategic demarcation inherently vests the two regions' autonomy to sculpt their CCA strategies, aligning them with localized needs and contexts while nestling within the broader contours of national guidelines. While the regional CCA strategies are carved within the ambit of national directives, there is a palpable need, as revealed through stakeholder interactions, to *enhance the interoperability and synergy between regional actions and national plans*. This involves a more structured and dynamic interaction between different governance levels and necessitates the incorporation of regional specificities within national strategies, ensuring that both levels mutually inform and enrich each other.

*Recommendations and good practices* gleaned from exploring these regions encompass several domains. *Establishing and effectively utilizing knowledge management structures, such as observatories*, is paramount to ensure that a robust and comprehensive knowledge base informs decision-making. Furthermore, *streamlining coordination among various agencies and levels of governance* is crucial to ensure a synergistic and coherent approach to CCA. Additionally, *mechanisms that systematically capture, analyze, and utilize feedback from implemented actions to refine subsequent strategies* and initiatives should be implemented. Fostering an environment that encourages innovation and experimentation and ensuring that these are sufficiently supported and integrated into the broader CCA strategy, is also key. Ensuring that *stakeholder engagement is inclusive* and meaningful is vital to ensure that insights and inputs from various stakeholders are genuinely considered and integrated into the CCA strategies. Furthermore, *regional CCA strategies must be aligned with national and international initiatives* and are adapted to address each region's unique contexts and challenges.

In conclusion, the path forward for the two regions demands an integrated approach, harmonizing strategic, social, and political endeavours, and ensuring resilience to the myriad uncertainties and possibilities that the future may unfold. Adopting a continually evolving approach that addresses the present challenges and anticipates future shifts is crucial, ensuring that regions are not merely adapting to the current realities of climate change but are also adequately prepared for its future manifestations. Both regions demonstrate unique strengths and opportunities that, if effectively leveraged, can significantly enhance their CCA strategies. However, navigating the inherent challenges and threats requires an adaptive and collaborative approach. Implementing structured and proactive strategies, enhancing stakeholder involvement, and ensuring the continuous adaptation and localization of knowledge will be pivotal in fostering resilient and climate-adaptive regions.

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## Projects

ARSINOE: <https://arsinoe-project.eu/>

CLIMATTICA: <https://www.climattica.eu/> (see section 2.2.2)

IMPETUS: Whole project: <https://climate-impetus.eu/>

Attica part: <https://climate-impetus.eu/demo-site/mediterranean/>

## List of abbreviations

|          |  |
|----------|--|
| CCA      | Climate Change Adaptation                        |
| CDP      | Carbon Disclosure Project <sup>15</sup>          |
| DG CLIMA | Directorate-general on Climate Action            |
| DG RTD   | Directorate-general on Research and Innovation   |
| EDP      | Entrepreneurial Discovery Process                |
| ESPKA    | National CCA Strategy                            |
| EU       | European Union                                   |
| JRC      | Joint Research Centre                            |
| PeSPKA   | Regional CCA Strategy                            |
| PO       | ERDF Policy objective                            |
| R&I      | Research and innovation                          |
| RES      | Renewable Energy Systems                         |
| RPC      | Representative Concentration Pathway             |
| S3       | Smart Specialisation Strategy                    |
| SWOT     | Strengths, weaknesses, opportunities and threats |
| TI       | Transformative Innovation                        |

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<sup>15</sup> <https://www.cdp.net/en>, a not-for-profit charity that provides a global disclosure system for investors, companies, cities, states, and regions to disclose their environmental impact

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### Annex 1. List of interviewees

| Date  | Interviewee              | Position  |
|---|--------------------------|---|
| <b>Regional Council for Research and Innovation of Attica Region</b>  |                          |   |
| 25.07.2023  | Antonios Angelakis       | Member of the Regional Council for Research and Innovation of Attica Region / Scientific officer in Innovation, Technology & Digital Economy at the Small Business Institute of Greece IME GSEVEE |
| 01.08.2023  | Thomaidis Nikolaos       | Vice-president of the Regional Council for Research and Innovation of Attica Region / Professor of Analytical Chemistry, Department of Chemistry, National and Kapodistrian University of Athens  |
| 01.08.2023  | Kontoes Haralambos       | Member of the Regional Council for Research and Innovation of Attica Region / Research Director of IAASARS/NOA  |
| <b>Innovation Center of Attica Region</b>   |                          |   |
| 27.07.2023  | Podaras Petros           | Coordinator and Project Manager   |
| <b>General Directorate of Sustainable Development &amp; Climate Change of the Attica Region</b>                                 |                          |   |
| 25.09.2023  | Gkoufa Antigoni          | Head of the General Directorate of Sustainable Development & Climate Change of the Attica Region  |
| <b>CLIMATTICA</b>   |                          |   |
| 26.09.2023  | Paraskevopoulou Argyro   | Director, Former- Head of the General Directorate of Sustainable Development & Climate Change of the Attica Region  |
| <b>Special Managing Authority (SMA) of the Operational Programme North Aegean</b>   |                          |   |
| 01.09.2023  | Mouflouzellis Efstratios | Executive of Unit A   |
| 01.09.2023  | Athanaselis Akis         | Executive of Unit A   |
| 01.09.2023  | Augoustidis Georgios     | Consultant of Unit A  |
| <b>Municipality of Agios Efstratios</b>   |                          |   |
| 18.09.2023  | Kakali Maria             | Mayor of Agios Efstratios   |
| <b>Municipality of Limnos</b>   |                          |   |
| 18.09.2023  | Dlmaris Georgios         | Vice Mayor of the Municipality  |
| 18.09.2023  | Charos Ioannis           | Municipality Executive  |
| <b>One Stop Liaison Office for the Support of the Innovation and Entrepreneurship Ecosystem of the Central Macedonia Region</b> |                          |   |
| 04.09.2023  | Mantzanakis Stavros      | Head  |
| 04.09.2023  | Lagkani Christina        | Technical Expert  |
| <b>Regional Strategy and Business Discovery Process, South Aegean Region</b>  |                          |   |
| 02.09.2023  | Voutsinos Antonios       | Head of the Special Management Service  |
| <b>Region of Crete</b>  |                          |   |
| 29.07.2023  | Meramveliotakis Giorgos  | Advisor to the Deputy Regional Governor for Innovation for the Region of Crete  |
| 14.09.2023  | Xylouris Nikolaos        | Deputy Regional Governor in the Environment sector  |
| 14.09.2023  | Kargaki Eleni            | Head of the Climate Change and Energy department. Environmental Management and Spatial Planning   |
| 14.09.2023  | Vogiatzi Chrysanthi      | Special Advisor of the Deputy Regional Governor for Environment, Region of Crete  |
| <b>Greek Ministry of Economy and Finance</b>  |                          |   |
| 01.08.2023  | Goumas Michail           | Deputy Head, Planning, Coordination & Monitoring Unit of the National Strategy for Smart Specialization   |
| 01.08.2023  | Pelekasi Stavroula       | Planning, Coordination and Monitoring Unit of the National Smart Specialization Strategy  |

## Annex 2. List of case studies

Case studies have been carried out to analyse to what extent and how enabling factors towards ‘Transformative Climate Change Adaptation’ strategies, as identified in the conceptual report (European Commission, 2024), are at play in reality, and what can be done to overcome barriers in various territorial contexts. The methodological framework described in the conceptual report essentially acts as a practical guide for undertaking cases studies on CCA strategies in different territories, in a uniform way. These case studies are listed below:

**Table 16:** “Transformative innovation for better climate change adaptation” – Case studies

| Country     | Territory                       | URL (*)   | DOI            | JRC number |
|-------------|---------------------------------|---|----------------|------------|
| Belgium     | Leuven                          | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137313">https://publications.jrc.ec.europa.eu/repository/handle/JRC137313</a> | 10.2760/58125  | JRC137313  |
| Finland     | Espoo                           | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137316">https://publications.jrc.ec.europa.eu/repository/handle/JRC137316</a> | 10.2760/177322 | JRC137316  |
| Finland     | Turku - Southwest Finland       | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137315">https://publications.jrc.ec.europa.eu/repository/handle/JRC137315</a> | 10.2760/211155 | JRC137315  |
| France      | Provence-Alpes-Côte d’Azur      | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137314">https://publications.jrc.ec.europa.eu/repository/handle/JRC137314</a> | 10.2760/46893  | JRC137314  |
| Greece      | Attica and North Aegean regions | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137322">https://publications.jrc.ec.europa.eu/repository/handle/JRC137322</a> | 10.2760/493562 | JRC137322  |
| Iceland     |                                 | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137291">https://publications.jrc.ec.europa.eu/repository/handle/JRC137291</a> | 10.2760/305796 | JRC137291  |
| Italia      | Emilia-Romagna                  | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137319">https://publications.jrc.ec.europa.eu/repository/handle/JRC137319</a> | 10.2760/790200 | JRC137319  |
| Netherlands | Northern Netherlands            | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137312">https://publications.jrc.ec.europa.eu/repository/handle/JRC137312</a> | 10.2760/10862  | JRC137312  |
| Poland      | Mazovia - Stare Babice          | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137323">https://publications.jrc.ec.europa.eu/repository/handle/JRC137323</a> | 10.2760/58125  | JRC137323  |
| Portugal    | Norte                           | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137321">https://publications.jrc.ec.europa.eu/repository/handle/JRC137321</a> | 10.2760/399394 | JRC137321  |
| Romania     | Nord Vest - Cluj                | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137317">https://publications.jrc.ec.europa.eu/repository/handle/JRC137317</a> | 10.2760/923916 | JRC137317  |
| Slovenia    | Gorenjska                       | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137320">https://publications.jrc.ec.europa.eu/repository/handle/JRC137320</a> | 10.2760/502482 | JRC137320  |
| Spain       | Andalucia - Granada             | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137324">https://publications.jrc.ec.europa.eu/repository/handle/JRC137324</a> | 10.2760/104672 | JRC137324. |
| Sweden      | Blekinge and Värmland           | <a href="https://publications.jrc.ec.europa.eu/repository/handle/JRC137318">https://publications.jrc.ec.europa.eu/repository/handle/JRC137318</a> | 10.2760/249067 | JRC137318  |

(\*) Links may give error message for those studies still under publication

## Annex 3. SWOT Analysis – Overview of both regions

In **the Attica region**, the intertwining of innovative practices and policy initiatives, notably through engagements like IMPETUS and ARSINOE, has carved out a paradigm that adeptly weaves together risk mitigation, opportunity capitalization, and sustainable development. The region demonstrates a commendable commitment to embedding innovative solutions to tackle the multifaceted challenges of climate change. However, beneath the veneer of these innovative endeavors lies a complex web of challenges, particularly in inter-agency coordination and implementation, which periodically thwarts the transformation of strategy into tangible, impactful outcomes.

**The North Aegean region** unfolds a divergent narrative. Here, the emphasis on adaptive spatial planning, multi-level governance, and strategic capacity enhancement, particularly during the 2021-

2027 programming period, is conspicuous. Despite a natural inclination toward experimentation and a diverse methodology, aimed at navigating each island’s unique development pattern and stakeholder engagement framework, the region contends with substantial barriers. A pivotal barrier is the underdeveloped knowledge base and strategic capacity, which, despite being recognized, have not been sufficiently underpinned by implementing structures, such as observatories, which would enable the systematic management and utilization of knowledge.

**Table 17.** SWOT analysis - overview for the two regions

|  | Strengths   |   | Weaknesses  |   |
|--|---|---|---|---|
|  | Attica  | North Aegean  | Attica  | North Aegean  |
|  | <b>Defining Goals and Expected Impacts</b>  | <ul style="list-style-type: none"> <li>- Well-Defined Strategy</li> <li>- Smart Specialization</li> <li>- Entrepreneurial Discovery Process</li> <li>- Policy and Planning</li> <li>- Governance Mechanisms</li> <li>- Political Endorsement</li> <li>- Pilot Projects and Innovations</li> </ul> | <ul style="list-style-type: none"> <li>- Strategic Foundations</li> <li>- Diverse Geography</li> <li>- Institutional Structures</li> </ul>  | <ul style="list-style-type: none"> <li>- Significant Vulnerabilities</li> <li>- Complexity and Breadth of Goals</li> <li>- Implementation Scale</li> <li>- Achievement of Goals</li> <li>- Social Transformation</li> </ul> |
| Opportunities  |   | Threats   |   |   |
| Attica   |   | North Aegean  | Attica  | North Aegean  |
| <ul style="list-style-type: none"> <li>- Innovation in Environmental Management</li> <li>- Tourism</li> <li>- Cross-Sectoral Synergies</li> <li>- Digital Transformation</li> <li>- Public Engagement</li> </ul>   |   | <ul style="list-style-type: none"> <li>- Dynamic Adaptation Process</li> <li>- Utilization of the Quadruple/Quintuple Helix Model</li> <li>- Localized Strategies</li> </ul>  | <ul style="list-style-type: none"> <li>- Climate Change Impacts</li> <li>- Uneven Risk Distribution</li> <li>- Systemic and Long-term Challenges</li> <li>- Economic and Sectoral Impacts</li> <li>- Resource Allocation</li> </ul> | <ul style="list-style-type: none"> <li>- Political Support</li> <li>- Geographical and Administrative Discontinuity</li> <li>- Short-Term Focus</li> </ul>  |
| <b>Articulating Policy Portfolios</b>  | Strengths   |   | Weaknesses  |   |
|  | Attica  | North Aegean  | Attica  | North Aegean  |
|  | <ul style="list-style-type: none"> <li>- Strategic Instruments and Policy Tools</li> <li>- Significant Financing</li> <li>- Ecosystem Instruments</li> <li>- CLIMATTICA Network</li> <li>- Integration of CCA</li> </ul>  | <ul style="list-style-type: none"> <li>- Existing Policy Framework</li> <li>- Experiences in Collaborations</li> <li>- Local Initiatives</li> <li>- Recognition of Resource Allocation</li> </ul>   | <ul style="list-style-type: none"> <li>- Inter-agency Coordination</li> <li>- Regulation of CCA</li> <li>- Systematic Structure for Cooperation</li> <li>- Balanced Strategy Coordination</li> </ul>                                | <ul style="list-style-type: none"> <li>- Resource Limitations</li> <li>- Limited Capacity</li> <li>- Lack of Larger-Scale Funding</li> <li>- Inconsistent Policy Implementation</li> </ul>                                  |
|  | Opportunities   |   | Threats   |   |
| Attica   | North Aegean  | Attica  | North Aegean  |   |
| <ul style="list-style-type: none"> <li>- Climate Adaptation Economy</li> <li>- Inter-regional Cooperation</li> <li>- Engaging in Collaborative Projects</li> <li>- Additional Strategic Priorities</li> <li>- Weaving CCA into Major Priority Areas</li> </ul> | <ul style="list-style-type: none"> <li>- Strategic Rebalancing</li> <li>- Structured Collaborative Framework</li> <li>- Replicating Successful Models</li> <li>- Utilizing Future Developments</li> <li>- Interregional/International Collaborations</li> </ul> | <ul style="list-style-type: none"> <li>- Transcending Climate Change Impacts</li> <li>- Rapidly Changing Climate Trends</li> <li>- Effective Implementation across Borders</li> <li>- Maintaining a Holistic Approach</li> <li>- Alignment of National and Regional Strategies</li> </ul>         | <ul style="list-style-type: none"> <li>- Overemphasis on Immediate Issues</li> <li>- Vulnerability Due to Limited Resources</li> <li>- Social and Administrative Inertia</li> <li>- Geographical Discontinuity</li> </ul>           |   |
| <b>Ensuring Cross Domain Synergies</b>   | Strengths   |   | Weaknesses  |   |
|  | Attica  | North Aegean  | Attica  | North Aegean  |
|  | <ul style="list-style-type: none"> <li>- Interdisciplinary Research</li> <li>- Collaborations with Academic Institutions</li> <li>- Research and Innovation Connection</li> <li>- Cross-Sector Synergies</li> </ul>   | <ul style="list-style-type: none"> <li>- Rich Research Base</li> <li>- Alignment with RIS3</li> <li>- Influx of Digital Nomads</li> <li>- Global Mindset</li> </ul>   | <ul style="list-style-type: none"> <li>- 'Siloisation' of Policies</li> <li>- Formalized Policy Absence</li> <li>- Barrier in Interdisciplinary Research</li> <li>- Lack of Cross-Department Structures</li> </ul>                  | <ul style="list-style-type: none"> <li>- Integration Challenges</li> <li>- Geographical and Administrative Isolation</li> <li>- Dependency on NSRF</li> <li>- Disconnect between Research and CCA Actions</li> </ul>        |



|  | Opportunities                          |   | Threats                                |  |
|--|--|---|--|--|
|  | Attica                                 | North Aegean                                | Attica                                 | North Aegean                             |
|  | - Whole-of-Government Approaches       | - Strategic Integration of Research         | - Persistent Policy Silos              | - Unsustainable Research Output          |
|  | - Quadruple Helix Model                | - Enhancing Cross-Sectoral Synergies        | - Institutional Path Dependencies      | - Inconsistent Economic Input            |
|  | - Interdisciplinary Research Program   | - Harnessing Digital Nomad Potential        | - Alignment with Productive Sectors    | - Mismatch of Strategies and Local Needs |
|  | - Localized Value Chains               | - Collaborations for CCA                    | - Effective Execution of Joint Actions | - Isolation Impact on Collaboration      |
|  | - Policy and Academic Integration      | - Digital Infrastructure Development        |  |  |
|  | Strengths                              |   | Weaknesses                             |  |
|  | Attica                                 | North Aegean                                | Attica                                 | North Aegean                             |
| Broadening and Deepening Stakeholder Involvement | - Diverse Stakeholder Involvement      | - Methodological Approach                   | - Depth of Stakeholder Involvement     | - Implementation Challenges              |
|  | - Engagement Strategies                | - Stakeholder Engagement                    | - Implementation Gap                   | - Limited Ongoing Engagement             |
|  | - Transcendent Cooperation             | - Digital Platforms                         | - Insufficient Institutionalization    | - Variable Adaptation Across Islands     |
| - Acknowledgment of Diverse Actors               | - Alignment with RIS3                  | - Limited Citizen Involvement               |  |  |
|  | Opportunities                          |   | Threats                                |  |
|  | Attica                                 | North Aegean                                | Attica                                 | North Aegean                             |
|  | - Transformative Strategies            | - Continuous Stakeholder Engagement         | - Escalating Costs                     | - Disparity in Island Development        |
| - Socially Just CCA Strategies                   | - Innovative Collaborations            | - Conflicting Views                         | - Resource Constraints                 |  |
| - Private Investment                             | - Enhanced Digital Participation       | - Socio-Cultural Navigation                 | - Misalignment of Collaborations       |  |
| - Project Maturation                             | - Localized Strategy Development       | - Market and Environmental Changes          | - Engagement Fatigue                   |  |
| - Genuine Co-Creation                            |  |   |  |  |
|  | Strengths                              |   | Weaknesses                             |  |
|  | Attica                                 | North Aegean                                | Attica                                 | North Aegean                             |
|  | - Structured Governance                | - Multi-Level Governance                    | - Transition of Coordination Unit      | - Inconsistent Operational Focus         |
| - Decision-making Responsibility                 | - EU-level Influence                   | - One-size-fits-all Avoidance               | - Geographical Distance                |  |
| - Diverse Units                                  | - Local Focus                          | - Complexity in Multi-Level Governance      | - Lack of Continuity                   |  |
| - Innovation Center                              |  |   | - Blurred Responsibilities             |  |
|  | Opportunities                          |   | Threats                                |  |
|  | Attica                                 | North Aegean                                | Attica                                 | North Aegean                             |
|  | - Enhancing Synergies                  | - Structured Continuity                     | - Legal and Policy Alignment           | - Disjointed Implementation              |
| - Inter-Regional Collaborations                  | - Clarified Roles and Responsibilities | - EU Compliance                             | - Resource Constraints                 |  |
| - EU Level Engagement                            | - Enhanced Collaboration               | - CCA Interventions                         | - Strategic Misalignment               |  |
| - Incorporate Diverse Input                      | - Local Empowerment                    |   | - Political and Bureaucratic Obstacles |  |
|  | Strengths                              |   | Weaknesses                             |  |
|  | Attica                                 | North Aegean                                | Attica                                 | North Aegean                             |
|  | - Emphasis on Innovation               | - Multifaceted Terrain                      | - Innovation for Novelty               | - Limited Value Chains                   |
| - Infrastructure                                 | - Scientific Foundations               | - Policy Alignment                          | - Restrained Exports                   |  |
| - Stakeholder Engagement                         | - Improving Innovation                 | - Risk Tolerance                            | - Barrier to Embedding Innovations     |  |
| - Existing Funding Mechanisms                    | - Policy Interventions                 |   | - Limited Experimentation              |  |
|  | Opportunities                          |   | Threats                                |  |
|  | Attica                                 | North Aegean                                | Attica                                 | North Aegean                             |
|  | - CCA Priority Integration             | - RIS3 Initiative                           | - Barriers to CCA Experimentation      | - Resource Limitations                   |
| - Leveraging Hackathons                          | - Cross-Border Cooperation             | - Political and Social Obstacles            | - External Economic Factors            |  |
| - Embracing Risk in CCA Strategies               | - Empowering Start-ups                 | - Lack of Practical and Measurable Outcomes | - Climate Risks                        |  |
| - Regulatory Sandboxes                           | - Nurturing Value Chains               |   | - Policy Continuity                    |  |
|  | Strengths                              |   | Weaknesses                             |  |
|  | Attica                                 | North Aegean                                | Attica                                 | North Aegean                             |
|  | - Robust Knowledge Base                | - Recognition of Need                       | - Knowledge Application                | - Lack of Established Observatories      |
|  | - Available Resources                  |   | - Inconsistent Efforts                 |  |
|  | - Prior Efforts                        |   |  |  |

|                           |   |   |   |   |
|---------------------------|---|---|---|---|
| <b>Strategic Capacity</b> | - Advanced Technologies<br>- Global Climate Impact Data   |   | - Systematization of Knowledge<br>- Skills and Capacity   | - Underutilized Resources   |
|                           | <b>Opportunities</b>  |   | <b>Threats</b>  |   |
|                           | <b>Attica</b>   | <b>North Aegean</b>   | <b>Attica</b>   | <b>North Aegean</b>   |
|                           | - Structured Knowledge Management<br>- Training and Partnerships<br>- Localized Knowledge Application | - Localized Knowledge Application<br>- Engaging Specialists<br>- Developing Transformative Learning | - Fading Traditional Knowledge<br>- Insufficient Local Authority Capacities<br>- Complex Interactions | - Persistent Gaps<br>- Complex Climate Challenges<br>- Limited Local Capacity |

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