

Transformative Innovation for better Climate Change Adaptation - Case Study: Provence-Alpes-Côte d'Azur, France

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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 reports covering 16 different territories from across the EU and beyond, casing various institutional contexts, a variety of biogeographical regions within different climate risks, different ranges of population sizes, and representing a diversity of approaches to CCA and transformative innovation¹.

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 feature.

In addition to summarizing the main findings under each of the seven features, the conclusion also suggests possible ways forward which could help the region move towards more of a Transformative Innovation approach to CCA.

This Report provides the findings for Provence-Alpes-Côte d’Azur region in France, as at January 2024 and is the result of a collaboration between the Joint Research Centre (JRC), DG CLIMA and DG RTD.

¹ A list of the case studies is provided in Annex 3

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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 region of Provence-Alpes-Côte d'Azur (PACA) on how this approach may help the territory increasing 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 studies in different European territories comprising various biogeographical regions with a variety of climate risks, various institutional contexts, different ranges of population sizes, and demonstrating a diversity of approaches to TI and CCA.

Main findings

Provence-Alpes-Côte d'Azur, due to its coastal, mountain, rural and urban territorial diversity, is confronted by a particularly wide range of climate change risks. Several places in the region face multiple and compounded risks, with water availability perceived as the dominating challenge in the short term. However, a lack of overall awareness still prevails in relation to the true scale and pervasiveness of the challenges ahead, as well as a degree of the CCA denial. The CCA imperatives are often confused with those of disaster risk management and CCA efforts seen as costs rather than investments. Still missing is a longer-term perspective on the need for radical transformations backed up by high-level political commitment. The overall impression gained in this study was that the region was only at the beginning of its CCA journey, which stands in contrast with its leading role on ecological transition in its broadest sense and the high-level political endorsement of its voluntary and ambitious Climate Plan predominantly focused on climate change mitigation. The following observations were made regarding the seven transformative innovation features in the territory:

Goals and Directionality: There are no explicit overall goals for CCA in the region's Climate Plan, or in its territorial planning strategy, nor in the regional plan for economic development, innovation and internationalization that includes the region's Smart Specialisation Strategy 2021-2027. Even though certain scattered CCA-relevant measures and/or actions are present in regional strategic documents, they do not provide strong directionality for transformative CCA.

Articulating Policy Portfolios: The bulk of instruments available to the region for supporting CCA investment come from the national level contributing to CCA actions in water management and de-sealing of soils under spatial plans at lower territorial levels - the latter through a policy of 'net zero artificialisation of land by 2050'. Certain conditionalities exist to align national and regional funding interventions to the region's Climate Plan. However, adequate filters are not in place to prevent possible financing of maladaptation practices, such as irrigation schemes, or facilities for producing artificial snow in mountain skiing areas, without sufficient consideration of long-term water availability. Overall, there seems to be a lack of demand for genuine CCA initiatives with transformative goal, rather than a lack of possible available funds.

Ensuring Cross-Domain Synergies: Efforts to mainstream CCA into the implementation of policies are visible in the region – particularly in relation to water management (with water scarcity as a main driving force), coastline and land management. Certain examples of area-based initiatives around the

region, which integrate CCA into other socio-economic objectives, are encouraging. However, CCA is not yet conditioning the economic development in the important sectors as tourism and agriculture, where the prevailing attitude appears to mainly keep business-as-usual with only incremental adjustments.

Increasing Breadth and Depth of Stakeholder Involvement: Consultation with a wide variety of institutional stakeholders is considered the norm for major CCA-relevant strategic documents at regional level, as well as the two main Metropoles and these processes are labelled as ‘co-construction’. Institutional stakeholder consultations are also compulsory at local urban planning documents. Despite some good examples, the research revealed ongoing difficulties especially in mobilising local elected representatives for serious debate around CCA topics. Citizens, Natural Parks and important local enterprises are not well connected into the CCA debate either, though some sectors (agriculture, industries involved in international value chains) are beginning to consider integrating CCA into their business models.

Setting up Effective Multi-level Governance Models: France’s public administrative composition is institutionally heavy and highly complex, with considerable apparent potential for overlap, which is reflected also in the Provence-Alpes-Côte d’Azur. There is insufficient coordination between the different layers involved for an effective CCA. At the regional level, coordination is handled chiefly through the documents, which do not have compulsory character. For Metropoles and other groupings of local authorities, the Territorial Climate Air Energy Plans are obligatory, but there are no corresponding documents for the region, which increases complexity and impedes the efficient CCA coordination. Despite some variation, the local planning documents at the levels of individual municipalities are generally lacking details on CCA. The powerful position of local elected representatives within their constituencies emerges as a weak link in the governance chain and poses a strong risk of short-term interests blocking the development of effective long-term strategic approaches to CCA at local levels.

Making Room for Experimentation: Various experimental initiatives on CCA are underway in the region, financed by the EU LIFE and Horizon Europe Programmes - including under the EU Mission on CCA – as well as by the Regional Council itself. They embody a heterogeneous set of actions, as well as new approaches to known themes like de-sealing of soil and coastal protection, some involving space technology. However, there is a lack of capitalisation of learning from such initiatives and their value is not being fully realised as a result.

Securing High Levels of Policy Intelligence, Learning, and Strategic Capacity: Although CCA awareness is growing in the region – especially as a result of Storm Alex in 2020 – it is far from complete and significant confusion remains between CCA and disaster risk management. Climate change denial is also evident in certain quarters; particularly in the most affected territories, which will require the most radical CCA approaches (e.g. ski resorts or the low-lying Camargue area). The national agencies ADEME, CEREMA and the independent regional expert body GREC-SUD play a key role in awareness raising, and have a comprehensive CCA knowledge base. A large number of other structures working at the interface between public authorities and the research community also make important contributions to that knowledge base, including the recently-established regional platform ‘Knowledge of the Territory’. However, insufficient capacity of CCA instructed public administrations and local authorities in the region emerge as a key bottlenecks for transformative CCA as the region is not in a position to effectively assess the CCA efforts and their outcomes.

Key conclusions

Overall awareness of the necessity of CCA and of its deep systemic character is growing in Provence-Alpes-Côte d'Azur. This is assisted by active interfaces with science and research, such as those embodied by CEREMA and GREC-SUD. CCA efforts are visible in land planning, with the 'Net zero artificialisation' law as a main driving force, as well as in water management. The following key conclusions were made regarding the seven transformative innovation features in the territory:

Goals and Directionality: A positive narrative should be developed to help boost transformative CCA approaches in the territory building on strong communication efforts already in place in the region with respect to climate mitigation goals. Also, strategic leadership on CCA could be consolidated in line with the region's pilot status for ecological transition, to underpin the development of its new CCA strategy foreseen with support from the EU Mission on CCA. Soon-to-be-adopted new National Adaptation Plan looks likely to bring increased directionality and aims at providing strong guidance to regional and local efforts to develop more CCA-specific strategies, and to capitalise better on the region's currently dispersed CCA-relevant experiments.

Articulating Policy Portfolios: In order to address the lack of demand for genuine CCA initiatives with transformative goal, the territory could consider integrating a robust project selection criteria for CCA –distinct from disaster risk management - into funding instruments such as Green Fund. It could also work to develop and introduce more comprehensive 'climate proofing' rules and regulations for public investment in buildings and infrastructure - including for summer comfort and adaptation to heat waves, and carefully plan forthcoming ERDF calls for CCA under the EU Cohesion Policy Objective (PO) 2, and where appropriate PO5, to address a broad range of CCA themes. The region could also consider introducing CCA more explicitly in the Entrepreneurial Discovery Processes (EDP) in operation under RIS3 – for example, as a horizontal theme running across the existing RIS3 priority fields, or possibly through a project selection criterion encouraging innovation in CCA activity – as a means of directing ERDF under PO1 towards transformative CCA.

Ensuring Cross-Domain Synergies: Partnerships between climate professionals and administrative structures in these sectors would need to be enhanced as a first step in strengthening the regional governance for CCA mainstreaming. To achieve the relevant cross-domain synergies in the region, conflicts between the prevailing regulatory environment, and planning and proper maintenance of CCA investments need to be eliminated. Also, scenarios and concrete pathways for climate-resilient economic activities, notably in tourism and agriculture sectors, need to be introduced with the well-established CCA approaches. Due to the ever more acute problems with severe summer heat waves in the region, strategic work on CCA and the healthcare system would also need to be initiated.

Increasing Breadth and Depth of Stakeholder Involvement: In order to mobilise local elected representatives, engage citizens, and involve businesses and certain other key actors in serious debates on CCA topics, it would be beneficial to capitalise on the public concertation exercise planned in the context of the regional COPs. In particular, smart involvement of the young generation could effectively enhance citizens input in the forthcoming strategic documents for CCA. Furthermore, the region could work on presentation of business cases for CCA, focusing on co-benefits and animate events for businesses around CCA-relevant topics with a view to greater private sector engagement in future strategy development for CCA.

Setting up Effective Multi-level Governance Models: In order to effectively tackle the shortcomings in multi-level governance, the territory should reinforce coordination between national authorities, the region and local authorities specifically on CCA, and in particular strengthen mechanisms for multi-level dialogue on CCA strategy preparation and implementation - assigning to the region a role of

orchestration and monitoring of overall progress. Furthermore, it should foster opportunities for synergies in CCA activities between inter-municipal groupings and municipalities, and regional departments, by providing incentives for joint investments and mutualising CCA expertise.

Making Room for Experimentation: In order to approach the experimentation more systematically, the region should gather and analyse results of experiments relevant to CCA in different domains and make them widely available in an easy-access format. Furthermore, it could develop and implement capitalisation actions for relevant actors at different territorial levels in the region, based on the results of experimental initiatives and consider running experiments on innovative public procurement in the context of CCA.

Securing High Levels of Policy Intelligence, Learning, and Strategic Capacity: To tackle the insufficient capacity for transformative CCA in public administration, the region should boost strategic capacity for CCA throughout the administration – including nomination of qualified persons, with a specific mandate on CCA in public bodies at all levels, including agencies. Furthermore, the region should consider developing indicators to measure improvements in adaptive capacity and CCA outcomes – where relevant through the use of suitable proxies, as well as elaborating a system to track and quantify funds disbursed for CCA - notwithstanding the difficulties inherent in estimating the CCA content of actions/initiatives geared primarily towards other objectives (mitigation, protection of biodiversity, normal management or repair of infrastructures etc.).

1 Introduction

This report has been prepared at the request of the European Commission’s Joint Research Centre (JRC), Innovation Policies and Economic Impact Unit, in collaboration with DG CLIMA. 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 of territorial cases across Europe. The study draws on the conceptual framework on this question previously defined in another JRC report (European Commission, 2024). The case study research covered several territories from across the EU and beyond, comprising 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 innovation². The methodology for the case studies relies on the following main sources:

- Qualitative interviews carried out with key actors in the two main policy fields: R&I and climate/environment.
- Other policy fields chosen for their particular relevance for each territory: e.g. regional development, spatial planning, energy, water, agriculture, forestry, food, fisheries, health, etc.
- Interviewees included decision-makers, officials in implementing bodies, researchers, NGOs and experts active in the field.
- Documentary and website analyses on strategies, policies and projects. A first round was carried out prior to the interviews on publicly available material, followed by a second round, with documents (public or draft) obtained from interviewees.

This Report provides the findings for Provence-Alpes-Côte d’Azur region in France, as at January 2024.

² A full list of the case studies is provided in Annex 3

2 Presentation of the case study territory

2.1 Profile of the territory

Provence-Alpes-Côte d'Azur, also referred to as Région Sud, is one of France's 13 Metropolitan regions. It is divided into 6 Departments, 3 Metropoles, 36 cooperative structures between Municipalities (EPCI) and no less than 958 Municipalities. The region is remarkably heterogenous with densely populated and heavily developed coastal areas, much less dense dispersed rural habitats, medium-sized agricultural areas and alpine territories with specific features. The region also has several Natural Parks and protected areas, with a high degree of biodiversity, although some species are endangered due to loss or degradation of their habitats.

Figure 1: Map of Provence-Alpes-Côte d'Azur, France.



Source: *Région Provence-Alpes-Côte d'Azur, 2023*

The region is home to over 5.1 million inhabitants, mostly concentrated along the Mediterranean coast and the Rhône Valley. With 96% of the population living within a city catchment area, it is the second most urbanised Metropolitan region in France, after Ile-de-France. Its population is aging significantly - it is the third French region in terms of the share of population aged over 65. The region's substantial natural and cultural assets and its distinctive Mediterranean situation have

traditionally made it a powerfully attractive pole for a wide range of talent, investment and visitors.³ Yet there are substantial disparities between the 6 Departments in terms of size and density of population. Land and housing pressure is generally acute. Despite the presence of centres of conspicuous wealth, there are pockets of acute poverty and problems of insecurity, particularly in and around the larger urban areas.

The region's GDP per capita PPS is slightly above French and EU averages. It is a leading region in maritime activities. The Grand Port Marseille-Fos is the first port of France, Toulon the first military port in Europe and the port of Antibes Europe's leading yachting port. It is well known as a tourist destination, with 30 million visitors/year (2021) - tourism is an important contributor to the regional economy, which also includes a large cultural sector. Other sectors with a strong presence in the region concern space and aeronautical activities, petrochemical industry, maritime industry, microelectronics, cybersecurity, healthcare, silver economy and digital services. The region is home to 10 competitiveness poles out of 55 in France and clusters in which ecosystems of actors gravitate around strategic value-chains. Whilst not a major agricultural region, it nevertheless hosts niches of high value-added agricultural activities including organic farming, such as wine, perfume and exotic plants. Services account for the highest share of the region's employment – it is the third region in

“The Provence-Alpes-Côte d’Azur region is a land of contrasts, combining major assets with major weaknesses. The region's aura and fame, its dynamic sectors, landscapes and biodiversity, are counterbalanced by a decline in regional attractiveness, a demographic slowdown, inequalities, high land consumption and numerous malfunctions in the transport sector”

Source: (Région Provence-Alpes-Côte d’Azur, 2019 p.16 of summary document)

France for employment in services.

According to the European Regional Innovation Scoreboard 2023⁴, Provence-Alpes- Côte d'Azur is a 'strong innovator –', coming 4th out of the 14 French regions, with a Regional Innovation Index of 103.3, compared to 105.3 for France overall. The region is rich in both public and private R&D organisations. It hosts two large universities, Aix-Marseille University and Nice-Sophia Antipolis, as well as several smaller higher education institutions. Most major national research centres also have antennae in the region, often sharing laboratories with universities in 'mixed research units'. In total, there are some 170,000 students in the region, across its 4 universities, 15 business schools et 17 engineering schools.

Regional greenhouse gas (GHG) emissions are high, at 10% of the French total, given that the region's share of total national population is 7.6%. Industrial emissions in the region are particularly high, currently reaching 3.7 tonnes of CO₂ equivalent (teq CO₂) per inhabitant, well above the French national level of 1.7 teq CO₂⁵. In the western part of the region, the Fos-sur-Mer area houses many high emitting industries. The Mediterranean climate with low rainfall, as well as the concentration of industries and population along the coast, lead to a persistence of polluting elements in the

³ OECD (2022) - [Notes-Sud-EN.pdf \(oecd.org\)](#)

⁴ [ec_rtd_ris-regional-profiles-france.pdf \(europa.eu\)](#)

⁵ <https://www.maregionsud.fr/votre-region/competences/economie-et-emploi>

atmosphere, exacerbated by high road transport emissions and frequent traffic congestion. The region is a net importer of energy and is lagging behind in green energy production.

Several major green transition projects are under development, such as: the ‘Hydrogen Basin’, aimed at decarbonising the industrial port of Marseille; ‘BarMar’, an underwater renewable hydrogen pipeline between Barcelona and Marseille-Fos area; and the introduction of floating wind power through the only dedicated test site in the Mediterranean Sea, currently with three wind turbines and installed capacity of 25 MW⁶. There are plans to commission around 100 additional floating wind turbines by 2030, rising to 50 entire offshore wind farms generating some 40 GW by 2050.

Table 1: Provence-Alpes-Côte d’Azur - Key characteristics.

Area	31,400 km ² . 6 Departments, 3 ‘Metropoles’, 958 Municipalities
Population	5.16 million inhabitants – concentrated along sea and Rhône valley. Declining population growth and ageing. Sub-regional disparities and substantial inequality – areas of conspicuous wealth and pockets of high poverty. Pressure on land and housing.
Geography	Highly diverse territory: 65% alpine area, 25% agricultural land, 1,000 km of coastline. Densely populated polycentric urban areas, heavily industrialised zones (including GHG emitting chemical industry, coke and refinery and metal industries) and ports. Home to 4 out of France’s 10 Natural Parks, 17 natural reserves and high biodiversity.
Economy	GDP per capita PPS €36,700 (2022), compared to €35,500 for France and €35,400 for the EU. Port and heavy industry in the area of Marseille; military and naval industry in Toulon; important tourism and cultural sector; large tertiary sector; specialisations in: space and aeronautical activities, petrochemical industry, maritime industry, microelectronics, cybersecurity, healthcare, silver economy and digital services; agricultural activities in niche sectors.
Green transition	Regional GHG emissions: 10% of the national total, higher than regional share in the total national population (7.6%). Industry and road transport constitute the main sources of GHG (respectively 31% and 29%), followed by energy production (23%). High dependency from extra-regional energy sources, with renewables accounting for only 10% of total energy consumption. Major energy transition projects under development in green hydrogen, photovoltaics, floating offshore wind – the latter targeting production of 40 GW by 2050.
Main climate change features	Particularly vulnerable region. Large range of risks in line with diversity of territory (coastal, mountain, rural, urban): water shortage most immediate risk, river flooding, urban heat, droughts, soil degradation, forest fires, loss of marine and land biodiversity, sea level rise causing coastline retreat and submersion and groundwater salinisation. Several places are facing cumulative climate risks.

Sources: Région Provence-Alpes-Côte d’Azur, 2021 and 2019, and insee.fr

2.2 Main climate change risks and vulnerabilities

Due to its high territorial diversity, Provence-Alpes-Côte d’Azur, is exposed to a particularly wide range of climate change risks. These fall into both extreme risk and slow onset categories. Many parts of the region face combined and cumulative risks, with dramatic impacts on human and natural

⁶ [New Floating Offshore Wind Farm to Generate Clean Energy for 45,000 People \(maritime-executive.com\)](https://www.maritime-executive.com/story/new-floating-offshore-wind-farm-to-generate-clean-energy-for-45000-people)

ecosystems. All the risks described below are already present and will become more frequent and more intense.

- Warming of air, sea, lakes and rivers. This is a slow onset risk, with heatwaves as extreme events. Longer and hotter summers will result in an increase in number of abnormally hot days and tropical nights (>20°C), amplifying the urban heat island effect and multiplying the risk of wildfires in a region with 50% wooded area. Warming of sea temperature will increase acidification of seawater. The main impacts of rising temperatures are likely to be on:
 - natural ecosystems, including land and marine biodiversity, with proliferation of invasive species and pests carrying diseases;
 - human health (excess mortality, allergies, pollution etc.) and wellbeing (thermal discomfort);
 - economic activity (productivity loss, closure of areas at risk of wildfires, decreasing attractiveness);
 - buildings and infrastructure (technical faults, failure of key components).
- Decrease in freezing days and in length and quality snow cover, with progressive loss of mountain glaciers. This will impact negatively on:
 - vegetation growth patterns affecting forest health and changing species' habitats, e.g. in alpine area (65% of territory) endangering the most vulnerable animals and plants;
 - mountain stability and landslides;
 - snow-linked tourism activities in the region's alpine area.
- Water scarcity linked to diminishing rainfall in summer and evaporation of inland water reservoirs, as well as less snow and shrinking glaciers in mountains, as mentioned above. Key impacts are expected to be on:
 - soil health due to prolonged extreme drought periods (severe episodes took place in 2022 and 2023) causing decreasing agricultural yields or total losses and degrading health and diversity of flora and fauna;
 - relations between different sectors of society, with conflicts over the use of scarce water resources becoming more common between farmers, industry, energy, population needs, touristic activities etc.
- Intensification of rainfall in winter causing changes in watercourses and flooding. This is a slow onset phenomenon, yet with significantly increased risk of extreme meteorological events, including powerful 'Mediterranean episodes' with storms, winds and heavy precipitation. The multiple impacts on housing, infrastructure and economy peoples' lives can be devastating, as after Storm Alex in 2020 (Box 1).

Box 1: Storm Alex in the Alpes-Maritimes – winter 2020

Storm Alex was a shocking weather event, which ravaged the hinterland of Nice in winter 2020. In just a few hours, the equivalent of more than three months of rain fell in the Alpes-Maritimes. In the Tinée, Vésubie and Roya valleys, rivers rose more than 8 metres.

420 properties were destroyed, many simply swept away. Hundreds of km of roads were smashed up and bridges gutted or destroyed, leaving villages inaccessible for months and causing EUR billions worth of damage.

10 people were killed and 8 left missing in the aftermath of the storm.

The event remains firmly imprinted in the minds of public officials, rescue workers and the general population of the region.



Source: <https://www.francetvinfo.fr/>

- Sea level rise threatening the 1,000 km long coastline. Scenarios forecast rising of 25cm by 2050 and of 40cm to 1m by 2100, increasing up to 2m in the next century⁷. The Camargue delta, which lies partly below sea level, is likely to be the most affected area. The associated impacts are:
 - widespread threats to the safety of people, buildings, infrastructures and economic activities concentrated in the coastal area;
 - salinisation of groundwater with negative consequences for agriculture and natural habitats.
- The shrinkage and swelling of clay soils is a widespread phenomenon resulting from multiple aspects of climate change related to heat and rain. The combined impacts are likely to be:
 - destabilisation of soils, endangering the foundations of housing, buildings and network infrastructure.

Given the topography of the region, transport infrastructures (roads, highways, railways, metro, tramways, airports) are critically vulnerable to the various climate change risks described here and the consequences of associated extreme weather conditions.

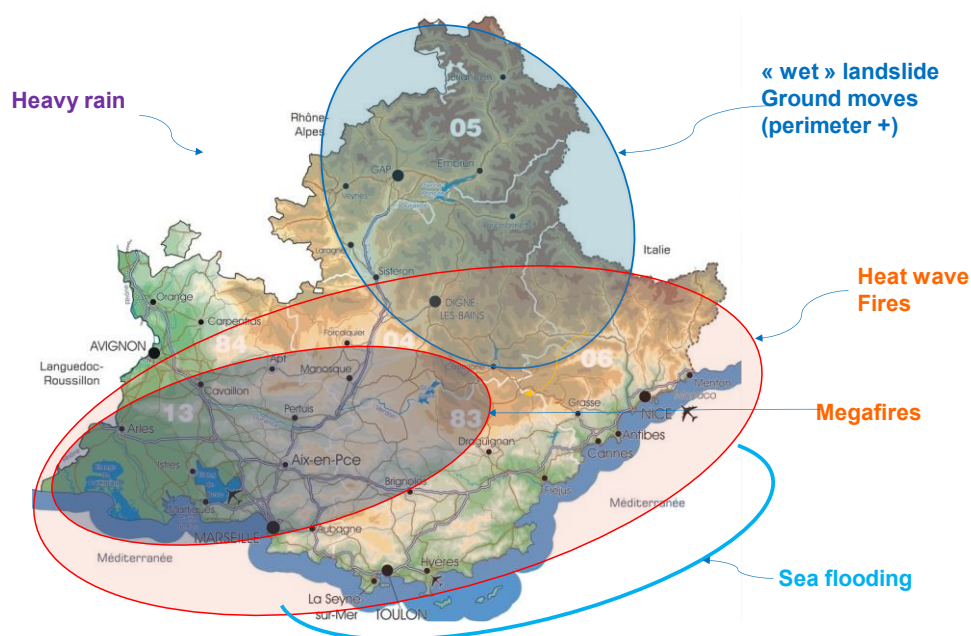
“By 2050, the forecasts predict the following impacts on the Metropole Aix-Marseille:

- *Heatwaves: 170-200 additional deaths annually*
- *Clay shrinkage and swelling: 24-55% increase in costs compared to 2021*
- *Air conditioning: €29-38m annually additional costs for households.”*

Source: (Metropole Aix-Marseille, 2023)

⁷ <https://citizenclimnet.fr/parcours-decouverte>

Figure 2: Grouping of main climate change risks facing different parts of Provence-Alpes-Côte d’Azur.



Source: Région Provence-Alpes-Côte d’Azur, 2023

2.3 State-of-play of CCA and innovation strategies

CCA Strategies

France adopted its first National Adaptation Strategy (NAS) in 2006, its first National Adaptation Plan (NAP) to cover the period 2011-2015 and its second NAP covering 2018-2022. The latter is currently under revision, with the third NAP expected in the first half of 2024. The Energy Transition Law for Green Growth ‘LTECV’⁸ (*Loi de transition énergétique pour la croissance verte*) adopted in 2015 provides for the preparation of Territorial Climate Air Energy Plan ‘PCAET’ (*Plan Climat Air Energie Territorial*) at local level (see below). The goals of the law concern climate change mitigation, energy poverty and waste reduction. The 2021 Law on Climate and Resilience⁹, seeks to ‘accelerate the ecological transition in all areas of daily life’ and targets CCA more directly by limiting land artificialisation (i.e. construction/installation of surfaces which leads to loss of land permeability), as examined in Section 3.2.

Provence-Alpes-Côte d’Azur region is a charter signatory of the EU Mission on CCA, although there is no dedicated CCA strategy as such yet at this regional level. CCA is covered in the region’s broader Climate Plan 2021-2026¹⁰ (the second such plan adopted by the region). CCA does not have a specific axis or objective under the Plan, but is visible under some of the axes (see section 3.1). Also relevant

⁸ <https://www.ecologie.gouv.fr/loi-transition-energetique-croissance-verte>

⁹ <https://www.ecologie.gouv.fr/loi-climat-resilience>

¹⁰ (Région Provence-Alpes -Côte d’Azur, 2021)

is the overarching territorial planning strategy for the region 'SRADDET' (*Schéma Régional d'Aménagement, de Développement Durable et d'Égalité des Territoires*) oriented towards SDGs and Paris Agreement with time horizons to 2030 and 2050. The SRADDET, currently under modification, aims to create a 'new territorial development model' covering 11 domains defined by national law, one of which relates to climate change. This has two objectives: 1) To fight climate change by reducing energy consumption, emissions and pollution; 2) To improve the resilience of the territory by protecting populations, biodiversity and natural spaces, carbon storage sinks.

At local level, a PCAET is obligatory for each inter-municipal grouping (EPCI) of more than 20,000 inhabitants. Half of the 36 EPCI in the region had adopted a PCAET by December 2023. The two main Metropolises have also each adopted a PCAET: Metropole Nice Côte d'Azur, for the period 2019-2025 - its second version – and Metropole Aix Marseille, for 2021-2027. As with the Climate Plan at regional level, CCA is present in these PCAETs under certain axes and measures, but not strongly visible. In certain parts of the region, legal provisions allow PCAETs to be defined in the context of Territorial Coherence Plans 'SCOT' (*Schéma de Cohérence Territoriale*) at higher territorial levels, through coordinated approaches to climate-air-energy planning between groups of EPCIs. There is also the 'PACA Climat' network of local authorities, coordinated by the regional directorate for environment, spatial planning and housing 'DREAL' (*Direction régionale de l'environnement, de l'aménagement et du logement*), which enables horizontal exchange between EPCIs on climate-related activities in the context of their PCAETs.

Innovation Strategies

As regards Research and Innovation (R&I) policies, the relevant strategic frameworks are enacted at the national and regional levels.

The French National Research Strategy aims to “respond to scientific, technological, environmental and societal challenges by maintaining a high level of fundamental research”¹¹. The Strategy identifies ten major societal challenges¹², for which the contribution of research and innovation is essential. While the National Research Agency 'ANR' (*Agence Nationale de la Recherche*) primarily supports new knowledge creation through bottom-up research activities selected on the basis of academic excellence, it also manages thematic programmes explicitly addressing these societal challenges. R&I is also promoted by the General Secretariat for Investments, directly under the Prime Minister, which supports major multi-sectoral projects aimed at deep transformations of French economy and society, with a radical innovation dimension.

In 2022, the Ministry of Higher Education and Research adopted a 'Climate-Biodiversity and ecological transition Plan for Higher Education and Research'¹³ to deliver France's international commitments to low carbon and ecological transition (Paris Agreement and EU Green Deal). The Plan seeks to promote not only research and technological innovation, but also social and organisational innovation, as well as transdisciplinary research co-constructed with citizens. It includes a commitment to incorporate

¹¹ <https://www.enseignementsup-recherche.gouv.fr/fr/qui-oriente-et-definit-la-politique-de-recherche-46108>

¹² 1. Sober management of resources and adaptation to climate change; 2. Clean, secure and efficient energy; 3. Stimulating industrial renewal; 4. Health and well-being; 5. Food security and the demographic challenge; 6. Mobility and sustainable urban systems; 7. Information and communication society; 8. Innovative, inclusive and adaptive societies; 9. A space ambition for Europe; and 10. Freedom and security for Europe, its citizens and residents.

¹³ Ministère de l'enseignement supérieur et de la recherche (2022).

ecological transition within all education programmes and in the management of Higher Education Establishments. It also promotes engagement in wider awareness raising and science communication activities on ecological transition.

An important component of French innovation policy is the ‘Future Investments Programmes’¹⁴ established in 2010, supporting the whole innovation life cycle with special attention to technology transfer and start-up creation. The territorial dimension has been enhanced in the latest wave of these programmes. The 55 French competitiveness poles¹⁵ distributed over the whole territory, gather public and private R&I and training actors in strategic domains. Through these poles, the aim is to create critical mass of collaborative innovation projects and foster innovation ecosystems, raising attractiveness of the whole national territory.

For Provence-Alpes-Côte d’Azur, the regional plan for economic development, innovation and internationalisation ‘SRDEII’¹⁶ (*Schéma régionale de développement économique, d’innovation et d’internationalisation*) 2022–2028, is the main R&I framework. The SRDEII includes the region’s Smart Specialisation Strategy (RIS3) 2021-2027, focusing on 8 strategic value chains in which the region enjoys competitive advantages in terms of innovation, growth and employment. In the context of the SRDEII, these value chains correspond to operations of regional interest ‘OIR’¹⁷ (*Opérations d’Intérêt Régional*), shown in the Box 2.

Box 2: Building blocks of PACA’s Smart Specialisation Strategy (RIS3) 2021-2027

- Sustainable agriculture
- Marine Economy
- Energies of tomorrow
- Industries of the future
- Smart Technology
- Tourism and creative industries
- Innovative therapies
- Silver economy

Each of these OIR is co-chaired by an elected regional representative and a business leader. They bring together public and private players who work together to identify and support strategic companies and projects for the sector.

¹⁴ Programme des Investissements d’Avenir : https://www.gouvernement.fr/sites/default/files/contenu/piece-jointe/2021/01/20210108_dp_programme_dinvestissements_davenir_vdef.pdf

¹⁵ <https://www.entreprises.gouv.fr/fr/innovation/poles-de-competitivite/presentation-des-poles-de-competitivite>

¹⁶ <https://www.maregionsud.fr/votre-region/competences/economie-et-emploi>

¹⁷ <https://www.orientation-regionsud.fr/Contenu/filieres-strategiques-oir>

3 Analysis against conceptual framework: Transformative Innovation for better Climate Change Adaptation

In their previous framework report (European Commission, 2024), the authors defined an analytical framework identifying seven key features of 'Transformative Innovation' as essential conditions for the design and implementation of CCA strategies with high ambition level. 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.

The analysis below follows this framework. The key characteristics of the territory's approach to CCA strategy development and implementation and their linkages with innovation policies and strategies, as revealed by the case study research, are explored in turn, in relation to the above seven features. Each feature constitutes a core section of the report.

3.1 Directionality: defining goals and expected impacts for society

Although Provence-Alpes-Côte d'Azur prides itself on being a frontrunner in green transition, this has so far almost exclusively concerned climate change mitigation, rather than CCA. There are no explicit overall goals for CCA in the region's Climate Plan, or in its territorial planning strategy 'SRADDET'. Even though certain scattered CCA-relevant measures and/or actions are present in both regional strategic documents, they do not provide strong directionality for transformative CCA. A similar situation exists with regard to the Territorial Climate Air Energy Plans 'PCAET' at Metropolitan level and that of other local authority groupings 'EPCIs' where these have been completed. Urban planning documents 'PLU' of individual local authorities generally add little or no strategic content on CCA, even in areas of high risk, such as those along the coast.

The new NAP under preparation, 'PNACC 3', is expected to bring added impetus to CCA activity, introducing a new planning scenario of +4°C by 2100. A new dedicated CCA strategy is being prepared for Nice-Côte d'Azur Metropole and a CCA strategy is planned at the level of the whole region with support from the EU Mission on CCA, but work on this has not yet begun. Strategic governance of CCA, insofar as it exists, originates mainly from the national level. There is no leadership specifically on CCA at regional level at present, nor any joint forum for CCA in the region.

3.1.1 Goal definition

National level

France's third NAP, 'PNACC 3' (*Plan National d'Adaptation au Changement Climatique 3*), currently under preparation, is founded on a 'National ecological planification' exercise, based on wide consultation and will cover three pillars: reducing CO₂ emissions; protecting biodiversity; and adapting to +4°C in 2100 compared to the pre-industrial era. The adoption of the +4°C trajectory is a milestone decision for France. All sectors will need to take that scenario as a reference, meaning that CCA is likely to assume significantly greater importance in all future.

The National Economic and Social Committee officially supports the approach of the +4°C trajectory, stating, '*In addition to a mitigation policy aimed at limiting greenhouse gas (GHG) emissions, which remains essential, there is an urgent need for new forms of adaptation to climate change, moving from reactive to anticipatory adaptation*'. The Committee calls for an '*innovative, systemic and fair adaptation strategy*'¹⁸. Regional and local authorities in the region were also generally positive about PNACC 3 during the interview research, emphasising the high-level political support behind it and the intensity of preliminary studies undertaken.

Regional level

¹⁸ <https://www.lecese.fr/presse/communiqués/face-au-changement-climatique-le-cese-preconise-une-strategie-dadaptation-systemique-et-juste>

At the regional level, the overarching territorial planning strategy SRADDET is obligatory (enforceable) but the Climate Plan is not¹⁹. Neither document spells out the concept of climate resilience in concrete terms, or sets an overall goal or target indicators for CCA. There is nevertheless a strong emphasis on using less land to achieve the same goals (*sobriété foncière*), limiting land artificialisation and territorial equity as general principles relating back to the national legal framework.

Among the SRADDET's 58 objectives, Objective 10 targets CCA most directly – 'To improve the region's resilience to risks and climate change, guarantee access to water resources for all'. In addition, there is a CCA dimension in Objectives 14, 15 and 16, which target water, biodiversity and forest management; in Objectives 50 and 51, on ecological continuity and in Objective 65, which promotes complementarities between infra-regional territories in terms of water, energy and environment. Of the SRADDET's 'rules' – which translate the objectives into obligations – the three most closely related to CCA concern the obligation to carry out vulnerability analyses, 'sobriety' in water management and de-sealing of soil in urban areas (Box 3).

Box 3: The 3 'rules' of the SRADDET for Provence-Alpes-Côte d'Azur most closely related to CCA

SRADDET OBJECTIVE 10: Improve the region's resilience to risks and climate change, guarantee access to water resources for all

1. **Rule GL1 - OBJ1 A** - Ensure the availability of water resources in the medium and long term right from the start of the regional planning project by: integrating upstream/downstream solidarity at catchment scale in the definition of objectives relating to the protection and management of water; optimising the use of local resources before resorting to new water investments.
2. **Rule GL1 - OBJ1 B** - Integrate an approach to reduce the vulnerability of the area by anticipating the accumulation and increase of natural risks.
3. **Rule GL1 - OBJ1 C** - Avoid and reduce soil sealing by adapting urban development practices.

Source: Région Provence-Alpes-Côte d'Azur (2019).

The Regional Climate Plan 2021-2024 has 6 priority axes: Air, Sea, Land, Energy, Waste and 'At home, day-to-day'²⁰ addressing 25 themes. None of the global goals target CCA directly, but CCA-relevant items are found among the 141 measures under different axes – for example:

- Axis 1 (Air): Measure 11 is '*Adapt transport system to climate change impacts*'.
- Axis 2 (Sea): one of the three objectives is to '*adapt coastlines to climate change: reducing vulnerability of coastal territories to flooding and erosion while maintaining naturality of coastline*', while Measure 38 is '*Encourage solutions inspired by nature to redevelop the coastline and combat erosion*'.
- Axis 3 (Land) : Measure 66 targets the '*Systematic integration of risks into urban planning and development policies, as well as measures to reduce soil sealing in accordance with the rules set out in the SRADDET*'. Under this axis, several other measures under 'biodiversity' and 'agriculture'

¹⁹ Région Provence-Alpes-Côte d'Azur (2019) and Région Provence-Alpes-Côte d'Azur (2021) respectively.

²⁰ Under this axis, a series of instruments are listed and discussed in Chapter 2 below.

also relate to CCA. Water management is also addressed, particularly under Measures 46 and 62, whilst the specific situation of mountain areas is covered by Measure 55 *'Mountain Preservation Plan'*. Also CCA-relevant are measures related to biodiversity and forest management, such as Measure 57 *'Forest of tomorrow'* and several measures related to fire prevention and disaster risk management in forests. Measures 62 to 64 support *'Managing water resources and preserving aquatic environments'*, with Measures 65 to 70 aimed more generally at *'anticipating natural risks'*.

A dedicated CCA strategy is envisaged for Provence-Alpes-Côte d'Azur, notably with support from the EU Mission CCA. However, no concrete progress has been made on this so far.

Local level

The two main Metropoles, Aix-Marseille and Nice-Côte d'Azur, have each a PCAET²¹, in line with the Energy Transition Law for Green Growth, as mentioned in introduction. These are approved by the Region as they must be aligned to SRADDET. The 5 objectives of PCAETs are determined by the law:

1. Reducing greenhouse gas emissions
2. Energy efficiency
3. Development of renewable energies
4. Air quality
5. Adaptation to climate change.

As with the regional Climate Plans this last objective does not feature prominently in either Metropolitan strategies. Both are addressing CCA more through the incorporation of adaptation in land planning and urban documents, with emphasis on de-sealing of soils – notably the Permeable City Strategy for Nice-Côte d'Azur - and combatting urban heat islands. Nevertheless, Nice-Côte d'Azur is currently working on a dedicated CCA strategy, with the commissioning of new studies and the establishment in 2023 of a High-Level Council for Climate and Biodiversity²².

A multiplicity of urban planning documents (PLU) exists at the level of individual local authorities. A recent study, which carried out an analysis of these plans for 65 coastal Municipalities in the region, however, found that a CCA dimension related to coastal risks is barely present in documents concerned (Box 4).

3.1.2 Strategic governance

High-level political commitment and leadership at national level on CCA is evident from the current exercise of developing France's third NAP, PNACC 3. At the level of Provence-Alpes-Côte d'Azur, strong commitment also exists for the region's Climate Plan as a whole. The region was nominated in 2022 as a 'national pilot'²³ under the 'National ecological planification' exercise mentioned above and

²¹ The third one - Métropole Toulon Provence Méditerranée has a project of PCAET.

²² <https://transitionecologique.nicecotedazur.org/agir/haut-conseil-local-pour-le-climat-et-la-biodiversite/>

²³ [Planification écologique : Provence-Alpes-Côte d'Azur choisie comme région pilote \(banquedesterritoires.fr\)](#).

launched its own 'Regional COP²⁴' (Conference of the Parties – echoing the well-known UN exercise) in November 2023, in order to align national goals and regional specificities in this broader Climate Plan context.

Deconcentrated structures of national authorities are key players in climate action in the region. These include most notably ADEME (Agency of Ecological Transition) and DREAL (Regional Directorate for environment, spatial planning and housing) and CEREMA (Centre for Studies and Expertise on Environmental Risks, Mobility and Land Use). The Ministry of Ecological Transition and Territories Cohesion has a supervising role for all three Agencies, with ADEME also answering to the Ministries of Energy Transition and of Higher Education and Research. They are all active in CCA activity, in addition to other climate related fields, mainly mitigation. However, for CCA specifically, strong leadership is not detectable at the level of the region itself. There is so far no obvious 'place' for gathering all relevant actors around CCA themes, nor any clear organisation of attributions within the Regional Council services distinctly for CCA. Progress in this area appears to rely more on certain committed individual officials. At local level, elected mayors retain full decisional power within their constituencies, despite the existence of EPCI.

Challenges for CCA in local urban planning documents in coastal Municipalities in Provence-Alpes-Côte d'Azur are shown in Box 4.

Box 4: Challenges for CCA in local urban planning documents in coastal Municipalities in PACA

An independent analysis was carried out in 2021 on the extent to which coastal risks are taken into account in the urban planning documents (PLU) of all the 65 coastal Municipalities of the Provence-Alpes-Côte d'Azur region. The objective was to assess how seriously sea-level rise, coastal risks and climate change adaptation are addressed in spatial planning at this territorial level. The results show that an agenda for adaptation to coastal risks is not being strongly implemented in local urban planning in the region, despite the provisions made under French public policies.

- While local planning documents evoking coastal risks cover almost 78% of the region's coastline, the risks are described in detail for less than 50% of the total length of the coast.
- Of the 34 coastal Municipalities with a planning document mentioning coastal floods and erosion, only 23 have urban planning regulations which include building and planning rules related to these risks. These account for 60% of the total length of the region's coast.
- Overall, the coastline features relatively weak regulatory provisions relating to coastal risks. Apart from the Camargue, there is no large territorial subset where measures are aimed at reducing and anticipating these risks. Where they exist, regulatory provisions are slim, most often "cheap and easy" measures. Territorial projects laying the groundwork for a new way of planning and inhabiting the coast are rare.
- As of July 2019, almost all Municipalities along the region's coast had been officially informed by the State about sea-related risks highlighted in recent studies, which is likely to influence revisions of local plans.

²⁴ [Cop regionale Diaporama.pdf \(prefectures-regions.gouv.fr\)](#)

Both in terms of natural hazards and vulnerability of territories, the PLU examined contain relatively little information on coastal risks. Most include sparse data on coastal floods and erosion, while none provides an assessment of the consequences of sea-level rise for the territory. For example, no attention is paid to any possible loss of beach tourism and the ensuing impact on the local economy.

In fact, these PLU do not really address climate change, sea level rise and coastal risks, in terms of adaptation.

Source: Robert and Schleyer-Lindenmann, 2021

3.2 Articulating instrument portfolios and defining synergies between funding sources

The bulk of instruments available to the region for supporting CCA investment come from the national level. Region-specific resources are small by comparison. National legal instruments make arguably the most important contributions to directing CCA action in water management and de-sealing of soils under spatial plans at lower territorial levels - the latter through a policy of 'net zero artificialisation of land by 2050'. As regards national funding instruments, none are specifically dedicated to CCA by name, but many can - in principle – finance CCA-relevant analyses and/or investments in CCA solutions, as part of other objectives such as water management, urban development, modernisation of agriculture, tourism, etc. Certain conditionalities exist to align national and regional funding interventions to the region's Climate Plan. However, adequate filters are not in place to prevent the financing of maladaptation, such as irrigation without sufficient consideration of long-term water availability, or facilities for producing artificial snow in mountain areas. Overall, there seems to be a lack of demand for genuine CCA initiatives with transformative goal, rather than a lack of available funds.

Out of a total EU Cohesion Policy envelope for the region of €615m for 2021-2027, there is an ERDF allocation of €17m for CCA investment, but the relevant call has not yet been launched. There may also be some possibility for ERDF financing of CCA in mountain areas under territory-based interventions, as well as under Interreg Italy-France. EAFRD can finance CCA activity with regard to animal and plant production systems in agriculture, but the financial amounts likely to come to the region for this are not known.

The region's RIS3 does not play any role in orienting EU funding towards R&I efforts for CCA. Certain national funding channels, notably the National Research Agency (ANR), may finance research in the region relating to CCA, but this is not the result of ex ante orientation of the funding.

3.2.1 Domestic instruments for climate action

National level

Various national funds and instruments can finance CCA-related activities in France, but there is no distinct budget branding for CCA at the national level. The most visible national driver of CCA action is in fact a regulatory instrument under the Law on Climate and Resilience²⁵. This notably includes the

²⁵ <https://www.ecologie.gouv.fr/loi-climat-resilience>

obligation for all local authorities, by 2050, to stop land artificialisation by compensating any new artificialised land area with an equivalent in re-naturalised area. The law has an intermediary objective of halving the rate of land artificialisation by 2030 and arriving at net zero 'ZAN' (*zero artificialisation nette*) by 2050 (Box 5).

Box 5: The Law ‘Zero net artificialisation by 2050’ (ZAN)

As part of the 2021 Climate and Resilience Law, France has set itself the goal of achieving ‘Zero net artificialisation of land’ (ZAN) by 2050, with an intermediate target of halving the consumption of natural, agricultural and forest areas over the ten years to 2031. The ZAN Plan aims to ‘renaturalise’ an area for every area that is built up. The objective is to reduce pressure caused by land artificialisation on the environment: increased risk of flooding; amplification of soil erosion; loss of biodiversity; global warming due to lower CO₂ absorption; pollution; loss of agricultural productivity; increasing heat island phenomenon in urban areas.

This gradual trajectory is to be set out in planning and urban development documents at all levels: regional schemes (SRADDET in particular) must integrate this objective by November 2024, and Territorial Coherence plans (SCOTs) and Local Urban Plan documents (PLUs) before February 2027 and February 2028 respectively. However, in response to the difficulties and concerns expressed by local authorities, a law was enacted in 2023 to provide local elected representatives with greater support in implementing ZANs as well as granting new deadlines.

Source: Ministère de la transition écologique et de la cohésion des territoires (2023)

Other key national regulatory instruments include the Plan for the prevention of flood risks ‘PPRI’ (*Plan de prévention des risques d’inondation*), which features stricter rules for building in flood-prone areas. However, the PPRI is not calibrated to extreme events of a scale which might result from accelerated climate change.

As regards national financing instruments, the most relevant for CCA include the following:

- The Water Agency²⁶ provides financial assistance for projects - often co-funded by local or Regional authorities – to improve water quality and availability. A new Water Plan was adopted in this regard, with a budget of €3bn distributed via regional Water Agencies, following the extreme drought of 2023. Projects include maintenance of water systems, on condition that there is no increase of water use as a result. Nature based Solutions (NbS), de-sealing of soils and renaturing are important priorities for this funding, although there is no filter against accidentally supporting maladaptation, such as irrigation in agriculture, watering of public spaces, or artificial snow systems provided these are using less water overall.
- The Green Fund²⁷ (*Fonds d'accélération de la transition écologique dans les territoires - Fonds Vert*), created in 2023 under the Ministry for Ecological Transition and Territorial Cohesion, has an annual budget of €2.5bn up to 2027. CCA is one axis of the Fund, but its emphasis appears reactive, rather than transformative. According to analysts at the French Institute of Economy for Climate, this funding is actually used more for climate change mitigation investments - such as building renovation or LED street lighting – than for CCA.²⁸

²⁶ https://www.eaurmc.fr/jcms/pro_123831/fr/nouveau-plan-de-bassin-d-adaptation-au-changement-climatique-pour-le-bassin-rhone-mediterranee-2024-2030

²⁷ <https://www.banquedesterritoires.fr/solution-fonds-vert>

²⁸ <https://www.i4ce.org/adaptation-plf-2024-concretise-des-avancees-mais-reste-loin-du-compte-climat/>

- The Fund for prevention of major natural risks ‘FPRNM²⁹’ (*Fonds de prévention des risques naturels majeurs*), with €200m annual budget, can be used by local authorities to carry out studies, or capital expenditure on works or equipment to prevent or protect against natural hazards. It can also be accessed by private individuals or companies to reduce the vulnerability of existing properties at risk of flooding.
- ADEME provides subsidies³⁰ to support the planning of territories’ ecological transition, including studies, investment in solutions, innovation and the sharing of solutions. This can include CCA, but so far the main focus of awards has been on mitigation.

In other domains, certain national instruments can be used to fund CCA, but their actual mobilisation in this sense could not be determined during the research. Examples of such instruments include:

- Future Mountains Programme ‘Avenir Montagnes’³¹, under the National Agency for Territory Cohesion (ANCT), which supports local authorities and socio-economic partners in the preservation of natural heritage in mountain areas.
- The Bank of Territories, which provides loans for projects to protect the coastline and local populations and preserve natural resources in the face of climate change and natural disasters³².

An independent analysis of France’s national budget for 2024, carried out by the Institute for Climate Economy, concludes that while progress is being made, instruments put in place are mostly geared towards responding to crises. They are not supporting the development of anticipatory and transformative approaches to preparing the country to adapt effectively to climate risks (Box 6).

Box 6: CCA in the 2024 French national budget: crisis management rather than systemic transformation

The French Institute for Climate Economics (I4CE) analyses French national budgets against their contribution to climate action. Its analysis of the latest budget (2024) points out that CCA has been taken into account for the first time, with several increases in funding – for instance, the civil protection equipment budget is being increased to respond to the changing nature of risk. However, the analysis concludes that most budget increases are geared towards crisis management, or reacting to events that occurred in 2022 and hardly at all towards reducing upstream vulnerabilities. As a result, the analysis argues that, while the actions financed in the 2024 budget will certainly help to increase reactive capacity in the years to come, it is substantially less convincing as to how it will address the more structural transformations that are needed, such as adapting cities to extreme heat, or developing an agricultural model that is resilient to intense drought.

The analysis notes that, along with increased budgets of existing programmes targeting crisis management, the first envelopes for specific CCA actions have been released, particularly to local authorities. While these initiatives are a step in the right direction, their impact has so far been limited. Very few CCA projects have

²⁹ <https://www.ecologie.gouv.fr/financement-prevention-des-risques-naturels-et-hydrauliques>

³⁰ <https://agirpourlatransition.ademe.fr/collectivites/financez-vos-projets>

³¹ <https://aides-territoires.beta.gouv.fr/programmes/ruralite-montagne-anct/> <https://www.banquedesterritoires.fr/programme-avenir-montagnes>

³² <https://www.banquedesterritoires.fr/offres/adaptation-changement-climatique-littoral>

actually been financed in 2023, due to a lack of projects ready to be deployed on the ground. The analysis argues in favour of stepping up support for those players who need to adapt.

Source: <https://www.i4ce.org/adaptation-plf-2024-concretise-des-avancees-mais-reste-loin-du-compte-climat/>

Regional level

Like other regions in France, the Regional Council of Provence-Alpes-Côte d'Azur largely delivers national funds in the context of CCA, rather than developing its own. However, the Region does deploy certain relevant instruments on its own initiative. For example, the Regional authority seeks to dedicate 20% of its budget to the objectives of its Climate Plan, with a target of 50% of its economy budget deployed in the fight against climate change, equating to some €200m over the period 2021-2026. This includes approximately 50% of the Fund for investment in regional enterprises 'FIER' (*Fonds d'Intervention pour les Entreprises Régionales*), supporting over 1,000 enterprises to address the challenges of the Climate Plan (Measure 99 of the Climate Plan). The share of these resources going specifically to CCA, however, is not known.

Under the 'FRAT' (*Fonds Régional d'Aménagement du Territoire*), renamed 'Our territories and our Municipalities first', the Regional Council directly supports land planning projects at Municipal level in line with Climate Plan³³, with €574m over the 5 years 2021-2026. Part of this allocation is for health-friendly urban planning, renaturing projects in public spaces, combatting the urban heat island effect, water resource and rainwater management and biodiversity enhancement (Measures 118, 119, 122, 123 and 124 under the Climate Plan). Here too, though, the share dedicated precisely to CCA is unknown, but does embrace the Region's annual Call for projects under the 'Mon Littoral' initiative³⁴, conducted jointly with the French government, through the regional directorate for environment, spatial planning and housing (DREAL), which aims to adapt beaches to future climate changes using NbS and preserving marine and coastal ecosystems.³⁵

Some measures that are CCA-relevant in the region's Climate Plan might be questioned for risking maladaptation. Measure 46, for example, targets an increase of the land area currently irrigated by 15%, whilst Measure 55 supports 'renovation of snowmaking networks to improve water and energy management'³⁶.

"We are still funding the ancient world – snow cannons and irrigation systems – not the new world"

Source: Interviewee from the Regional Council

3.2.2 Domestic R&I instruments

National level

The largest public R&D budgets are available at national level. France 2030³⁷ is a main national investment plan designed to help France to 'catch up in terms of industrial development, invest massively in innovative technologies and support the ecological transition'. It has a total budget of €53bn over the period 2022-2030, including approximately €1bn annually for research, distributed competitively by the National Research Agency (ANR). This will comprise funding for 15 'Priority research projects and equipment' (PEPR - *Programmes et Equipements Prioritaires de Recherche*). A new PEPR started in

³³ <https://www.maregionsud.fr/votre-region/competences/amenagement-du-territoire>

³⁴ <https://www.monlittoral.fr/organisations/dreal-provence-alpes-cote-dazur/>

³⁵ <https://www.monlittoral.fr/2021/07/resultats-de-lappel-a-projet-adaptation-des-littoraux-au-changement-climatique-lenjeu-de-lerosion-des-plages-annees-2019-et-2020/>

³⁶ According to draft: Région Provence-Alpes-Côte d'Azur (2024).

³⁷ <https://www.economie.gouv.fr/france-2030>

2023 with the aim to ‘transform climate modelling methods by improving our understanding of impacts and risks, in order to develop climate services and meet society’s expectations in terms of adaptation and resilience’. In this context, Calls have been launched for research into the phenomenon of clay soil shrinkage and swelling and in relation to agricultural and food transitions³⁸, worth a total of more than €2.3bn, although CCA is only a possible dimension of the latter. In addition, ANR finances bottom-up research, including in CCA fields. However, there is no record of amounts dedicated to CCA-relevant R&D projects funded by ANR, or in the French national R&D budget overall.

Box 7: Examples of two CCA-relevant research projects underway in Provence-Alpes-Côte d’Azur

Both projects use interdisciplinary research methods.

Project Cool-Ammetropolis - Towards the reduction of CO2 emissions and urban heat islands in the Aix-Marseille-Provence Metropolis, using an interdisciplinary approach. The project aims to:

- characterise and improve the spatio-temporal representation of fossil CO2 emissions and compare them with biogenic emissions;
- characterise the variability of urban heat islands and CO2 concentrations, on diurnal and seasonal scales, at all spatial scales over the Metropolis;
- define and assess the benefits of developing scenarios for adapting to climate change up to 2035, in terms of CO2 and urban heat islands.

Source: <https://www.adaptation-changement-climatique.gouv.fr/s-inspirer/projets-recherche/cool-ammetropolis-vers-la-reduction-des-emissions-co2-et-des-ilots>

Project TOP - Trajectories of mountain agro-pastoral systems: adapting practices to climatic, ecological and socio-economic changes. The TOP project uses the conceptual framework of socio-ecosystem science and land science to understand the trajectory, vulnerability and resilience of agro-pastoral systems to changes in climate, vegetation and the socio-cultural and economic context.

Source: <https://www.adaptation-changement-climatique.gouv.fr/s-inspirer/projets-recherche/top-trajectoires-des-systemes-agro-pastoraux-en-montagne-adaptation>

Various national Agencies carry out CCA-relevant studies, such as CEREMA and the French Geological Survey (BRGM), but do not distribute funds for research. These are examined later under ‘Knowledge sources’ in Section 3.7.

Regional level

The Regional Council has limited budgets for research and focuses on applied and cooperative research, often co-funding national resources. Regional Council funding follows orientations of the Regional Plan for Higher Education, Research and Innovation ‘SRESRI’ (*Schéma régional de l’enseignement supérieur, de la recherche et de l’innovation*). SRESRI has recently acquired a new selection criterion for research projects ‘contribution to Climate Plan’, but its operationalisation is relatively weak (binary) and does not distinguish CCA.

³⁸ <https://www.banquedesterritoires.fr/ami-demonstrateurs-territoriaux-des-transitions-agricoles-et-alimentaires>

Under the Fourth Investments in the Future Programme 'PIA4' (*Programme d'investissements d'avenir 4*)³⁹, the Regional Council jointly invests with the State in actions to promote the development of innovative businesses. The Programme finances individual or collaborative projects of regional or even national scope, in line with the regional priority operations (OIR – *Opérations d'Intérêt Régional*) defined in the Regional Plan for Economic Development, Innovation and Internationalisation, SRDEII, the Smart Specialisation Strategy (RIS3) and the Regional Climate Plan. While an 'eco-conditionality' and a requirement of 'contribution to Climate Plan' prevail for the selection of R&D projects, these do not translate into explicitly CCA-oriented criteria. Nearly €74m will be made available up to 2025 to fund these investments through three complementary actions:

- 'Innovation Projects': financial assistance to R&D carried out by local SMEs or intermediate-sized businesses (ETIs) at the feasibility study or development stage.
- 'Collaborative R&D projects (I-Démo Régionalisé)': support for collaborative research and development projects, involving one SME or ETI and one research partner, with the aim of disseminating and integrating results within a given sector.
- 'Projects to support and transform sectors': assistance for the structuring of key regional sectors through pooled investment and R&D expenditure.

RIS3 has no visible role in supporting innovation for CCA. The OIR are vast and geared to major projects, some in mitigation like hydrogen. In practice, certain domains may contribute to CCA, such as space technologies for earth observation, but CCA is not a specific focus here.

The Regional Council and the regional delegation of the Ministry of Ecological Transition (DREAL PACA) fund student theses, which can be oriented towards CCA. For example, DREAL⁴⁰ invited Master students from the National Academy for Architecture in Marseille 'ENSA-M' (*École nationale supérieure d'architecture de Marseille*) to work on exploratory planning proposals around the theme of "Living on the coast tomorrow", imagining the future of coastal areas in the context of climate change and rising sea levels.

3.2.3 EU instruments for climate change adaptation

The Regional Council is Managing Authority (MA) for the European Regional Development Fund (ERDF), European Social Fund (ESF+), Just Transition Fund (JTF) and European Agricultural Fund for Rural Development (EAFRD) in the region, as well as for Interreg Euro-MED⁴¹. Projects are usually co-funded by both national and regional funds. It is understood that the Region did not make substantial use of ERDF for CCA investment during the 2014-2020 phase. The MA reported that pressure to spend quickly, augmented by the addition of REACT EU resources did not favour targeting of CCA where solutions were not mature and related projects not ready. For 2021-2027, the total EU allocation for ERDF, ESF+ and JTF is €615m. The emphasis of ERDF investment in climate action has so far been squarely on mitigation, with calls launched on energy renovation of social housing and public buildings

³⁹ http://innovationavenir-provencealpescotedazur.fr/2023-09-19_AAP_filieres_PIA4_Sud-PACA.pdf

⁴⁰ <https://www.monlittoral.fr/ressources/habiter-demain-le-littoral-projets-de-fin-detude-des-etudiant-e-s-ensam-juillet-2022/>

⁴¹ <https://europe.maregionsud.fr/leurope-en-action/la-region-autorite-de-gestion>

and investment in the green and blue grid. JTF support is concentrated in the Department of Bouches-du-Rhône, also with the accent on mitigation, including optimisation of the materials cycle, low-carbon energy mix and innovation for industrial ecology⁴². A modest €17m of ERDF is available for CCA investment under Specific Objective 2.4 (incorporating disaster risk management and climate change adaptation), but no CCA Calls have yet been launched. A call focused on NbS is expected to be launched later in 2024. There is also a possibility of limited support for CCA under integrated territory-based interventions under Priority Objective 5 targeting mountain areas.

The region is involved in various Interreg activities which have relevance for CCA, for example:

- Interreg cross border Programme France-Italy Alcotra - notably the ACLIMO⁴³ project providing support for preserving natural heritage, through better understanding of the effects of climate change on the habitats and species most vulnerable to reducing water resources. Also the ALP'AERA⁴⁴ project improving governance of CCA in the French-Italian Alpine valleys and developing indicators for monitoring climate and air quality in the area.
- Interreg transnational cooperation Next Med⁴⁵ - with an emphasis on CCA, disaster risk prevention and resilience in the Mediterranean region taking into account ecosystem-based approaches.

As regards the EAFRD, France's National Programme for Agriculture and Rural Development 2022-2027 'PNDAR' (*Programme national de développement agricole et rural*)⁴⁶ aims to intensify and enlarge the agro-ecological transition by combining the creation of economic and environmental value. One of the nine priority themes of the PNDAR is '*Supporting the adaptation of animal and plant production systems in the face of hazards and climate change, with particular emphasis on water-saving and efficient management*'. CCA-relevant investment in agriculture is therefore foreseen for the EAFRD, but the funding volume going to Provence-Alpes-Côte d'Azur is not known.

Under Horizon Europe, Provence-Alpes-Côte d'Azur is a charter signatory of the EU Mission Ocean, as well as the Mission CCA, as mentioned earlier. In the context of the Mission CCA, the region is part of the CardiMed project involving many partners (see Box 13 in Section 3.6).

3.2.4 International programmes

Through the UN Environment Programme (UNEP) Action Plan for Mediterranean, the region participates in the 'Blue Plan', under which studies and future scenarios are developed to raise awareness among Mediterranean stakeholders and decision-makers of key sustainable development issues in the region. One project under the Plan, CASadapt⁴⁷, explores options for adapting the socio-ecosystems of the Mediterranean coast to climate change. In addition, the International Atomic Energy Agency (IAEA) Marine Environment Laboratories, located in Monaco, work closely with the surrounding Provence-Alpes-Côte d'Azur region on preventing Mediterranean and coastal pollution, and indirectly partially also on related scenarios to prevent climate change damage.

⁴² <https://europe.maregionsud.fr/actualites/detail/la-region-sud-region-pilote-en-france-de-la-planification-ecologique>

⁴³ <https://www.interreg-alcotra.eu/fr/aclimo>

⁴⁴ <https://www.interreg-alcotra.eu/fr/alpaera-aide-la-gouvernance-de-lair-et-du-climat-en-zones-alpines-alcotra>

⁴⁵ <https://www.interregnextmed.eu/>

⁴⁶ <https://agriculture.gouv.fr/le-programme-national-de-developpement-agricole-et-rural-pndar-contexte-et-objectifs-2022-2027>

⁴⁷ <https://planbleu.org/projets/casadapt/>

3.3 Ensuring cross domain synergies

Efforts to mainstream CCA into the implementation of policies are visible in the region – particularly in relation to water management (with water scarcity as a main driving force), coastline and land management. Re-naturing, de-sealing of soils and other NbS can be seen as priorities in the deployment of solutions and gradually increased use of bioclimatic architecture is evident. Outside the national regulatory obligation for land ‘de-artificialisation’, mainstreaming generally progresses in these fields through dialogue and persuasion rather than through hard criteria. There are also certain mismatches between fiscal rules at local level and the need for CCA, such as conflicts between expanded urban greening and fines imposed to restrict the use of water vital for maintaining green infrastructures.

Examples of area-based initiatives around the region – some very large - which integrate CCA into other socio-economic objectives are encouraging. However, an overview is lacking of CCA needs across all sectors under extreme future scenarios like, for example, 500C urban summers. Little progress is visible in relation to healthcare in the context of severely increased urban heat effect, or across a range of new diseases which might be foreseen. CCA is not yet mainstreamed in economic development – notably in tourism, agriculture, which are so important to the region. Here, the prevailing attitude appears to be mainly one of maintaining business-as-usual with only incremental adjustments.

Apart from the voluntary Regional Climate Plan, the main regional level tools for mainstreaming CCA in Provence-Alpes-Côte d’Azur are the planning documents SRADDET, Territorial Coherence Plan (SCOT) and the PLU at local level. There are also plans for the prevention of risks ‘PPR’ (*Plans de prévention des risques*), which are imposed by the State. However, there is a lack of compulsory mainstreaming criteria in these documents. For projects funded by the Region, integration of CCA elements generally occurs through dialogue and persuasion, rather than hard criteria. The national legal provisions on zero net artificialisation by 2050 represent the main compulsory incentive for change, but this does not cover all aspects of CCA, so mainstreaming remains somewhat truncated.

In this context, CCA mainstreaming into the implementation of different policies can be seen to be progressing in Provence-Alpes-Côte d’Azur, in the fields of:

- Land planning: de-artificialisation - de-sealing of soils and re-naturing.
- Incorporation of climate change risks in building practices: combatting the urban heat island effect, bioclimatic architecture, particularly as an alternative to air conditioning, and adapting to clay soil shrinkage and swelling.
- Coastline management.
- Water management.

However, CCA mainstreaming is lagging behind in:

- The tourism sector: business-as-usual largely prevails, although with some consideration of new approaches, such as lengthening the season in mountain resorts.
- Agriculture: water scarcity is a main concern, but the focus is mainly on technical improvement of irrigation systems or marginal changes in production techniques, rather than deeper transformation or a change in business models.

- Healthcare: regional health agencies are not mobilised in the CCA debate. The upcoming regional Health Environment Plan may initiate positive developments as it plans to integrate climate adaptation in health policies and address urban developments practices favourable to health.

Services in the Regional Council involved in CCA generally work across departments at technical level, however their linkage with economic development departments is reportedly weak. Agriculture presents a particularly difficult challenge. During the interview research, farmers in the region – as elsewhere in France and Europe - were engaged in highly disruptive and sometimes violent protests, which had a substantial connection with their perception of the effects of environmental regulations on the sector.

At local level, fiscal rules can cause difficulties for authorities wishing to carry out CCA actions. Traditionally, they have been able to augment local budgets thanks to real estate investments. However, ‘ZAN’ rules prohibit substantial new construction, particularly in commercial centres. CCA expenditure is seen as a cost inflating

“We need to plant much more vegetation in our towns and cities to help combat the urban heat island effect. Yet at the same time, due to environmental regulations, we shall be fined for watering that vegetation. Therefore, there’s a very real risk that this crucial green infrastructure will die and our investment will have been for nothing. How do we square the circle?”

Source: Interviewee from Metropole administration

local budget deficits rather than an investment. In coastal adaptation especially, there remain many regulatory and technical obstacles, which the ‘*Mon Littoral*’ initiative⁴⁸ conducted jointly with DREAL, is designed to help overcome.

In Aix Marseille Metropole, there is a strong focus at present on combatting the urban heat island effect, but how to translate this challenge into obligations in urban planning and building regulations has not yet been fully worked out. The PCAET of Aix Marseille Metropole⁴⁹ has ambitious CCA mainstreaming goals, for example:

- commitments in urban planning and development documents to a policy of resilient development in the face of the risks of thermal discomfort, flooding, fire, or tension over water resources;
- increased robustness of economic activities and infrastructures in the face of climatic hazards, particularly for medical and social establishments and energy networks;
- more sustainable management and consumption of water resources;
- heightened awareness of climate risks among the general public and socio-economic players.

The Metropole nevertheless recognises that for most of these goals, efforts will need to be substantially increased from their current level and sustained if they are to be realised. Currently, an overall vision across all relevant sectors seems lacking of what life might be like under extreme future scenarios, such as regular 50°C urban summers.

⁴⁸ <https://www.monlittoral.fr/organisations/dreal-provence-alpes-cote-dazur/>

⁴⁹ Métropole Aix-Marseille Provence (2023).

The City of Marseille is a participant in the EU Mission ‘100 Climate Neutral and Smart Cities by 2030’ and produced its ‘City Climate Contract’⁵⁰ in 2023. CCA is one dimension under one of its five objectives, ‘Strengthening our Mediterranean model of the green city’. Studies have been carried out on specific challenges in the old historical centre with respect to CCA, examining the impacts of urban re-naturing; mapping of potential ‘fresh islands’ in the city. Proposed actions include, de-sealing of soils starting with city-owned land, re-use of grey water, renaturing the coastline and protecting the Posidonia plant, as natural solutions against coastal erosion. The City is applying regulations on flood prevention plans and working on urban densification in line with ZAN rules. However, it is proving difficult to reconcile de-artificialisation goals with the City’s growing needs for housing.

Box 8: Major planned urban greening project Parc des Aygalades, Marseille

One large CCA-relevant project planned for Marseille is the Parc des Aygalades. The aim is to convert the Canet site (25 ha), currently owned by the French national rail company SNCF, into an urban park. It is a complex project that responds to many challenges, both technical and social, with an expected cost of around €36m.

This heavily degraded former industrial site sits on highly polluted land and is subject to torrential flood risk from the Aygalades watercourse which passes through it stream, where it is located. The project will feature depollution of land using plants and renaturing of the banks of the Aygalades.

The planned 16ha park will alleviate the flooding risk through extensive use of Nature based Solutions (NbS). At the same time, it will improve air quality, substantially enhance biodiversity and help to control the urban heat island effect.

Importantly, the park will also provide an attractive leisure facility, improving the wellbeing of residents in a traditionally deprived area. It will serve to link this area to new employment and social opportunities arising in surrounding areas also under redevelopment.



Artists impressions of the future Parc des Aygalades, Marseille.

Source: [Parc des Aygalades, Site du Canet, Marseille \(tourisme-marseille.com\)](https://www.tourisme-marseille.com)

Source: [Le parc du ruisseau des Aygalades | Euromediterranée \(euromediterranee.fr\)](https://www.euromediterranee.euromediterranee.fr)

Ramatuelle is a small coastal Municipality of only 2,000 inhabitants near St. Tropez. It is relatively wealthy due to its popularity as a tourist destination. Ramatuelle’s PLU has been revised in line with

⁵⁰ <https://www.marseille.fr/marseille-2030-objectif-climat-et-le-programme-100-villes>

the key objective of better reconciliation between economic development and the protection of the local environment. The Municipality has recently completed a holistic transformation of a degraded beach area, with extensive use of bio-materials. The initiative includes measures to reduce energy consumption and GHG emissions by limiting motorised circulation, as well as to protect people from extreme heat, encourage animal and plant biodiversity and curb light and noise pollution. CCA features among its many goals.

Box 9: Ramatuelle: reconciling economy, environment, biodiversity and CCA

The 2018 Local Urban Plan of the coastal Municipality Ramatuelle is an ambitious planning document prepared with the contribution of a multi-disciplinary team of experts. The plan aims at combining several objectives: economic and social development, protection of landscapes and natural environment as well as ecological transition. The latter goal includes several action lines contributing to CCA:

1. Integrate energy efficiency and the challenges of low-carbon energy into the plan - introducing a new "Climate-Air-Energy" Planning and Development Guideline to strengthen and harmonise actions in the area of territorial low-carbon energy.
2. Provide greater support for adaptation to global warming by introducing new rules to encourage appropriate architecture. Prevention of heat islands by promoting increased vegetation and the reduction of built volumes and artificialisation of land.
3. Organise the conditions for enhancing biodiversity in the light of the experience gained from the implementation of the Pampelonne beach development plan, in particular by reinforcing the Green and Blue Belt and biotope quality.
4. Further improve the protection of people and property from the consequences of climate change and prepare the conditions for resilience by adapting the provisions of the local urban development plan to environmental risks, marine submersion, torrential rain, drought, heatwaves and forest fires.

The Pampelonne beach development plan pursues the goal of adapting the coastal economy to present and future climate change. It enables beach facilities to be relocated to shelter from increasingly violent storms and rising sea. The plan includes: reconstitution of the dune environment that ensures the stability and natural charm of the beach, as well as reduction of car traffic and landscaping of car parks. It awards long-term contracts to beach operators who will construct bioclimatic buildings in the public maritime domain, using sustainable materials, which are demountable and set back from the shoreline.

Sources: www.ramatuelle.fr/revision-plu-ramatuelle/ and www.ramatuelle.fr/schema-damenagement-de-plage-de-pampelonne/

3.4 Increasing breadth and depth of stakeholder involvement

Consultation with a wide variety of institutional stakeholders is considered the norm for major CCA-relevant strategic documents at regional level, such as the regional Climate Plan and SRADET, as well as the PCAET of the two main Metropoles and other EPCI. These processes are labelled as ‘co-construction’, in the documents concerned. Institutional stakeholder consultations are also compulsory at local level for revisions to PLU. Despite some good examples of such exercises, the research revealed ongoing difficulties overall in mobilising local elected representatives for serious debate around CCA topics.

Citizen involvement is also perceived as underdeveloped. Citizens have generally been weakly involved in these consultations so far. In this regard, the current preparation of the new NAP at national level, PNACC 3, has highlighted the imperative of educating the general public to improve their understanding of CCA. The Regional COP, initiated towards the end of 2023, will nevertheless include a citizen concertation in mid-2024, prior to validation of its outputs. The region’s Climate Plan also foresees various citizen mobilisation initiatives, as well as training for elected representatives at local level.

Certain other key actors are not well connected either to the CCA debate. Natural Parks, for example, and importantly enterprises have not yet been greatly involved in CCA-relevant consultation exercises. There are nevertheless emerging signs that enterprises in some sectors (agriculture, industries involved in international value chains etc.) are beginning to consider the need for integrating CCA into their business models.

In Provence-Alpes-Côte d’Azur, the SRADET is prepared through a ‘co-construction’ process featuring enlarged consultations between State Services, Agencies and Utilities (water, electricity, rail etc.), National Parks, Ports, Agricultural Chambers and elected persons at local level. These consultations have revealed conflicts at their core in the use of land and water, frequently based on diverging interest between alpine areas (net water providers) and industrialised coastal areas (net water receivers). The Regional COP launched in November 2023⁵¹, under the joint leadership of the Regional Prefect and the President of the Regional Council, brings together a full range of institutional stakeholders, including local authorities and other public bodies in the region, socio-economic actors and associations. After a diagnostic phase, stakeholders will be mobilised via thematic working groups aimed at review of knowledge, identification of ongoing initiatives, definition of objectives and development and prioritisation of new actions.

At local level, revisions to PLU must involve consultations by law. Sainte Maxime⁵² represents a good example of a stakeholder consultation exercise in identifying barriers to acceptability of coastal re-composition scenarios, which also delivered insights and ideas about possible solutions. Marseille’s City Climate Contract⁵³, under the EU Cities Mission, incorporates more than 200 projects from local actors resulting from a collaborative effort involving more than 50 local stakeholders in eight thematic

⁵¹ <https://www.prefectures-regions.gouv.fr/provence-alpes-cote-dazur/Region-et-institutions/L-action-de-l-Etat/Environnement-developpement-durable-et-prevention-des-risques/COP-regionale-en-PACA-un-territoire-engage-pour-la-transition-ecologique>

⁵² https://www.monlittoral.fr/wp-content/uploads/2022/05/Synthese_Table4Acceptabilite_AtelierSainteMaxime_VF_RelUSR-3.pdf

⁵³ <https://www.marseille.fr/marseille-2030-objectif-climat-et-le-programme-100-villes>

commissions. Generally, however, the interview research highlighted widespread difficulties in effectively engaging local elected representatives in debate on issues connected with CCA.

The general public has so far not been involved in the SRADDET process. The elaboration of the PCAET of the two main Metropoles, although also relying on broad stakeholder consultations, with long lists of stakeholders presented in the documents, demonstrate little evidence of citizen involvement. Obtaining meaningful input from citizens is generally considered difficult overall. Climate change denial and a lack of openness to change are perceived to be widely present among the public. The recent national level consultation for preparation of the third NAP, PNACC 3, highlighted a major need to educate citizens about CCA and to avoid confusion, particularly between adaptation and mitigation trajectories⁵⁴ (Box 10).

“The potential role of citizens is ambiguous. Some do not (want to) see the reality. Some are perfectly conscious, especially the young ones, but the balance of power is not in their favour.”

Source: Interview with State Agency in the region

Box 10: National consultation on ‘reference warming trajectory for adaptation to climate change’ (TRACC)

To support a coordinated process for the ongoing review of its national adaptation strategy, PNACC 3, France is adopting a ‘reference warming trajectory for adaptation to climate change’ (TRACC), intended to serve as a benchmark for all adaptation measures. A consultation on various scenarios ran from May to September 2023 and generated 1,124 contributions (very low for a country the size of France), including 31 from institutions (government departments and operators, business federations, etc.). Responses were received on three questions:

1. ‘Should France adopt a reference warming trajectory (TRACC) to the end of the century to enable it to adapt, while continuing to reduce its greenhouse gas emissions in line with the objectives of the Paris Agreement?’ A large majority of respondents were in favour of introducing a TRACC (2/3 of responses). Those who expressed an unfavourable opinion seemed to confuse mitigation and adaptation, i.e. the TRACC with the greenhouse gas (GHG) emissions reduction trajectory set out in the National Low Carbon Strategy (SNBC).
2. ‘What do you think of a reference warming trajectory for adaptation in Metropolitan France whose warming levels would be: +2°C in 2030, +2.7°C in 2050 and +4°C in 2100?’ 84% of contributors were in favour of the proposed reference warming levels. A minority would have preferred an even more pessimistic scenario, in order to be prepared for the worst-case scenario.
3. ‘Which tools and what technical and financial support should be made available to local authorities, economic players and the general public to enable them to take into account the projected impacts of global warming in the future?’ Only 20% of the contributions proposed solutions for adapting to climate change, such as greening urban spaces. The rest were divided between contributions proposing mitigation solutions, or more general solutions on environmental protection, and contributions that were not on the subject of global warming.

Source: [20231106 Fiche presse TRACC.pdf \(ecologie.gouv.fr\)](#)

⁵⁴ https://www.ecologie.gouv.fr/sites/default/files/20231106_Fiche%20presse_TRACC.pdf

Nevertheless, for the Regional COP, public concertation will take place prior to validation of COP regional objectives and strategies expected in May 2024. Moreover, the region's Climate Plan includes citizen mobilisation initiatives. For example, its Measure 125 is '*Recognising and supporting citizen initiatives*', with notable reference to the Regional Youth Parliament. Measure 126 foresees '*Strong support for civil society and associations*', including the Water Agora and the Parliament of the Sea, with the joint organisation by the Region, ADEME and CEREMA of an annual conference on the challenges of CCA. CEREMA, together with urban planning agencies, organises a range of discussion events with decision-makers, technicians and interest groups, of which some appear relevant to CCA. CEREMA also develops methodological tools for increased participation. The regional expert group on climate GREC-SUD works to bring scientific knowledge on climate change, including CCA, to a wide group of stakeholders in an accessible way. In this regard, GREC-SUD plays a dual role of independent scientific advice provider and interface between science and society (Box 11).

Box 11: GREC-SUD: working towards stakeholder mobilisation around CCA

The regional experts group on climate in Provence-Alpes-Côte d'Azur (GREC-SUD) is a flagship project of the AIR Climate association, funded since 2015 by the Region and ADEME. Inspired by the IPCC, GREC-SUD aims to centralise, diffuse and share scientific knowledge on all aspects of climate change in the region. Its objectives are:

- to educate local actors about major environmental issues;
- to strengthen the links between scientists and local actors;
- to identify and document climate challenges;
- to help local actors steer their actions and policies towards an ecological, energy and social transition that is relevant in the long term.

GREC-SUD deploys itself or is involved in multiple activities contributing to the mobilisation of stakeholders around CCA in the region. These include: working meetings with elected representatives, local authorities, companies and associations; seminars and conferences on topics linked to CCA such as the future of tourism or agriculture in a changing climate; direct support to stakeholders such as managers of natural parks; participation in companies' training activities around climate change; and media communication etc.

Source: <http://www.grec-sud.fr>

Some important actors are not well connected to the CCA debate. Natural Parks, for example, despite their key role in conservation and protection of biodiversity, are not yet focused on CCA. Private companies too are generally not involved in CCA-related consultations. ADEME reports difficulties in finding entrepreneurs willing and able to come with new, untested green solutions. Nevertheless, weak signals are being received from enterprises in some sectors (agriculture, industries involved in international value chains etc.) which are starting to consider the need for integrating CCA into their business models. Enterprise intermediaries are generally not yet involved in CCA either, but represent interesting potential. For example, the cluster Ea eco-enterprises⁵⁵, active in water and energy sectors, supports collective projects such as 'Challenge InnovProvence EAU' aiming to transform the

⁵⁵ <https://www.ea-ecoentreprises.com/>

urban fabric of a district. This cluster is also involved in the project Alcotra SeTe with Italy⁵⁶, on strengthening cross-border water governance and actions to counter the negative effects of climate change on the frontier territory and its biodiversity.

3.5 Setting up effective multi-level governance models

France's public administrative composition is institutionally heavy and highly complex, with considerable apparent potential for overlap. The situation in Provence-Alpes-Côte d'Azur is no exception to this rule. For effective CCA, there is insufficient coordination between the different layers involved. At the regional level, coordination is handled chiefly through the regional land planning document, SRADDET, but not through the Climate Plan, which does not have compulsory character. The fact that Territorial Climate Air Energy Plans 'PCAET' are obligatory for Metropoles and other groupings of local authorities 'EPCI', but not for the Region, would seem to increase complexity and diminish the likely strength of coordination needed for CCA.

The local planning documents 'PLU' at the level of individual Municipalities are generally lacking in detail on CCA, although there is variation between them. The all-powerful position of local elected representatives within their constituencies also emerges as a weak link in the governance chain. In this sense, there is a strong risk of short-term interests blocking the development of effective long-term strategic approaches to CCA at the local level. The situation may be partially explained by the historical division in responsibilities between the State for natural risk prevention and local authorities for spatial planning and economic development.

In France, different administrative layers are present: the State, Regions and different local levels. For Provence-Alpes-Côte d'Azur, this translates into the 6 Departments, 3 Metropoles and 958 Municipalities and 36 groupings of Municipalities (EPCI) mentioned in the introduction. Water Agencies cover different territorial boundaries relating to broad water basins. The 'Rhône-Méditerranée – Corse' water basin runs through five regions, including Provence-Alpes-Côte d'Azur, and equates to some 25% of Metropolitan French territory. The overall governance picture presented is one of institutional complexity, in which vital effective coordination for a multi-faceted policy area like CCA is challenging.

"The multiplicity of governance levels: this is the drama of French institutional organisation! Simplifying reforms generally add more layers without taking any away. They do not simplify..."

Source: Interviewee from the regional administration

SRADDET can be seen as an instrument of multi-level governance through its ambition to bring coherence between regional and local territorial plans, based on three degrees of strength - '*respect for*', '*compatibility with*' and '*taking account of*' the plans of different territorial levels. Territorial diversity, internal competition and potential for infra-regional complementarity represent important concerns in the SRADDET. The notion of territorial equality permeates the entire SRADDET, extending

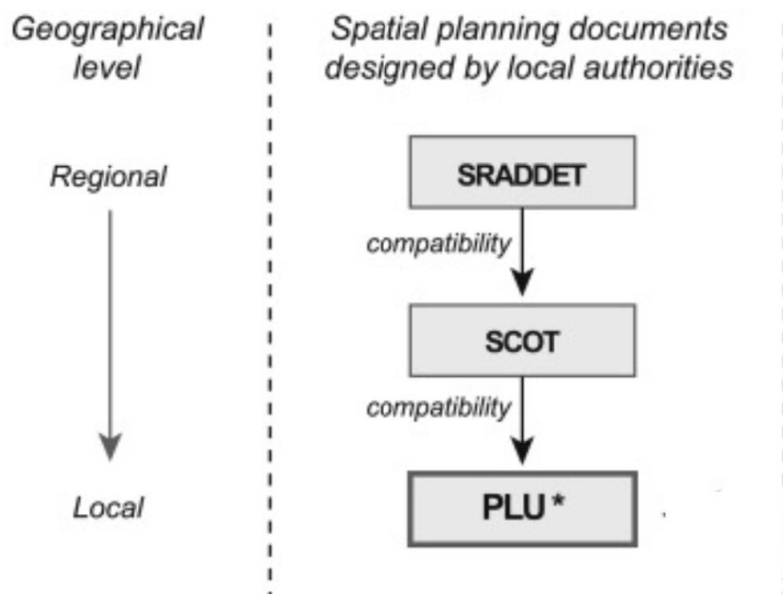
⁵⁶ <https://www.ea-ecoentreprises.com/sete/>

to the region’s inhabitants. The SRADDET also defines functional regions – namely ‘alpine’, ‘azur’, ‘provençal’ and ‘rhodanian’ as complementary territorial systems⁵⁷.

Since adoption of the Law on the New Territorial Organisation of the Republic ‘NOTRe⁵⁸’ (*Nouvelle Organisation Territoriale de la République*) in 2015, the regional level has acquired a reinforced role in fields linked to economic development, territorial planning, transport and the environment – including ecological transition. In Provence-Alpes-Côte d’Azur, this translates into the voluntary preparation and adoption of the regional Climate Plan. Nevertheless, the Regional Council does not have a strong coordination role in terms of climate-related planning at different levels. The Region checks compatibility with SRADDET of the Territorial Climate Air Energy Plans, PCAET, of Metropoles and other groupings of local authorities (EPCI), which is possibly the only way it can seek synergies between them. EPCI are notably responsible for water management and flood prevention, however the Region does not have authority over EPCI or individual local authorities.

The Region gives advice on Territorial Coherence Plans ‘SCOT’ at EPCI level and PLU at Municipal level (Figure 3). This advice is delivered based on inter-service consultation in the Regional authority involving the services for waste, transport, energy etc. There are 28 SCOTS in the region and by 2027, they must all be compatible with SRADDET. The Region also signs Territorial Equilibrium Contracts ‘CRET’ (*Contrats Régionaux d’Équilibre Territorial*), with local public institutional partners, with the aim of embracing key elements of the regional Climate Plan in local integrated spatial planning approaches.

Figure 3: Planning documents at regional, inter-municipal and local levels.



Source – extracted from: <https://www.sciencedirect.com/science/article/pii/S0264837721000776?via%3Dihub>

⁵⁷ (Région Provence-Alpes-Côte d’Azur, 2019).

⁵⁸ <https://www.ecologie.gouv.fr/loi-portant-sur-nouvelle-organisation-territoriale-republique-notre>

As highlighted in earlier Sections, the local level urban planning documents PLU are generally not strong in terms of CCA and entrenched attitudes of local elected representatives are often seen as a barrier to adoption of effective CCA approaches. Among the reasons for this situation is division of powers that has long prevailed between the State (for natural risk prevention) and local authorities (for spatial planning and economic development). In a region where tourism and real estate are highly developed on the coast, local authorities in coastal areas tend to pay more attention to economic issues than to natural risks, which do not officially fall under their responsibility. This may result in the trivialisation of climate risks by some local elected representatives, who may not consider them as a priority compared to other issues (Box 12).

“Elected people at the local level are lost amongst all the domains they have to cover, all the new regulations that are piling up. Concerning adaptation to climate change, it’s very hard for them to develop a vision, understand the situation, have a view on solutions and find funding.”

Source: Interviewee from local authority

Box 12: A division of power between State and local authorities not conducive to CCA-proof local plans?

In 2020, researchers from the University of Aix-Marseille, with main disciplinary backgrounds in geography, psychology and sociology, examined the barriers for local authorities on the region’s coast to incorporate transformative approaches to CCA in their municipal land planning documents.

The researchers concluded that the anchoring of human communities on the coast induced by heavy and costly infrastructures built in the past is preventing the emergence of an alternative vision of coastal settlements and complicating any strategic retreat. In addition to this inertia, there may be a politico-institutional resistance to adaptation, making it difficult to give up developing the waterside. Local authorities may have trouble envisaging economic development that steps back from the sea; inhabitants can find it difficult to imagine leaving a place they have long lived in and are attached to, or can resist leaving accommodation acquired through lifelong saving. Resistance can also take the form of denial of the danger that climate change implies, due to collective inability to think about the future and unwillingness to change life style.

Thus, like inhabitants, local authorities may trivialise sea-level rise and risks associated with climate change to avoid questioning their social and ecological trajectory and the urban development constituting their landscape identity. Like some of their voters, local elected officials could thus find themselves unable to plan for adaptation, and this could be reflected in the urban planning documents.

Source : [\(Robert and Schleyer-Lindenmann, 2021\)](#)

3.6 Making room for experimentation

Various experimental initiatives on CCA are underway in the region, financed by the EU LIFE and Horizon Europe Programmes - including under the EU Mission CCA – as well as by the Regional Council itself. They embody a heterogeneous set of actions, as well as new approaches to known themes like de-sealing of soil and coastal protection, some involving space technology. However, there is a lack of capitalisation of learning from such initiatives and their value is not being fully realised as a result. Barriers to experimentation also exist on the demand side in the form of strict public procurement rules, as well as on the supply side in the shortage of suitably qualified professionals able to develop and implement new and innovative solutions. Measures under the region's Climate Plan, bringing exchange of experience opportunities to beneficiaries of the EU LIFE Programme, offer a potentially viable way forward in this regard.

There are certain CCA-relevant initiatives with experimental character going on in the region, but there is no overall view of such activity at different territorial scales, or under the different available funding sources. Some examples, which do not constitute an exhaustive list, include:

- Horizon Europe projects funded under the EU Mission CCA:
 - CardiMed⁵⁹ aims to establish a framework and network for enhancing climate resilience in the Mediterranean biogeographical region, bringing together disparate efforts and solutions. It will implement holistic modelling tools in relation to water-energy-food-ecosystems and establish an extensive digital infrastructure for easy access, enhanced data collection and evaluation. Experimentation under CardiMed is underway at the University Aix-Marseille (Box 13).
 - DesirMED⁶⁰ seeks to develop a comprehensive Mediterranean strategy on green and blue infrastructures in order to harmonise the deployment of innovative CCA solutions. Specifically, the project focuses on the integration of NbS for building climate resilience via a network and portfolio of solutions on a Mediterranean scale.

⁵⁹ <https://cordis.europa.eu/project/id/101112731>

⁶⁰ <https://cordis.europa.eu/project/id/101112972>

Box 13: CardiMed: Multi-disciplinary experimentation at Aix-Marseille University under EU Mission CCA

CardiMed - Climate Adaptation and Resilience Demonstrated In the Mediterranean region - aims at testing and demonstrating transformative solutions in climate resilience, mainstreaming nature-based solutions in systemic transformation. With an EU Horizon Europe contribution of €19.3m, the project gathers 51 participants from 12 countries and will run from 2023 to 2028. Actions will be implemented across 9 demonstration sites and comprise 47 different nature-based solutions. The consolidation of the demonstrating regions and communities will result in the CardiMed Resilience Alliance, which will function as the vehicle for expanding the network via upscaling the existing sites and adding new ones.

The Department 'Science-Society Interactions' at the University of Aix-Marseille is conducting the experiment in Provence-Alpes-Côte d'Azur. This department is multi-disciplinary, drawing on knowledge and skills from life and material sciences, earth sciences, engineering sciences, health sciences and epidemiology, social sciences and humanities. Experiments are being carried out at the University's St Jérôme and St Charles campus sites on the subjects of de-sealing of soil and revegetation, with the following key questions: how to build indicators, methodologies, changes in practices and representation in order to transfer and replicate them on a Mediterranean and European scale. The experiments target the development of innovative solutions for water management and purification systems that are better suited to cope with extreme rainfall, as well as the identification of plant species adapted to a changing climate. The research covers not only technical, but also economic (return on investment) and sociological aspects. The experiment includes multiple analyses - e.g. on modification of the urban heat island effect and on possible health impacts due to new insect-borne diseases resulting from climate changes. In order to ensure transfer of knowledge in decision-making, a thesis in cognitive science is to be conducted with decision-makers on perceptions of de-sealing of soil. The experiment will also serve as a living lab for students.

Source: <https://cordis.europa.eu/project/id/101112731> and interview

- Projects funded by the Region:
 - Projects funded under the Region's call on use of space technologies to monitor land use, which today is done using cadastral data. The call is based on a framework partnership agreement with the National Centre for Space Technologies, which includes the objective to make the region a forerunner in the use of space technology solutions for the environment and risk management. ÉCoMed⁶¹: Study of the *Posidonia oceanica*-banquette system aims to improve users' ecological knowledge and perception of *Posidonia* banks in order to understand how they can be better used as NbS for coastal erosion – see Figure 4.

Figure 4: *Posidonia* banks - natural coastal protection.



Source: [The life of Posidonia oceanica \(seaforestlife.eu\)](http://seaforestlife.eu)

⁶¹ <https://thalassa-env.com/ecomed-etude-du-systeme-posidonie-banquette>

- Projects funded under the EU LIFE programme:
 - The ADAPTO project⁶² by Conservatoire du Littoral, aims to explore solutions for erosion and marine submersion in natural coastal areas, in the context rising sea levels and more frequent extreme weather events brought by increasing climate change (Box 14).

Box 14: Testing flexible solutions to coastline management: the ADAPTO project - EU LIFE Programme

ADAPTO is a project funded under the EU LIFE programme initiated by the Conservatoire du Littoral, the public body in charge of protecting French coastal areas. The aim of the project is to explore solutions to marine erosion and submersion in natural coastal areas in the context of accelerated climate change, which is reflected in rising sea levels and more frequent extreme weather events. ADAPTO is testing flexible coastline management solutions on 10 French pilot sites belonging to the Conservatoire du Littoral, which are predominantly natural and agricultural.

In Provence-Alpes-Côte d’Azur, the experimentation is carried out on the ‘Vieux Salins d’Hyères’ site. The protected area covers 365 ha, making it an important protected natural area. Studies carried out by Office for geological and mining research ‘BRGM’ (Bureau de recherches géologiques et minières) and the University of Aix-Marseille have shown that this coastal wetland is an ideal location for adaptive management of the coastline and natural areas, such as the removal of rock from the coastline with a view to renaturation. The starting point of the project consisted in rejecting a ‘protection scenario’ (hard protection by dykes). The project involves restoring a natural dynamic to the dune-beach system that forms the interface between the sea and the wetland. To achieve this, it is planned to remove the rocks protection and then gradually readjust the facilities and the public reception area as the environment evolves. The project will develop actions aimed at users, the local population and elected representatives, in order to answer their questions and work with them to prepare for future developments.

Source: <https://www.lifeadapto.eu/>

Notable barriers to experimentation on CCA in the region include a deficit in professionals able to implement new and innovative solutions, as well as strict public procurement rules, which limit appetite for unproven solutions. Above all, there is a strong need for capitalisation to draw the different existing CCA experimentation experiences together and derive maximum value from them. CCA-related networking, similar to that

“We’re missing a proper catalogue of climate change adaptation initiatives in the region”

Source: Several interviewees from State, Region and local authority services

offered by the region’s Climate Plan in the context of the EU LIFE Programme, could be a credible way forward in this regard. Measure 116 of the Plan fosters coordination of the regional Inter-LIFE network, offering all LIFE beneficiaries the possibility to exchange experience.

⁶² www.lifeadapto.eu

3.7 Securing high levels of policy intelligence, learning and strategic capacity

Although CCA awareness is growing in the region – especially as a result of Storm Alex in 2020 – it is far from complete and there remains significant confusion between CCA and disaster risk management. Climate change denial is also evident in certain quarters, particularly in places most affected which will require the most radical CCA approaches – such as ski resorts and the low lying Camargue area. The national agencies ADEME, CEREMA and the independent regional expert body GREC-SUD play a key role in awareness raising, as well as in the comprehensive knowledge base for CCA which is a credit to the region. A large number of other structures working at the interface between public authorities and the research community make important contributions to that knowledge base, including the Region’s recently-established platform ‘Knowledge of the Territory’. However, the region is not in a position to judge the full scale of broader socio-economic impacts of climate change, or effectively measure its CCA efforts, or their outcomes. Insufficient capacity in public administrations in the region emerges as a key bottleneck for transformative CCA, despite increasing support available to local authorities.

3.7.1 Awareness and understanding of CCA

General awareness of climate change is growing in the region in the light of more frequent extreme events. Storm Alex in 2020, in particular, had a powerful eye-opening effect (Box 1). Awareness among local elected representatives is also gradually improving, but understanding tends to be centred more on the need for disaster risk management, rather than for long-term adaptation. This situation is not helped by short electoral cycles. Climate change denial is also apparent in certain quarters. In low-lying Camargue (Box 15), for example, radical decisions will be needed soon about withdrawing from coastal areas, but there is no sign of any preparedness for change.

Box 15: Camargue: a hard pathway towards a radical model of adaptation to climate change

The region of Camargue, at the delta of the Rhône river, is affected by severe climate change risks. The first impact, already visible, is soil and water salinisation as a result of rising temperatures, persistent rainfall deficits and the continuing decline in the flow of the Rhône. The second impact is marine submersion in this partly reclaimed area and lying below sea level. Observations confirm rising sea levels (+7 cm for 2019-2001). Even in an optimistic scenario, the Mediterranean will rise almost 45 cm by 2100 and 60 cm by 2150 (pessimistic scenario 150 cm). The Municipality of Les Saintes-Maries-de-la-Mer is one of the most vulnerable in the region: it will become an island or a peninsula, even in an optimistic scenario.

The Managing Director of the Tour du Valat, a private research institute based in Arles, explains. ‘Throughout the 20th century, developments made it possible to dam the river, create irrigation canals, break the waves, develop agriculture and salt works. There was a period of prosperity, making people of the Camargue proud, but it was based on an illusion of control and stability. Faced with the ineffectiveness of these infrastructures, the idea of giving up and engaging in a strategic retreat arises. Combatting erosion and reinforcing these dykes are exorbitantly expensive without being viable solutions in the long term. Today, climate change is showing us that nothing is set in stone, and that we are going to have to adapt. Strategic retreat is a highly sensitive subject in the region, where the words "population displacement" and "reconversion" seem taboo’.

Source: <https://citizenclimet.fr/parcours-exploration> and <https://www.nationalgeographic.fr/environnement/2020/01/menacee-par-la-secheresse-la-camargue-risque-de-finir-sous-leau>

Lack of snow threatens the continued existence of the region’s ski resorts, yet their immediate response is simply to make more and more artificial snow, despite the substantial volumes of water –

an increasingly scarce resource - needed for this process (Box 16). The irony of France hosting the Winter Olympic Games in 2030 was highlighted by many interviewees during the research. A prospective study is ongoing on the future of ski stations using data provided by Climsnow (see Annex 2) with the purpose to provide evidence to support their diversification strategies. Sun-based tourism is also one of the region's most famous attractions, but there seems to be little strategic reflection around a likely future where tourists will tend to flee from heat, rather than seeking it out.

Box 16: A necessary change of business models for transition of mountain ski resorts

The French Court of Auditors published a report in February 2024 highlighting the consequences of climate change for winter tourism in the mountains and examining how resorts have adapted. From the end of the 2000s the decline in skiing and the increasing unsuitability of the resorts' real estate began to undermine the financial equilibrium of the ski lifts and the local economy that partly depends on it. This phenomenon is exacerbated by climate change, which is having a greater impact in the mountains than in the plains, with a rise in temperatures accelerating since the 2010s. All ski resorts in France will suffer the consequences of global warming by 2050, in particular those at the southern side of the Alps (including in Provence-Alpes-Côte d'Azur).

The Court of Auditors criticises responses implemented by mountain stakeholders that are essentially based on the production of snow, which has a short-term effect because its cost is high and its effectiveness tends to diminish as temperatures rise. In addition, the Court points out the negative impact of snow production on water resources, which appears to be underestimated in many areas. Diversification initiatives are found to be rarely backed up by a genuine project: rather, they are carried out on an ad hoc basis, and often tend to reproduce the ski model, based on major investment and high visitor numbers, with no business plan to establish their economic relevance.

The president of the national association of mountain resort mayors denounces "a dogmatic report that takes no account of the views of mountain professionals", saying that "with artificial snow, we can irrigate areas for much longer", adding that snow cannons are "absolutely not a problem".

Sources: *Cour des Comptes (2024)*; and https://www.francetvinfo.fr/monde/environnement/crise-climatique/ski-le-president-de-france-montagnes-pointe-un-rapport-dogmatique-de-la-cour-des-comptes-qui-demande-aux-stations-de-changer-de-modele_6348454.html

Both ADEME and CEREMA support local and regional authorities in awareness raising, with pedagogical documents, websites, seminars and workshops on CCA themes, as well as an annual conference specifically on adaptation of coastal areas⁶³. Below the regional level, the Urban Development Agency for the Aix area 'AUPA', organises environmental transition seminars and uses maps of urban heat islands as an effective communication tool. Metropole Aix Marseille, under Measures 84 and 86 of its PCAET, plans a novel approach by mixing climate awareness raising with artistic goals. The work of GREC-SUD on making science on climate issues accessible to society also makes an important contribution in different parts of the region. One of the more unusual earlier projects in which GREC-SUD was a partner, focused on raising awareness of climate change effects on Mediterranean forests through music and sound composition (Box 17).

⁶³ <https://www.monlittoral.fr/ressources/presentations-conference-technique-territoriale-les-littoraux-face-au-changement-climatique-comprendre-les-enjeux-repenser-ensemble-nos-pratiques/>

Box 17: Raising awareness of the wider public on climate change through mixing science and art

GREC-SUD researchers took part in the heterotopies#1 project in 2017, led by M-topia: a permanent sound composition on the effects of climate change on Mediterranean forests. The aim is to diffuse scientific knowledge about the future of Mediterranean forests and to engage in direct dialogue with the public (elected representatives, local residents, artists, etc.).

This musical work is a geolocated sound trail, accessible via an iPhone or iPad application. The duo Jeroen Strijbos & Rob Van Rijswijk, who specialise in electroacoustic composition, have come up with a creation called 'Walk with me', which uses GPS data to map out areas of sound. This musical universe is combined with field recordings based on scientific data, local observations, perceptions, empirical approaches, interviews, accounts by local residents and philosophical texts.

Source : [GREC-SUD – Art et science : immersion en forêt méditerranéenne](#)

3.7.2 Knowledge base for CCA

The knowledge base relevant for CCA in Provence-Alpes-Côte d'Azur is considerable and represents a substantial strength of the region. It comprises a wide variety of sources from national level, national bodies in the region and of the region itself. A non-exhaustive listing of the main components of this knowledge base are presented in a table at [Annex 2](#). Overall, however, regional knowledge is more developed for climate risks than for their socio-economic impacts.

"We haven't gone far enough in understanding what climate change means for people's lives. We don't perceive the ongoing deep changes"

Source: Interviewee from research organisation

As regards national level in the region, ADEME carries out a wide range of prospective studies and evaluations relevant to CCA and supports CCA project development by local authorities. The regional Directorate for Infrastructure and Major Installations 'DIGE' (*Direction des Infrastructures et des Grands Equipements*) is playing a leading role in a pioneering study on resilience of transport infrastructure in the region, co-financed by the State and the Regional Council (Box 18).

For the region itself, the Platform 'Knowledge of the Territory' is a new initiative, which gathers a large number of indicators and data on the regional territory from a variety of sources. With regard to CCA, these data sources notably include advanced measurement of soil occupation. The originality of the Platform lies in its strong interaction with users for needs definition. CEREMA is closer to the field than most other research organisations in the region and is able to compile data prepare studies for local authorities' climate planning tailor-made to their specific needs. CEREMA has a special public status, meaning that public authorities are able to circumvent normal public procurement rules and contract with them directly, including for works.

GREC-Sud also provides valuable support to authorities in the region. For example, GREC-Sud assisted the development of CCA-relevant measures in the PCAET of Metropole Aix Marseille. As regards Nice-Côte d'Azur, a high level advisory body on climate issues (*Haut Conseil Climat*⁶⁴) was recently established in the form of an independent multi-disciplinary group of experts to help guide the Metropole in its climate work, including the on-going development of its new CCA strategy.

⁶⁴ <https://transitionecologique.nicecotedazur.org/agir/haut-conseil-local-pour-le-climat-et-la-biodiversite/>

Box 18: Pioneering study on resilience of transport infrastructure in Provence-Alpes-Côte d’Azur

The disaster caused by the storm Alex in 2020, resulting in the destruction of hundreds of kilometres of roads, acted as a trigger for launching a major study on resilience of transport infrastructure in Provence-Alpes-Côte d’Azur. The study, with results expected at the end of 2024, is co-funded by the State and the Region on a 50-50 basis. It represents a pilot study at national level, contributing to the preparation of the new National Action Plan for CCA, the PNACC-3.

The study follows an integrated approach, taking a systemic view of all transport modes as an interconnected whole. Transport infrastructure operators - rail, airports, ports, roads - are multiple and operate under different jurisdictions: without such an integrated approach, there would be a risk of dispersed analyses with each operator focusing on his own infrastructure. In the study, all operators are involved, with the Regional Council playing the coordinator role. The study identifies physically and functionally critical infrastructures at regional level, taking into account the interdependencies between them using a shared methodology and assumptions. It is part of a larger investigation, which includes both climate change adaptation and mitigation, seeking to incorporate technological as well as behavioural innovations.

The first part of the study consists of a vulnerability analysis, involving CEREMA, GREC-Sud and the Regional Council, which examines the impacts of future climate change on the infrastructures concerned under different scenarios. The development of scenarios also opens room for radical options, including that of abandoning the expensive rebuilding of infrastructures destroyed by storm Alex in sparsely populated valleys. Analyses and scenarios map possible behavioural changes in terms of mobility, including under new models such as mobility-as-a-service, as well as the potential acceptability of new models by the population.

The second part of the study will be the elaboration of an action plan. Here, important perspectives will be the definition of improved criteria for CCA to be integrated into the development of new infrastructure projects, as well as new rules of use for existing infrastructure.

Source : Limon, 2024

Monitoring and evaluation of CCA is still underdeveloped overall. At national level, the 2nd NAP does include CCA-relevant indicators, but these are relatively basic. Neither CCA efforts nor outcomes are properly measured as yet, although some broad estimations have been carried out (Box 19).

Box 19: Estimation of cost of action and inaction on CCA in France

The cost of the French economy's transition to decarbonisation is well documented (estimated at + €50 billion per year). A more recent concern is that of climate adaptation. In 2022, the Institute for Climate Economics (I4CE) published the first assessment of public financial needs.

The overall estimate was an additional €2.3bn/year for eighteen essential measures to be taken as a matter of urgency, in eleven priority areas (civil protection, coastline, transport infrastructure, construction, etc.). These include, for example, giving more resources to fire-fighting and flood prevention, water management, helping coastal municipalities affected by erosion and supporting the economic transition of mountain resorts.

I4CE points out in its study that taking account of the future climate in major public investment programmes from the outset will always cost less than incurring the costs after the event – for example: building housing or schools that can cope with heatwaves; developing transport networks that can withstand more frequent severe bad weather; encouraging agricultural sectors that are compatible with reduced water etc. Integrating

adaptation into investments from the outset in this way usually only represents a limited estimated additional cost - less than 5%, for example, for modernising transport infrastructure.

Source : <https://www.adaptation-changement-climatique.gouv.fr/comprendre/enjeux/le-cout-de-l-adaptation-et-de-l-inaction>

In 2022, the General Council for Food, Agriculture and Rural Areas was asked to assess the cost of climate change for the French agricultural and food sectors. The analysis estimated that between now and 2050, the cost of climate change for agriculture and the agri-food industry will be in the following orders of magnitude:

- €1bn/year for additional water-related costs;
- €1bn/year for the additional costs associated with the increase in climatic hazards;
- €2bn for the additional cost of developing "climate" diagnoses;
- €190m/year for related expertise;
- €600m/year to renew 10% of French orchards annually.

Source : [Évaluation du coût du changement climatique pour les filières agricoles et alimentaires | Ministère de l'Agriculture et de la Souveraineté alimentaire](#)

3.7.3 Strategic capacity

CCA does not enjoy the same high profile in public administrations in the region as climate change mitigation. Regional administrations are not really structured with CCA in mind. As noted earlier, the CCA agenda is being pushed forward largely by a small number of dedicated individuals in the region's public institutions, who must balance CCA attributions against many other tasks. Whilst the logic of integrating CCA into the implementation of a broad spectrum of public policies is understood, there is currently not sufficient critical capacity mass to make transformative CCA a reality. This view is borne out in the 2023 analysis of climate action in the State budget by the Institute for Climate Economics, which concludes, *'Despite a few additional posts within the State administration, the human and engineering resources for adaptation within public operators and local authorities are still very inadequate compared to the scale of the needs.'*⁶⁵

The State Agency in the region ADEME has developed various practical tools to help local authorities develop their capacities for CCA strategy making and implementation of CCA solutions, including the TACCT toolbox and 'Cooler my city' initiative (Box 20). ADEME⁶⁶ also provides training for public officials on CCA and use of the tools it has developed.

⁶⁵ <https://www.i4ce.org/adaptation-plf-2024-concretise-des-avancees-mais-reste-loin-du-compte-climat/>

⁶⁶ https://formations.ademe.fr/formations_adaptation-au-changement-climatique_adapter-son-territoire-au-changement-climatique---passer-a-l-action--connaître-les-outils-et-méthodes-pour-l-adaptation_s4854.html

Box 20: CCA capacity building tools for local authorities developed by the Ecological Transition Agency, ADEME

TACCT - toolbox for the design of a CCA strategy

The TACCT (Trajectoires d'Adaptation au Changement Climatique des Territoires) approach, developed by ADEME and dedicated to local authorities, enables them to develop a climate change adaptation policy from 'A to Z'. It covers all stages, from diagnosis, through the development of the strategy and its action plan, to the monitoring of measures and the evaluation of the strategy. Conceived as a toolbox, TACCT guides users step by step and is organized in the form of 'methods' sheets, which provide methodological advice on how to organise, set up and successfully implement monitoring and evaluation of adaptation policies. The methodology is designed to be accessible to all local authorities. It can be used either as a monitoring-evaluation tool, or as a one-off or regular aid for integrating adaptation into pre-existing monitoring-evaluation systems. The IT tool is the operational translation of the methodological guide: it provides a framework for putting its recommendations into practice.

Source: tacct.ademe.fr

'Cooler my City' (Plus fraîche ma ville)

'Cooler my city' (Plus fraîche ma ville) is a state-owned start-up backed by ADEME, in partnership with the Association of French Mayors (AMF). Its mission is to help local authorities choose sustainable urban cooling solutions. It offers first-level help, free of charge, to all local authorities. It features a range of documented technical solutions, illustrated by examples from French territories, to guide users step-by-step from choosing solutions to implementing them. The initiative also includes seminars and webinars and a community of practice.

Source : <https://plusfraichemaville.fr>

The Region's Platform 'Knowledge of the Territory' mentioned above is under the responsibility of the Regional Council's unit 'Delegation Knowledge Transversal Planning' DCOPT (*Délégation Connaissance Planification Transversalité*), an intelligence cell composed of experts with multiple backgrounds, which also supports capacity building for local authorities. It carries out prospective studies relevant for CCA and organises internal seminars in the Regional Council covering various CCA themes. In the Aix area, the Urban Agency AUPA (*Agence d'Urbanisme du Pays d'Aix*) helps animate local partnerships dealing with CCA topics, whilst Nice Côte d'Azur Metropole has recently signed an agreement with Axa Climate to adapt a private training platform on the challenges of ecological transition to the needs of the local civil service⁶⁷.

⁶⁷ <https://www.environnement-magazine.fr/politiques/article/2023/02/10/142711/metropole-nice-cote-azur-forme-12-000-agents-transition-environnementale>

4 Conclusions

Provence-Alpes-Côte d’Azur, due to its coastal, mountain, rural and urban territorial diversity, is confronted by a particularly wide range of climate change risks. Several places in the region face multiple and compounded risks, with water availability perceived as the dominating challenge in the short term. However, a lack of overall awareness still prevails in relation to the true scale and pervasiveness of the challenges ahead, as well as a degree of denial - especially among stakeholders in areas likely to be most affected. CCA imperatives are often confused with those of disaster risk management and CCA efforts seen as costs rather than investments. Still missing is a longer-term perspective, backed up by high-level political commitment, on the need for radical transformations brought in by climate change in such a vulnerable region. The overall impression gained in this study is that of a region which is only at the beginning of its CCA journey.

This stands in contrast with the Region’s leading role on ecological transition in its broadest sense and the high-level political endorsement of its voluntary and ambitious Climate Plan, which influences regional policies. However, this Plan, as well as the climate aspects of the region’s overall land planning document, are predominantly focused on climate change mitigation, with only minor and fragmented content on CCA. The same is true for plans at sub-regional level and for the range of policy instruments, which can theoretically support CCA investment. Regional leadership for CCA appears fragmented across institutional levels and policy domains.

Nevertheless, overall awareness of the necessity of CCA and of its deep systemic character is growing in Provence-Alpes-Côte d’Azur. This is helped by active interfaces with science and research, such as those embodied by CEREMA and GREC-SUD. CCA efforts are visible in land planning, with the ‘Net zero artificialisation’ law as a main driving force, as well as in water management. Overall, however, CCA mainstreaming appears truncated so far. The soon-to-be-adopted new National Adaptation Plan (NAP) looks likely to bring significantly increased directionality. This is a welcome development – the new NAP will need to provide strong guidance to regional and local efforts to develop more CCA-specific strategies, and to capitalise better on the region’s currently dispersed CCA-relevant experiments.

4.1 Possible Ways Forward

The main conclusions arising from each of the seven key Transformative Innovation features of the analytical framework are re-stated below. Under each of these features, possible ways forward are suggested, which could help the region move towards more of a Transformative Innovation approach to CCA.

1. Directionality

Although Provence-Alpes-Côte d’Azur prides itself on being a frontrunner in green transition, this has so far almost exclusively concerned climate change mitigation, rather than CCA. There are no explicit overall goals for CCA in the region’s Climate Plan, or in its territorial planning strategy ‘SRADDET’. Even though certain scattered CCA-relevant measures and/or actions are present in both regional strategic documents, they do not provide strong directionality for transformative CCA. A similar situation exists with regard to the Territorial Climate Air Energy Plans ‘PCAET’ at Metropolitan level and that of other local authority groupings ‘EPCIs’ where these have been completed. Urban planning documents ‘PLU’ of individual local authorities generally add little or no strategic content on CCA, even in areas of high risk, such as those along the coast.

The new NAP under preparation, 'PNACC 3', is expected to bring added impetus to CCA activity, introducing a new planning scenario of +4°C by 2100. A new dedicated CCA strategy is being prepared for Nice-Côte d'Azur Metropole and a CCA strategy is planned at the level of the whole region with support from the EU Mission on CCA, but work on this has not yet begun. Strategic governance of CCA, insofar as it exists, originates mainly from the national level. There is no leadership specifically on CCA at regional level at present, nor any joint forum for CCA in the region.

Possible ways forward:

- Given the importance of the national level in France, consider launching a major central R&I initiative on CCA, to help boost transformative approaches to this crucial societal challenge.
- Work to develop a positive narrative around CCA in the region, building on strong communication efforts already in place with respect to mitigation goals.
- Consolidate strategic leadership on CCA in the region, in line with the region's pilot status for ecological transition, to underpin the development of its new CCA strategy foreseen with support from the EU Mission on CCA.

2. Articulating instrument portfolios and defining synergies between funding sources

The bulk of instruments available to the region for supporting CCA investment come from the national level. Region-specific resources are small by comparison. National legal instruments make arguably the most important contributions to directing CCA action in water management and de-sealing of soils under spatial plans at lower territorial levels - the latter through a policy of 'net zero artificialisation of land by 2050'. As regards national funding instruments, none are specifically dedicated to CCA by name, but many can - in principle - finance CCA-relevant analyses and/or investments in CCA solutions, as part of other objectives such as water management, urban development, modernisation of agriculture, tourism, etc. Certain conditionalities exist to align national and regional funding interventions to the region's Climate Plan. However, adequate filters are not in place to prevent the financing of maladaptation, such as irrigation without sufficient consideration of long-term water availability, or facilities for producing artificial snow in mountain areas. Overall, there seems to be a lack of demand for genuine CCA initiatives with transformative goal, rather than a lack of available funds.

Out of a total EU Cohesion Policy envelope for the region of €615m for 2021-2027, there is an ERDF allocation of €17m for CCA investment, but the relevant call has not yet been launched. There may also be some possibility for ERDF financing of CCA in mountain areas under territory-based interventions, as well as under Interreg Italy-France. EAFRD can finance CCA activity with regard to animal and plant production systems in agriculture, but the financial amounts likely to come to the region for this are not known.

The region's RIS3 does not play any role in orienting EU funding towards R&I efforts for CCA. Certain national funding channels, notably the National Research Agency (ANR), may finance research in the region relating to CCA, but this is not the result of ex ante orientation of the funding.

Possible ways forward:

- Integrate robust project selection criteria for CCA - as distinct from disaster risk management - into domestic funding instruments such as Green Fund.

- Work to develop and introduce more comprehensive ‘climate proofing’ rules and regulations for public investment in buildings and infrastructure - including for summer comfort and adaptation to heat waves.
- Carefully plan forthcoming ERDF calls for CCA under EU Cohesion Policy Objective (PO) 2, and where appropriate PO5, to address a broad range of CCA themes and develop a mechanism for later capitalising on lessons learnt across different project types supported.
- Consider introducing CCA more explicitly in the Entrepreneurial Discovery Processes (EDP) in operation under RIS3 in the region – for example, as a horizontal theme running across the existing RIS3 priority fields, or possibly through a project selection criterion encouraging innovation in CCA activity – as a means of directing ERDF under PO1 towards transformative CCA.

3. Ensuring cross domain synergies

Efforts to mainstream CCA into the implementation of policies are visible in the region – particularly in relation to water management (with water scarcity as a main driving force), coastline and land management. Re-naturing, de-sealing of soils and other NbS can be seen as priorities in the deployment of solutions and gradually increased use of bioclimatic architecture is evident. Outside the national regulatory obligation for land ‘de-artificialisation’, mainstreaming generally progresses in these fields through *dialogue and persuasion* rather than through hard criteria. There are also certain mismatches between fiscal rules at local level and the need for CCA, such as conflicts between expanded urban greening and fines imposed to restrict the use of water vital for maintaining green infrastructures.

Examples of area-based initiatives around the region – some very large - which integrate CCA into other socio-economic objectives are encouraging. However, an overview is lacking of CCA needs across all sectors under extreme future scenarios like, for example, 50°C urban summers. Little progress is visible in relation to healthcare in the context of severely increased urban heat effect, or across a range of new diseases which might be foreseen. CCA is not yet mainstreamed in economic development – notably in tourism, agriculture, which are so important to the region. Here, the prevailing attitude appears to be mainly one of maintaining business-as-usual with only incremental adjustments.

Possible ways forward:

- Work to eliminate conflicts between the prevailing regulatory environment in the region and needs for planning and proper maintenance of CCA investments.
- Build scenarios and concrete pathways for climate-resilient economic activities, notably in tourism and agriculture sectors, where CCA is not yet sufficiently established on the agenda.
- Initiate strategic work on CCA and the healthcare system.
- Consider ways to enhance partnership between climate professionals and administrative structures in the above sectors, as a first step in strengthening governance for CCA mainstreaming.

4. Increasing breadth and depth of stakeholder involvement

Consultation with a wide variety of institutional stakeholders is considered the norm for major CCA-relevant strategic documents at regional level, such as the regional Climate Plan and SRADDET, as well as the PCAET of the two main Metropolises and other EPCI. These processes are labelled as ‘co-

construction', in the documents concerned. Institutional stakeholder consultations are also compulsory at local level for revisions to PLU. Despite some good examples of such exercises, the research revealed ongoing difficulties overall in mobilising local elected representatives for serious debate around CCA topics.

Citizen involvement is also perceived as underdeveloped. Citizens have generally been weakly involved in these consultations so far. In this regard, the current preparation of the new NAP at national level, PNACC 3, has highlighted the imperative of educating the general public to improve their understanding of CCA. The Regional COP, initiated towards the end of 2023, will nevertheless include a citizen concertation in mid-2024, prior to validation of its outputs. The region's Climate Plan also foresees various citizen mobilisation initiatives, as well as training for elected representatives at local level.

Certain other key actors are not well connected either to the CCA debate. Natural Parks, for example, and importantly enterprises have not yet been greatly involved in CCA-relevant consultation exercises. There are nevertheless emerging signs that enterprises in some sectors (agriculture, industries involved in international value chains etc.) are beginning to consider the need for integrating CCA into their business models.

Possible ways forward:

- Work on presentation of business cases for CCA, focusing on co-benefits. Animate events for businesses around CCA-relevant topics with a view to greater private sector engagement in future strategy development for CCA.
- Capitalise on the public concertation exercise planned in the context of the regional COP to enhance citizen input forthcoming strategic documents for CCA – consider, in particular, smart involvement of the young generation.

5. Setting up effective multi-level governance models

France's public administrative composition is institutionally heavy and highly complex, with considerable apparent potential for overlap. The situation in Provence-Alpes-Côte d'Azur is no exception to this rule. For effective CCA, there is insufficient coordination between the different layers involved. At the regional level, coordination is handled chiefly through the regional land planning document, SRADDET, but not through the Climate Plan, which does not have compulsory character. The fact that Territorial Climate Air Energy Plans 'PCAET' are obligatory for Metropoles and other groupings of local authorities 'EPCI', but not for the Region, would seem to increase complexity and diminish the likely strength of coordination needed for CCA.

The local planning documents 'PLU' at the level of individual Municipalities are generally lacking in detail on CCA, although there is variation between them. The all-powerful position of local elected representatives within their constituencies also emerges as a weak link in the governance chain. In this sense, there is a strong risk of short-term interests blocking the development of effective long-term strategic approaches to CCA at the local level. The situation may be partially explained by the historical division in responsibilities between the State for natural risk prevention and local authorities for spatial planning and economic development.

Possible ways forward:

- Reinforce lines of coordination specifically on CCA, between national authorities, the region and local authorities.

- Strengthen mechanisms for multi-level dialogue on CCA strategy preparation and implementation - assigning to the Region a role of orchestration and monitoring of overall progress.
- Foster opportunities for synergies in CCA activities between EPCI and municipalities and regional departments, by providing incentives for joint investments and mutualising CCA expertise.

6. Making room for experimentation

Various experimental initiatives on CCA are underway in the region, financed by the EU LIFE and Horizon Europe Programmes - including under the EU Mission CCA – as well as by the Regional Council itself. They embody a heterogeneous set of actions, as well as new approaches to known themes like de-sealing of soil and coastal protection, some involving space technology. However, there is a lack of capitalisation of learning from such initiatives and their value is not being fully realised as a result. Barriers to experimentation also exist on the demand side in the form of strict public procurement rules, as well as on the supply side in the shortage of suitably qualified professionals able to develop and implement new and innovative solutions. Measures under the region's Climate Plan, bringing exchange of experience opportunities to beneficiaries of the EU LIFE Programme, offer a potentially viable way forward in this regard.

Possible ways forward:

- Gather and analyse results of experiments relevant to CCA in different domains and make them widely available in an easy-access format.
- Develop and implement capitalisation actions for relevant actors at different territorial levels in the region, based on the results of experimental initiatives.
- Consider running experiments on innovative public procurement in the context of CCA.

7. Securing high levels of policy intelligence, learning and strategic capacity

Although CCA awareness is growing in the region – especially as a result of Storm Alex in 2020 – it is far from complete and there remains significant confusion between CCA and disaster risk management. Climate change denial is also evident in certain quarters, particularly in places most affected which will require the most radical CCA approaches – such as ski resorts and the low lying Camargue area. The national agencies ADEME, CEREMA and the independent regional expert body GREC-SUD play a key role in awareness raising, as well as in the comprehensive knowledge base for CCA which is a credit to the region. A large number of other structures working at the interface between public authorities and the research community make important contributions to that knowledge base, including the Region's recently-established platform 'Knowledge of the Territory'. However, the region is not in a position to judge the full scale of broader socio-economic impacts of climate change, or effectively measure its CCA efforts, or their outcomes. Insufficient capacity in public administrations in the region emerges as a key bottleneck for transformative CCA, despite increasing support available to local authorities.

Possible ways forward:

- Continue and considerably strengthen vital work already underway in the region on awareness raising and training with regard to CCA – with particular focus on local elected representatives.
- Consider elaborating a system to track and quantify funds disbursed for CCA - notwithstanding the difficulties inherent in estimating the CCA content of actions/initiatives geared primarily

towards other objectives (mitigation, protection of biodiversity, normal management or repair of infrastructures etc.).

- Develop indicators to measure improvements in adaptive capacity and CCA outcomes – where relevant through the use of suitable proxies.
- Boost strategic capacity for CCA throughout the administration in the region – including nomination of qualified persons, with a specific mandate on CCA in public bodies at all levels, including agencies (water agencies, national parks, Conservatoire du Littoral, MétéoFrance, transport authorities, forest authorities, etc.)

Many of these suggested possible ways forward complement and reinforce one another. It is hoped that – together – they can prove useful to the authorities in Provence-Alpes-Côte d’Azur in their journey towards better CCA through deployment of Transformative Innovation approaches.

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ADAPTO – Conservatoire du Littoral (Life project) [adapto, un projet Life initié par le Conservatoire du Littoral \(lifeadapto.eu\)](http://adapto.unprojetlife.fr)

ADEME : CitizenCLIMET <https://citizenclimet.fr>

ADEME : Plus fraîche ma ville www.plusfraichemaville.fr

ADEME : TACCT Trajectoire d'Adaptation au Changement Climatique des Territoires <https://tacct.ademe.fr>

ALPAERA (Interreg Alcotra) <https://www.interreg-alcotra.eu/fr/alpaera-aide-la-gouvernance-de-lair-et-du-climat-en-zones-alpines-alcotra>

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CEREMA - Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement www.cerema.fr

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CRACC - Centre de ressources pour l'adaptation au changement climatique <https://www.adaptation-changement-climatique.gouv.fr/s-inspirer/regions/provence-alpes-cote-azur>

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Région Provence-Alpes-Côte d'Azur: plateforme littoral <https://www.monlittoral.fr/>

List of abbreviations and acronyms

ADEME	Agence de la transition écologique = French agency for the ecological transition
AIR (Climat)	L'Association pour l'Innovation et la Recherche (au service du climat) = Association for Innovation and Research (serving the climate)
AMU	Aix-Marseille Université = University of Aix-Marseille
ANCT	Agence Nationale pour la Cohésion des Territoires = National agency for territorial cohesion
ANR	Agence Nationale de la Recherche = National research agency
ARBE	Agence Régionale de la Biodiversité et de l'Environnement = Regional agency for biodiversity and environment
ARS	Agence régionale de Santé = Regional health agency
AUPA	Agence d'Urbanisme du Pays d'Aix = Aix agency for urbanism
BRGM	Bureau de recherches géologiques et minières = French geological & mining office
CCA	Climate Change Adaptation
CEREMA	Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement = Centre for studies and expertise on risks, environment, mobility and territorial planning
CIMA	Convention interrégionale du Massif des Alpes 2021-2027 = Interregional Alpine convention 2021-2027
COP	Community of Practice
CPER	Contrat de Plan Etat Région = State-Region contract
CRET	Contrat Régional d'Équilibre Territorial = Regional plan for territorial balance
DGEC	Direction générale de l'énergie et du climat = General directorate for energy and climate
DREAL	Direction régionale de l'environnement, de l'aménagement et du logement = Regional directorate for environment, territorial planning and housing
EIA	Environmental Impact Assessment
EPCI	Etablissement public de coopération intercommunale = Public establishment of inter-municipal cooperation
ETI	Entreprise de Taille Intermédiaires = Medium-sized Enterprises
FEADER	Fonds Européen Agricole pour le Développement Rural = European Agricultural Fund for Rural Development
FPRNM	Fonds de prévention des risques naturels majeurs = Fund for prevention of major natural risks
FRAT	Fonds Régional d'Aménagement du Territoire = Regional planning development fund
GHG	Green House Gases

GREC	Groupe régional d'experts sur le climat = Regional climate expert group
JRC	Joint Research Centre
LTECV	Loi relative à la transition énergétique pour la croissance verte (2015) = Law on the energy transition for green growth (2015)
MNCA	Métropole Nice Côte d'Azur = Metropolis Nice Côte d'Azur
NAP	National Adaptation Plan
NbS	Nature based Solutions
OIR	Opérations d'Intérêt Régional = Operations of regional interest
ONERC	Observatoire national sur les effets du réchauffement climatique = National observatory on the effects of global warming
PACA	Provence-Alpes-Côte d'Azur
PCAET	Plan Climat Air Énergie Territorial = Territorial Climate Air Energy Plans
PEPR	Programmes et Equipements Prioritaires de Recherche = Priority Research Programs and Equipment
PIA	Programme d'investissement d'avenir = Future Investment Programme
PLU	Plan Local d'Urbanisme = Local Urban Plan
PNACC 3	Plan National d'Adaptation au Changement Climatique 3 = National Plan for Adaptation to Climate Change 3
PNDR	Programme national de développement agricole et rural = National agricultural and rural development programme
PPRI	Plan de prévention des risques d'inondation = Flood risks prevention plan
PPRN	Plan de prévention des risques naturels = Natural risks prevention plan
R&D	Research and development
R&I	Research and innovation
SCOT	Schéma de Cohérence Territoriale = Territorial Cohesion Scheme
SECAP	Sustainable Energy and Climate Action Plan
SRADDET	Schéma régional d'aménagement, de développement durable et d'égalité des territoires = Regional plan for planning, sustainable development and territorial equality
SRDEII	Schéma régional de développement économique, d'innovation et d'internationalisation = Regional plan for economic development, innovation and internationalization that includes the region's Smart Specialisation Strategy (RIS3) 2021-2027
SRESI	Schéma régional de l'enseignement supérieur, de la recherche et de l'innovation = Regional plan for higher education, research and innovation
TACCT	Trajectoires d'Adaptation au Changement Climatique des Territoires = Adaptation Trajectories to Climate Change in Territories
TRAC	Trajectoire de réchauffement de référence pour l'adaptation au changement climatique = Reference warming trajectory for adaptation to climate change

ZAN

Zéro artificialisation nette = Net zero artificialization of soils

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Annex 1: List of interviews

Date	Interviewee	Position
22/01/2024	Rectorat de la Région Académique Provence-Alpes-Côte d'Azur	
	Jean-Luc PARRAIN	Délégué Régional Académique à la Recherche et à l'Innovation
	Métropole Aix Marseille Provence	
	Corinne PINA	Directrice Mission Stratégie climatique
	Agence d'urbanisme du Pays d'AIX - AUPA	
	Sabrina RODRIGUEZ	Responsable de l'Atelier Transition Environnementale
	Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement - CEREMA Méditerranée	
	Renaud BALLAGUER	Directeur
	Agathe PUGET	Chargée de mission
	Ea éco-entreprises	
	Cristina CASIAN	Directrice déléguée + PNC Bio Environnement Horizon Europe
André DURBEC	Président	
23/01/2024	Association AIR Climat	
	Antoine NICAULT	Directeur - Coordinateur et animateur du GREC-SUD
	Région Sud Provence-Alpes-Côte d'Azur	
	Christine LOUSSERT	Direction du Développement Economique Durable et de l'Innovation - Service Innovation Recherche et Enseignement Supérieur
	Marie-Caroline VALLON	Direction de la Transition Energétique et des Territoires
	Agence de la transition écologique - ADEME	
	Elodie BRICHE	Coordnatrice R&D Urbanisme Durable et intrapreneure
	Jonathan BOURGUIGNON	Attaché
	Ville de MARSEILLE	
	Arthur COUSSY	Chef de projet Mission 100 Villes
	Delphine MARIELLE	Responsable écologie et résilience
Jérémie LECA	Responsable évolution du trait de côte	
Sonia MECHEREF	Responsable risque inondation	
24/01/2024	Agence de la transition écologique - ADEME	
	Yves LE TRIONNAIRE	Directeur Direction Régionale
	Région Sud Provence-Alpes-Côte d'Azur	
	Aurélien CHARPENTIER	Délégation Connaissance Planification Transversalité - Service Planification Régionale et Territoriale (DCOPT – SCOT) - Plateforme connaissance du territoire - Cheffe de Service
	Olivier BAUDY	DCOPT – SCOT - Chef de projet SRADDET
	Julien DARIO	DCOPT – SCOT - Responsable Plateforme Connaissance du Territoire
	Claire AJOUÇ	DCOPT – SCOT – Attachée Unité Plateforme Connaissance du Territoire
	Agence de l'Eau	
Annick MIEVRE	Directrice de la délégation PACA corse	

Date	Interviewee	Position
	Philippe PIERRON	Expert à la délégation PACA corse
	DREAL Direction Régionale de l'Environnement, de l'Aménagement et du Logement Provence-Alpes-Côte d'Azur	
	Marie-Françoise BAZERQUE	Directrice adjointe
24/01/2024	Sophie LE GARREC	Cheffe de l'unité Air Climat Transition Energétique, Service Energie Logement
	Sabrina SAYAH	Chargée de mission Climat
25/01/2024	Aix-Marseille Université	
	Alain SANDOZ	Professeur - Faculté des Sciences -Directeur du Département Interactions Sciences et Sociétés
	Euromediterranée	
	Guillaume HERMITTE	Secrétaire Général
	Stéphane GHIO	Directeur de la stratégie, du développement et de l'innovation
	Mairie de Ramatuelle	
5/02/2024	Métropole Nice Côte d'Azur	
	Félix GRAVEL	Directeur de la transition écologique et de l'environnement
6/02/2024	Région Sud Provence-Alpes-Côte d'Azur	
	Yohann PAMELLE	Direction Générale Aménagement du Territoire et Développement Durable, Directeur de Projet Plan Climat
7/02/2024	Elodie GARIDOU	Direction Déléguée FEDER - Service Transition Juste Ecologique et Energétique
	Thibaut LIMON	Direction des Infrastructures et des Grands Equipements DIGE - Expert en transition écologique et énergétique dans les transports, innovations et financement

Annex 2: Main knowledge sources relevant for CCA in Provence-Alpes-Côte d’Azur

Knowledge source	Content
Region-specific	
Platform ‘Knowledge of the territory’ - <i>Plateforme connaissance du territoire</i> ⁶⁸	A new mechanism for coordinating and pooling region-specific data and studies, run by the Region, the State, the national statistical and geographic institutes ⁶⁹ . Its main objectives are to offer shared observation tools for the benefit of the region and to lead a network of professional actors. Its originality lies in: high degree of interactions with users for needs definition; the use of advanced tools for data relevant for climate change adaptation.
Regional experts group on climate in region Sud Provence-Alpes-Côte d’Azur - <i>Groupe régional d’experts sur le climat en région Sud Provence-Alpes-Côte d’Azur</i> (GREC-SUD) ⁷⁰	A regional ‘mini-IPCC’, which centralises, popularises and shares scientific knowledge on climate change and vulnerabilities in the region through publications, data, videos and communication activities. Its objective is to inform and train local managers and decision-makers with the aim to improve understanding of climate change and incorporate scientific findings into public policy. It is a member of the national network of regional expert groups on climate, active in almost all French regions.
Regional observatory on energy, climate and air - <i>Observatoire régional de l’énergie, du climat et de l’air</i> - ORECA ⁷¹	An observatory gathering data and knowledge from 12 major actors in the fields of energy and air quality in the region. Its mission is to evaluate and support public policies by observing developments in the energy sector. It acts as a resource centre on statistical data, produces an annual dashboard and carries out specific studies.
Regional agency for biodiversity and environment - <i>Agence régionale de la biodiversité et de l’environnement</i> - ARBE ⁷²	A regional agency aiming at supporting local authorities and stakeholders in their efforts to preserve biodiversity, water in the ecological transition. It improves and exploits knowledge on biodiversity and water (management of observatories and contribution to regional strategies); raises awareness and provides training on biodiversity; coordinates networks of stakeholders and develops European and international projects.
Platform ‘My coastline Provence-Côte d’Azur’ - <i>Plateforme Mon Littoral Provence-Côte d’Azur</i> ⁷³	An observatory aiming to pool, inform and disseminate local data and organise exchanges on coastline management, with a view to contributing to a regional culture of coastal risk management and adaptation to climate change. It started with a coverage of one department (Var) and will be subsequently extended to all departments.
Platform Citizen CLIMET ⁷⁴	An online platform for scientific and technical data on climate change and the ecological transition in the region, produced by teams attached to research bodies, public and private companies and associations. It provides users with

⁶⁸ <https://connaissance-territoire.maregionsud.fr/la-plateforme/presentation-generale>

⁶⁹ INSEE – Institut national de la statistique et des études économiques and IGN – Institut géographique national

⁷⁰ <http://www.grec-sud.fr/>

⁷¹ <https://oreca.maregionsud.fr/>

⁷² <https://www.arbe-regionsud.org/>

⁷³ <https://www.monlittoral.fr/>

⁷⁴ <https://citizenclimet.fr/>

Knowledge source	Content
	climate and meteorological data, as well as geographical reference information to cross-reference indicators and maps.
Cartopas ⁷⁵	A cartographic atlas featuring 71 maps in pdf format, covering the main environmental, planning and housing issues in the region. It is maintained by the Regional Directorate for the Environment, Planning and Housing (DREAL), the regional delegation of the Ministry of Ecological Transition and Territorial Cohesion and the Ministry of Energy and Transport.
Local High-level Council for Climate and biodiversity - <i>Haut conseil local pour le climat et la biodiversité</i> (Metropole Nice Côte d'Azur) ⁷⁶	An independent body, made up of multidisciplinary experts, whose role is to support strategic decisions, for the decades to come, in all areas of mitigation and adaptation in the metropolitan area, both in terms of major territorial strategies and measures to combat global warming and preserve biodiversity.
National with regional delegation	
Centre for Studies on Risks, the Environment, Mobility and Urban Planning - <i>Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement</i> - CEREMA ⁷⁷	The major French public agency offering multidisciplinary, transversal expertise in the fields of urban planning, regional cohesion and ecological and energy transition for resilient and climate-neutral cities and regions. It has a staff of 2,600 people out of which 500 are dedicated to research and innovation activities. It provides assistance in developing, implementing and assessing public policies at national and local levels, in the fields of climate, ecological transition and regional cohesion. The regional antenna develops numerous research partnerships with the region, notably on urban heat islands and on resilience of transport infrastructure.
Ecological Transition Agency - <i>Agence de la transition écologique</i> - ADEME ⁷⁸	A public agency with the mission to support and mobilise all players - citizens, economic players, local authorities and researchers - to accelerate the ecological transition. ADEME provides advice, financial support, publications and guides as well as training. The regional office encourages the creation of networks and the coordination of local relays, adapting its action to the region's specific socio-economic and environmental contexts.
French Office for Biodiversity - <i>Office français de la biodiversité</i> – OFB ⁷⁹	A public agency with the mission to preserve life in aquatic, terrestrial and marine environments. It plays an essential role in combating the loss of biodiversity in the face of pressures, such as the destruction and fragmentation of natural environments, various forms of pollution, the over-exploitation of natural resources, the consequences of climate change etc. It provides knowledge, research and expertise on species, environments and their uses; support for the implementation of public policies; management and support for managers of natural areas and support for stakeholders and mobilisation of society.

⁷⁵ <https://www.paca.developpement-durable.gouv.fr/cartopas-actuel-a14590.html>

⁷⁶ <https://transitionecologique.nicecotedazur.org/agir/haut-conseil-local-pour-le-climat-et-la-biodiversite/>

⁷⁷ <https://www.cerema.fr/>

⁷⁸ <https://www.ademe.fr/>

⁷⁹ <https://www.ofb.gouv.fr/provence-alpes-cote-dazur>

Knowledge source	Content
National	
The portal DRIAS 'the future of climate' - <i>Le portail DRIAS les futurs du climat</i> ⁸⁰	A portal that provides a series of modelled climate data for the past, present and future (1950-2100), at high spatial resolution, or by mountain range, as well as key indicators for assessing the extent of climate change.
National Observatory on impacts of climate change - <i>Observatoire national sur les effets du réchauffement climatique (ONERC)</i> ⁸¹	A public body that coordinates national policy on adaptation to climate change. Its main tasks are to collect and disseminate information on the risks associated with global warming, formulate recommendations on the adaptation measures to be considered to limit the impacts of climate change and liaise with the Intergovernmental Panel on Climate Change (IPCC).
Resource centre for adaptation to climate change - <i>Centre de ressources pour l'adaptation au changement climatique - CRACC</i> ⁸²	A portal that offers a wide range of resources by theme (forest, town, sea, etc.), concrete examples of action in local areas, tools for taking action and solutions for adapting to climate change. It is aimed at different user profiles: elected representatives, private individuals, consultancies, etc. It has dedicated pages gathering initiatives in each French region.
<i>Météofrance</i> ⁸³	The national meteorological institute. Along with short-term weather forecasts and the collection of historical weather data, it produces indicators on impacts of climate change on the national territory. It includes a research and a training centre.
The Climsnow portal ⁸⁴	A portal that provides data, at various timescales, on the reliability of snow cover, its variability and the capacity of each resort to maintain its operations. The aim is to provide evidence to feed forward-looking studies on the development and transition of mountain areas.
Geological and mining research Office - <i>Bureau de recherches géologiques et minières - BRGM</i> ⁸⁵	The national geological service, a public body for earth science applications to manage resources and risks in the soil and subsoil. It carries out geological studies, such as, e.g. an assessment of the cliff instability risk in a department of the Provence-Alpes-Côte d'Azur region.

⁸⁰ <https://www.drias-climat.fr/>

⁸¹ <https://www.ecologie.gouv.fr/observatoire-national-sur-effets-du-rechauffement-climatique-onerc>

⁸² <https://www.adaptation-changement-climatique.gouv.fr/s-inspirer/regions/provence-alpes-cote-azur>

⁸³ <https://meteofrance.com/>

⁸⁴ <https://www.climsnow.com/>

⁸⁵ www.brgm.fr

Annex 3: 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:

“Transformative innovation for better climate change adaptation” – Case studies

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

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

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