

Review

Local Climate Adaptation and Governance: The Utility of Joint SECAP Plans for Networks of Small–Medium Italian Municipalities

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Abstract: The “Joint Sustainable Energy and Climate Action Plans” (Joint SECAPs) introduced by the Covenant of Mayors (CoM) are voluntary tools that favour a joint approach to energy planning and climate change mitigation/adaptation among municipalities in the same territorial area. The goal is to obtain joint results that are more effective and advantageous than those that can be achieved by the individual municipalities with respect to local climate change adaptation and mitigation policies. This article assesses their effectiveness in Italy. Six different experiences conducted mostly in small and medium municipal networks are compared, verifying the advantages and critical points in the different phases of building and implementing adaptation measures. A list of recommendations/objectives emerges from these experiences to guide the joint construction of adaptation measures, which may be implemented through multi-level participatory governance that encourages experimentation and innovation on the local level and develops synergy with large-scale policies and plans.

Keywords: Joint SECAPs; climate adaptation; multilevel governance; local government



Citation: D’Onofrio, R.; Camaioni, C.; Mugnoz, S. Local Climate Adaptation and Governance: The Utility of Joint SECAP Plans for Networks of Small–Medium Italian Municipalities. *Sustainability* **2023**, *15*, 8738. <https://doi.org/10.3390/su15118738>

Academic Editors: Carlito Tabelin, Andrei P. Kirilenko, Maricar Aguilos and Hernando P. Bacosa

Received: 19 October 2022

Revised: 19 May 2023

Accepted: 24 May 2023

Published: 29 May 2023



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1. Introduction

Although climate change is a global problem and much of the responsibility for initiating actions to address this challenge is shared politically on the international, national, and regional levels, such actions must be implemented on the local level [1–3].

Cities and municipalities are key in promoting mitigation and adaptation actions [4–6] and play a crucial role in pursuing sustainability, equitably distributing resources, and promoting new climate policies, low-carbon technologies, and sustainable infrastructure [7]. Local governments play this role in three main ways [8]: (a) leading the local community (by developing and implementing local policies and regulations that pursue objectives beyond national targets); (b) acting as an infrastructure manager and/or owner (by encouraging energy efficiency in public buildings and promoting sustainable products and services through green public procurement) [9,10]; and (c) sharing information with the local community on experiences and examples to improve knowledge and awareness about climate change [11].

European adaptation policies have progressed quickly in recent years with the introduction of the European Green Deal [12], the new EU Adaptation Strategy [13], and the Climate Law of 2021 [14]. Scientific research has also dealt extensively with adaptation [15,16], studying a variety of aspects including the spatial aspect of plans [17]; indicators and metrics for verifying their effectiveness [18]; the reasons for the success of some experiments [19]; the importance of a long-term perspective [20]; the role of the local community [21,22]; and the role of cities [23]. Nevertheless, measures and plans dealing with mitigation are still favoured with regard to operations [24,25]. This propensity for mitigation rather than adaptation was clearly highlighted a few years ago by a survey of 885 European cities [26]. The survey showed that about 66% of EU cities with a population

- concrete reasons for the usefulness of Joint SECAPs in small and medium municipalities with particular reference to defining and managing climate change adaptation strategies.

The article is structured as follows. Section 2 discusses the potential, barriers, and hopes for the spread of Joint SECAPs in Italy. Section 3 discusses the method used to assess the initiatives in the different municipalities to implement the adaptation measures set out in the Joint SECAP plans. Section 4 regards the results of the comparison between the various Italian Joint SECAPs. Section 5 interprets the barriers, difficulties, and innovations introduced by the plans, also through the involvement of their coordinators/managers, and finally, discusses the lessons learned and offers a possible list of recommendations/objectives as a contribution to the debate.

2. The Potential of Joint SECAPs and Their Implementation in Italy

Despite various difficulties, according to the New EU Adaptation Strategy on Adaptation to Climate Change [13], the local level is the ‘bedrock of adaptation’ and local authorities play a crucial role in implementing national adaptation strategies, promoting smarter, quicker, and more systematic adaptation and spreading awareness about adaptation in all areas of intervention [23].

Joint SECAPs, which are recommended by the CoM for small/medium-sized municipalities within the same territorial area, cover a population of roughly less than 10,000 inhabitants per municipality, although the tool can also be used for larger agglomerations [49].

Under the CoM, SECAPs are strategic documents that dictate guidelines on procedures to implement in the fight against climate change [46], although without defining binding precepts, so the actions do not, for example, directly affect territorial governance regulations [50].

Viewed from this perspective, combating climate change would be a challenge to solve not on the local scale, but in other areas. These aspects lead to potential conflict. While the construction and management of the plan on the local level are desirable, the involvement of entities, actors, and tools pertaining to other competencies and other governance levels is required. Resolving potential conflict requires the promotion and reinforcement of coordination activities and a clear division of tasks and responsibilities for the different public actors participating in the process [4,51].

On the other hand, the joint construction of SECAPs could strengthen the bargaining power of small municipalities vis-à-vis higher level bodies and territorial stakeholders, interpreting the perspectives regarding the sustainability of the different stakeholders and actors, becoming more open to debate in order to achieve short- and long-term adaptation goals [52–54], and transforming current barriers into factors for enabling action and change [55]. By promoting Joint SECAPs, the difficulties found in small municipalities would be resolved. Such difficulties include

- The lack of the necessary budget in small municipalities to respect the commitments of the CoM in developing action plans and critical points that arise due to the lack of integration between plans operating on different levels and their interaction with actions for adaptation [56,57].
- The fragmentation of skills among different sectors of the public administration and the absence of coordination between them [58].
- The sector-based approach of SECAPs and the lack of an integrated urban vision do not encourage their consideration as institutional tools on par with urban plans, regulations, etc. They are often simply considered as tools for planning and financing ordinary interventions in urban areas [44].

The European Horizon 2020 research ‘Path2LC’ identifies joint planning as a possible solution to overcome barriers to the implementation of SECAPs [59]. In its recent report entitled ‘D4.9 SE(C)APs: From local planning to concrete action Barriers, success factors and decision processes’, the plans were analysed by the network of researchers (five

of at least 50,000 had a local mitigation plan, 26% had an adaptation plan, only 17% had a joint mitigation/adaptation plan, and about 33% had no local climate plan. Most research in recent years has regarded large cities [27,28] and the barriers to developing and planning policies and actions for adaptation [29–32]. Small cities and municipalities instead do not seem able to effectively address climate risks due to a lack of resources [30], the necessary skills [33], and the lack of policy tools that larger cities and entities have [29].

A good observatory for investigating these difficulties, especially with respect to adaptation and small municipalities, is the ‘Covenant of Mayors’ (CoM). This is an initiative by the European Commission, the role of which is to encourage local entities to commit themselves to climate actions, with growing participation in recent years [33–35]. This network of municipalities was created in 2008 and integrated into the Covenant of Mayors for Climate and Energy and then into the Global Covenant of Mayors for Climate and Energy (GCoM) in 2017.

Official documents and the Covenant of Mayors offer a preferential look at the policies implemented by local authorities, as shown by the recent Joint Research Centre (JRC) report ‘Covenant of Mayors: 2021 assessment. Climate change mitigation and adaptation at local level’ [36]. This report underlines how the large majority of signers (63.2% of 10,500 signatories as of 2021) have committed themselves to reaching objectives that do not include adaptation, but only mitigation. This delay in addressing adaptation is associated with the difficulty of local entities to develop actions in sectors that hold jurisdiction or limited financial capacity and the difficulty of monitoring, given that most action plans do not include monitoring reports in the current phase (only 69 of 953 action plans). This report also confirmed that small towns and municipalities have very limited capacity for action with regard to adaptation [36].

Faced with these documented difficulties, especially in small municipalities and cities, some researchers argue that it is necessary to increase the governance capacity of adaptation by proposing a strategy to reconcile the needs of different actors and promote collective action and coordination [37]. To do so, a good opportunity may be the creation of municipal climate networks to support adaptation efforts [38–40]. Building networks would allow for the pooling of resources, with the exchange of crucial information on adaptation policies and actions and mutual learning [30]. Networking [41,42] could facilitate the implementation of custom solutions based on local needs [43], strengthen local communities, and increase the ‘environmental awareness’ of different stakeholders [44]. The results of this strategy could also lead to solutions to common problems [30] and promote adaptation actions integrated into decisionmaking processes [45].

Networking to build common, shared actions to tackle climate change is one of the objectives of the Joint SECAP Plans (Sustainable Energy and Climate Action Plans) [46]. These local, voluntary plans promoted by the CoM follow a joint approach to energy planning and mitigation of/adaptation to climate change in surrounding cities to obtain results that are more effective than in isolated cases. The municipalities involved would, therefore, benefit from economies of scale, with evident savings in personnel and resources [46].

There are few contributions to the literature on the effectiveness of adaptation plans, especially with regard to small municipalities [47]. This article, therefore, aims to partially fill in the gap by reflecting on the ability of networks of small cities and municipalities to use Joint SECAPs to govern the complexity of the climate challenge by proposing concrete adaptation actions on the ground.

This paper focuses on the CoM in Italy [48] and investigates the actual effectiveness of Joint SECAPs in addressing climate adaptation in municipalities and small towns. To do so, it explores the following topics:

- the nature of adaptation actions and validity of the shared approach in the process of constructing and implementing actions for adaptation;
- ways of managing the complexity of multiple levels and actors to pursue concrete actions on the ground for mitigating local vulnerabilities rather than becoming a source of conflict between actors and entities on different levels;

European countries and followers), with the result that in most cases only partial results were achieved, the so-called ‘low-hanging fruit’ [59]. This means that to date, only easy-to-implement measures have been introduced, disregarding ones that are more strategic.

These measures include, for example, those regarding education or raising awareness among some bands of the population [59]. According to the Path2LC project, this lack of consideration of the role of SECAPs is due to the scarce skills and motivation of stakeholders, the inability to integrate these plans within ordinary territorial management, powerlessness when faced with the jungle of financing available to implement the action plans, etc.

One very effective solution indicated by this research is the ‘Learning Municipality Networks’ approach, that is, exchange networks activated among the different relevant administrations to define objectives and common actions. In support of this network, the project involves a series of tools such as webinars, peer-to-peer sessions (inter-regional and inter-national), expert input, and tailored workshops, as well as an open-source knowledge base. The underlying idea is to overcome obstacles by exchanging knowledge and experiences between the municipalities and cities participating in the network, improving coordination between different sectors of the public administration, cooperation with civil society, and the availability of the planning and monitoring tools necessary to develop and reach the objectives set in the plans.

While Joint SECAPs as conceived by the CoM are only referenced indirectly in the Path2LC project, they are more explicitly called on by the Italian Institute for Environmental Protection and Research (ISPRA) in its ‘Report 2020 on the State of activation of the Covenant of Mayors’ [60]. ISPRA states that it is essential to use SECAPs to strengthen joint action on behalf of small Italian municipalities. It, therefore, calls for incentives to encourage the submission of Joint SECAPs to reach minimum population thresholds, at least those above 3000 inhabitants.

The call by ISPRA is very important for Italy. Although the country has not developed a national law to impose the development of climate plans, it participates significantly in the CoM (Figure 1), with 5145 municipal signatories, the vast majority of which (4968) have less than 50,000 inhabitants (Figure 1). Although a large number of Italian local authorities have made commitments with respect to adaptation, few have addressed this issue in their SECAP (Table 1).

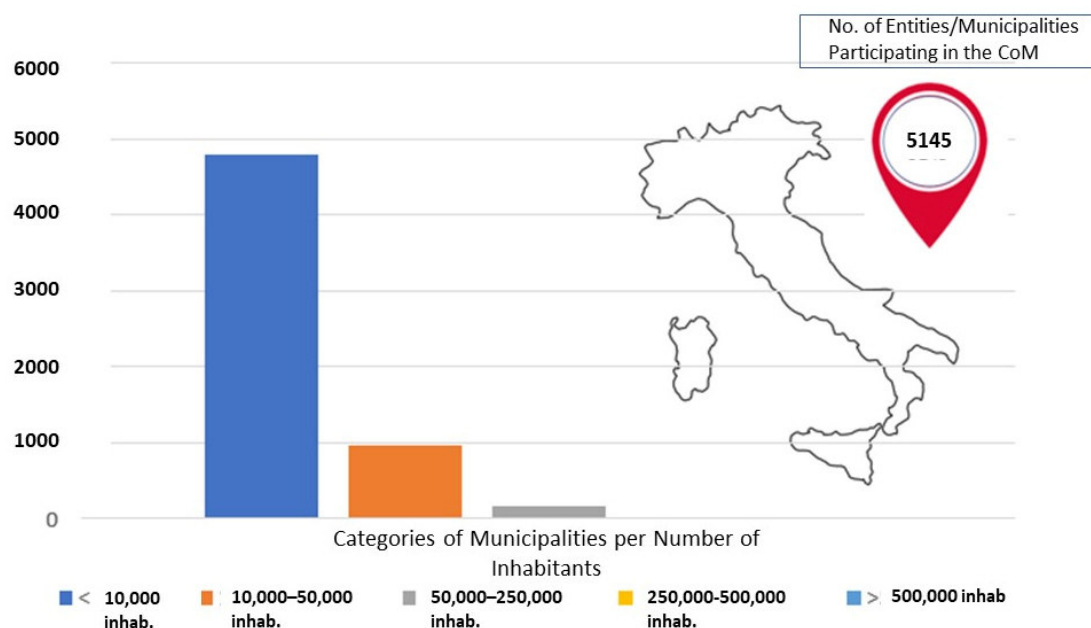


Figure 1. Total Italian signatories and classes of entities per number of inhabitants. March 2023. Source: CoM, <https://eu-mayors.ec.europa.eu/en/signatories>, accessed on 3 March 2023. Figure produced by the authors.

Table 1. Signatories of the Covenant of Mayors as of 2021 and their commitments. Source: ISPRA, <http://bogelso.sinanet.isprambiente.it/temi/cambiamenti-climatici/il-patto-dei-sindaci-per-il-clima-e-lenergia>, accessed on 3 March 2023. Table produced by the authors.

Italian Signatories of the Covenant of Mayors	Signatories Who Have Submitted an Action Plan	Signatories That Have Monitored the Action Plan	Signatories That Have Made Commitments with Respect to Adaptation	TOT
<10,000 residents	2497 (70%)	703 (20%)	354 (10%)	3554
10,000–50,000	686 (60%)	279 (24%)	195 (16%)	1160
50,000–250,000	115 (52%)	57 (26%)	47 (22%)	219
250,000–500,000	9 (50%)	4 (22%)	5 (28%)	18
>500,000	5 (38%)	4 (31%)	4 (31%)	13

In the above-mentioned report, ISPRA attributes the scant participation and performance of small and medium-small municipalities to sudden institutional changes, the widespread lack of qualified personnel for implementation, monitoring, and evaluation of the results of the actions taken, fragmentation among different offices and departments in the public administration, the lack of data and skills important for climate change initiatives, and the frequent lack of coordination and political leadership to guarantee the necessary consistency.

The report, therefore, recommends specific promotion and support for small municipalities to pursue the following:

- Greater harmonisation of data and methods;
- Greater sharing of technical skills as well as the necessary personnel, not only for adherence and preparing the plan, but also for the expected monitoring stages;
- More adequate management of the issues of climate-change adaptation by developing more stringent guidelines on the means of stating and calculating emissions;
- Strengthening promotional activities through the use of mechanisms that encourage the presentation of Joint SECAPs.

This article examines some ongoing experiences with Joint SECAPs in a number of Italian areas for the purposes outlined in Section 1 while considering the critical issues raised in this Section. Among the plans examined, some are promoted by European projects (Interreg Italy–Croatia; Horizon 2020; Life, etc.), and others by certain regional laws that have provided incentives (also financial) in recent years for drafting energy and climate plans, as in the case of the Veneto and Emilia–Romagna Regions.

3. Materials and Methods

This article is based on a preliminary review of Joint SECAP plans in Italy. It relies on an analysis of official documents, a selection of case studies representing the different areas of the country (Northern, Central, and Southern Italy), and the application of an evaluation matrix to verify the contents and tools used to construct, share, and implement the plans. The evaluation matrix (Table S1) is accompanied by a questionnaire (Table S2) that was submitted to the plan managers/coordinators to collect their opinions on the usefulness and effectiveness of the plans. Finally, a qualitative comparison was made to identify similarities and divergences in the construction of adaptation actions and the measures developed for their implementation over time.

The selected plans pertain to territories in the following Italian regions: two in Emilia–Romagna; two in Veneto; one in Le Marche; and one in Campania. The municipalities in Emilia–Romagna consist of unions of municipalities; in other cases, they are aggregations of municipalities. The methods used to construct the various processes in the plans are substantially in line with the Covenant of Mayors guidelines [46], although some

of these experiences were promoted by European projects. In the latter case, means of construction and involvement of territorial actors and citizens, monitoring and implementation were adopted, demonstrating the EU's strong commitment to combating climate change.

The networks mostly consist of small (around 10,000 inhabitants according to CoM indications) or medium-sized municipalities, although larger municipalities are also present.

The Joint SECAPs selected are the following:

- Joint SECAP Unione Tresinaro Secchia (presented by the Unione dei Comuni di Baiso, Casalgrande, Castellarano, Rubiera, Scandiano, and Viano (Province of Reggio Emilia, Emilia-Romagna Region). Total population: about 81,000; approved by the municipalities in 2021. <https://www.comune.scandiano.re.it/servizi/ambiente/piano-d-azione-per-lenergia-sostenibile-e-il-clima-Secap/>, accessed on 3 March 2023.
- Joint SECAP Terre Estensi (presented by the Associazione Intercomunale pursuant to Art. 8 Regional Law no. 11 of 26 April 2001), Participants: Municipalities of Ferrara, Voghiera, and Masi Torello. Total population: about 139,000, approved by the municipalities in 2019. https://www.pattodeisindaci.eu/about-it/la-comunit%C3%A0-del-patto/firmatari/piano-d-azione.html?scity_id=16127, accessed on 3 March 2023.
- Joint SECAP 'Venezia Orientale Resiliente' (presented by the Conferenza dei Sindaci del Veneto Orientale: Veneto Regional Law no. 16/93 and later modifications). Municipalities of: Annone Veneto, Caorle, Cavallino-Treporti, Ceggia, Cinto Caomaggiore, Concordia Sagittaria, Eraclea, Fossalta di Portogruaro, Gruaro, Jesolo, Meolo, Musile di Piave, Noventa di Piave, Portogruaro, Pramaggiore, Quarto d'Altino, San Michele al Tagliamento, San Donà di Piave, Santo Stino di Livenza, Teglio Veneto, Torre di Mosto, and Fossalta di Piave. Total population: 236,000; approved by the Conferenza dei Sindaci in 2020. This plan was developed under the European LIFE project 'Veneto ADAPT'. https://www.vegal.net/catalogo/web/allegati/6051d98eab2d2_Presentazione_SECAP_light.pdf, accessed on 3 March 2023.
- Joint SECAP 'Valle dell'Agno' (presented by the aggregation of municipalities composed on Val d'Agno (Capofila), Recoaro Terme, Cornedo Vicentino, Brogliano, Castel Gomberto, and Trissino). Total population: about 63,000, agreement signed in 2016. <http://www.comune.valdagno.vi.it/comune/progetti-e-attivita/Secap-valle-dellagno>, accessed on 3 March 2023.
- Joint SECAP 'Vesuviano' (presented by the municipalities of Palma Campania, San Giovanni Vesuviano, Striano (NA). Total population: about 57,000. This is encompassed in the European network of Horizon 2020 PATH2LC projects. Public Authorities together with a holistic network approach on the way to low carbon municipalities. The city councils of the three municipalities approved the plan in 2021. In 2016, these municipalities activated the Municipal Office for Environmental Sustainability (Italian acronym UCSA) to facilitate and/or enhance management with regard to the environment, energy, and climate change adaptation. <https://vcloud.ilger.com/cloud4/index.php/s/i5WxPPoKDpPWobs>, accessed on 3 March 2023.
- Joint SECAP 'Riviera delle Palme' (presented by the municipalities of San Benedetto del Tronto, Cupra Marittima, Grottammare, and Monteprandone). This is included in the network of the Interreg Italia-Croazia 'joint_SECAP' project. Population: about 82,000. Joint SECAP currently being approved by the municipalities. <https://it.readkong.com/page/la-partecipazione-del-territorio-nel-Secap-congiunto-della-5266974>, accessed on 3 March 2023.

Most of these plans are just starting to be implemented, and the first monitoring phase has not yet finished. The effectiveness of adaptation measures, therefore, cannot be verified after the fact. This article makes evaluations before the fact based on a survey of documents in the plans (accessible on the municipal websites) and through distribution of a questionnaire to coordinators/managers, intending to deepen the assessments once the first monitoring phase is complete.

The six plans selected and shown in the evaluation matrix were examined using the following interpretational lenses (Table S1):

- how the adaptation strategy is constructed, with reference to awareness, risks, and impacts of climate change to address; common objectives and priorities among the different entities participating in the network; and type of adaptation actions selected;
- subjects and tools identified to facilitate the construction and implementation of the common adaptation actions;
- feasibility and synergy among the different adaptation actions and in relation to other public administration projects;
- role of participation among local actors, citizens, and public entities, and the role of communication to publicise the plans.

The questionnaire (Table S2), is around four topics:

a. The Joint SECAP Process

What were the steps following the city council's approval in compliance with the Covenant of Mayors?

b. Difficulties

What were the main difficulties faced in the relationship between municipalities and between municipalities and superordinate bodies when constructing the adaptation actions?

c. Collaborative Relationships

Has construction of the Joint SECAP favoured the development of concrete projects and/or work/interventions for the territory regarding the issues of climate-change adaptation? What role did internal municipal offices play? Whose role was it to coordinate the adaptation actions implemented?

d. Involvement of Local Populations and Actors

How did activities for stakeholder/local population participation and involvement influence the success of the project? Will they also play an important role in the future? How? Finally, the purpose of the comparative analysis was to evidence:

- alignment or misalignment in identifying the common priorities and objectives of the adaptation;
- the most common measures for implementing and monitoring the adaptation actions over time and managing their complexity, involving the multiple levels of governance and different actors;
- the most effective measures and tools to encourage acceptance of the adaptation actions by different stakeholders (technicians, entrepreneurs, public entities, and universities) and local communities.

4. Results

4.1. Analytical Investigation of the Plans in the Study

The analytical survey of each Joint SECAP regarded the adaptation strategy used, the feasibility and synergy of adaptation actions, the organisation of the participatory process, and the role played by communication/dissemination (Table S1). Based on the results, the following was observed.

Unione Tresinaro Secchia Joint SECAP

(a) Adaptation Strategy

The plan classifies the vulnerabilities and risks in the entire territory, differentiated according to the territorial location: lowland municipalities and hillside municipalities. The objectives and actions for adaptation are specified depending on the characteristics of each territorial area in reference to detailed action sheets. There are seven objectives for each territorial area. The planned adaptation actions concern not only the physical territory (water reuse and recovery; adaptation and cooling in the urban area (buildings and open spaces), etc.), but also profitable use of urban-planning tools (limiting land consumption and greening) and interaction with other plans and projects managed by other entities.

(b) Feasibility and Synergy in Adaptation Actions

In the plan, a technical working group is created among the municipalities to share the Joint SECAP process, and meetings are planned with local stakeholders to define a shared path to construct the plan. This shared path also envisages possible further investigation and integration through interaction with the stakeholder working groups. The construction of adaptation actions involves an explicit connection with other projects and plans by the entities themselves or promoted by others.

(c) Participatory Process and Role of Communication/Dissemination

A communication plan is envisaged to support the path leading to the approval of individual Joint SECAPs and subsequent public presentations.

Terre estensi Joint SECAP

(a) Adaptation Strategy

The plan characterises the territorial climate of the Intermunicipal Association. It identifies vulnerabilities and risks and develops short- and long-term climate scenarios with reference to other large-scale plans. It also identifies key areas for action according to different levels of economic and social vulnerability. It envisages 25 adaptation actions concerning increasing temperatures, decreased rainfall, and increasing extreme weather events.

(b) Feasibility and Synergy in Adaptation Actions

To coordinate the shared adaptation actions, a 'Protocol of understanding' was stipulated between the relevant public administrations and private parties. This protocol requires the parties to share actions and timeframes and identifies responsibilities with respect to the timeframes, implementation, and monitoring. The lead municipality coordinates the work and activities, raising awareness, and informing stakeholders.

(c) Participatory Process and Role of Communication/Dissemination

The Joint SECAP was constructed by activating focus groups and carrying out preliminary exploratory activities with the various municipal service providers, energy operators, economic and trade associations, and mobility operators. This led to the creation of integrated reference frameworks and the selection of adaptation actions in the immediate future to be shared both now and in the future.

Venezia Orientale Resiliente Joint Secap

(a) Adaptation Strategy

The plan assesses territorial risks and vulnerabilities, and thereby identifies the objectives specified for the sectors of interest on three levels: individual municipalities; large uniform areas; and entire territories covering the 22 municipalities in the network. The objectives are divided into large homogeneous areas in terms of environmental characteristics, settlement dynamics and socioeconomic identity, and local urban-planning indications. Common lines of action are selected for each homogeneous area, thus favouring the sharing of choices and interventions. The primary actions for adaptation regard mobility, tourism, territorial planning, environment and biodiversity, water, agriculture, and forestry.

(b) Feasibility and Synergy in Adaptation Actions

The network of municipalities is highly organised and coordinated. The lead municipality coordinates relations between the political/administrative bodies (Steering Committee) and technicians (Technical Commission). Several coordination meetings are foreseen to establish priority mitigation and adaptation actions, activation and monitoring methods, timeframes, responsibilities, the actors' tasks, and the necessary economic resources. The project envisages the establishment of an 'Area Resilience Manager' in charge of coordinating and encouraging actions to negotiate/promote the Joint SECAP on behalf of private actors in the area.

(c) Participatory Process and Role of Communication in Favouring the Success of the Plan

In the start-up stage of training activities regarding the plan, the administrations expressed their willingness to build a communication plan and involve the local population. The metropolitan city held start-up training activities (for both technicians and administrators), and the administration looked for appropriate moments of interaction with other territorial bodies and local stakeholders. The review and monitoring foreseen by the plan allow for continuous improvement of the process. Most interventions are also aimed at activating non-structural (indirect) actions to involve and empower citizens on an ongoing, permanent basis.

Valle dell'Agno Joint SECAP

(a) Adaptation Strategy

The plan describes the environmental, demographic, and social context of the aggregation of municipalities. It also identifies the risks and vulnerabilities, as well as concrete activities that can increase resilience regarding four categories of intervention: passive defence, active defence, insurance defence, and abandonment. The risks and vulnerabilities regard hydrogeological imbalances, precipitation and flooding, droughts and heat waves, and loss of biodiversity. For each vulnerability identified, the plan presents adaptation actions involving different areas of intervention, such as green areas and reforestation, rain-water management in urban areas, etc. Some of these actions, which often correspond to different types of risks and vulnerabilities, also regard citizen awareness and the connection with urban planning.

(b) Feasibility and Synergy in Adaptation Actions

The plan expresses the need to activate a fruitful collaboration, both technically and politically, between the different sectors of the municipal administrations involved. With regard to monitoring and managing the Joint SECAP after approval and also following any organisational changes, the public works, urban planning, environment, and budget offices will have to coordinate and share the actions. However, the plan does not include any ad hoc tools or figures to facilitate this activity.

(c) Participatory Process and Role of Communication in Favouring the Success of the Plan

The plan sets out meetings with stakeholders and citizens to promote joint actions (particularly with companies, other authorities, and schools). Activities are planned to inform citizens about topics in the plan and possible future actions.

Vesuviano Joint SECAP

(a) Adaptation Strategy

The plan describes the environmental framework and territorial risks and vulnerabilities with specific reference to those requiring priority action. It also identifies the medium- and long-term objectives of adaptation regarding hydrogeological risks, droughts and lack of water, and heat waves. It selects adaptation measures with reference to specific critical issues, sectors of intervention, and the related field of action. The adaptation sheets are organised into objectives, period of implementation, risks avoided, cost estimates, relevant entities, beneficiaries/entities involved, and monitoring indicators.

(b) Feasibility and Synergy in Adaptation Actions

The plan envisages a 'Protocol of understanding' between the public administration and stakeholders (individuals or associations), in which the administrations are committed to coordinating work and activities between the different thematic groups (environment, energy, transport, sustainable mobility, culture, etc.) and the different institutional levels (region, province, basin authority, civil protection, and municipalities). An 'information desk' (UCSA OneStopShop) is also planned for all stakeholders relating to issues of climate change adaptation and energy savings, acting as a catalyst for calls for tenders and funding, particularly from the EU. Other aspects regard sharing actions and the steps to prepare

and implement the action sheets by periodically reporting on the progress and supporting area subjects in coming together and advancing their own initiatives. The creation of an organism—the Integrated Management System—is also envisaged to connect the municipalities when implementing the actions in the plan.

(c) Participatory Process and Role of Communication in Favouring the Success of the Plan

The plan sets out various activities to involve the different players in the process. These actors include, in particular: the city government and various sectors and municipal offices involved in all plan instruments, ongoing projects, and programmes (also and especially European ones); and the main stakeholders in the various sectors of interest (industrial production, agriculture, all types of schools, large- and small-scale distribution, transport, the environment, and cultural and social associations), as both ‘solution bearers’ and ‘beneficiaries’ of the actions. Participatory drafting of the action sheets is also envisaged, identifying the actors, costs, timeframes, regulatory/cultural/economic barriers and how to overcome them. The training and information capacity of the Joint SECAP is promoted through the ‘Energy and Sustainability Desk’ in close synergy with stakeholders and citizens.

Riviera delle Palme Joint SECAP

(a) Adaptation Strategy

The plan identifies 73 risks in the territory of the different municipalities, of which 27 are due to rising temperatures, 6 to decreasing rainfall, and 40 are due to extreme events. With respect to these risks, common objectives and the resulting adaptation actions are identified and divided into sectors: building, energy, transport, waste, industry, and other sectors. Stakeholder priorities are also identified with respect to water, agriculture and forestry, the natural environment and biodiversity, the built environment, education, civil protection, spatial planning, and tourism. The 18 overall adaptation actions selected by the stakeholders concern one or more climate phenomena. Among them, the group of actions concerning urban flooding is predominant, with the reduction of heat wave effects immediately following.

(b) Feasibility and Synergy in Adaptation Actions

Consultation with all stakeholders was a central part of the planning process, from the initial stages to its conclusion. A group of experts facilitated three focus groups that worked to identify the risks, objectives, and actions. The focus groups were followed by bilateral meetings with the individual relevant administrations, with whom an in-depth discussion took place to effectively identify and describe the actions and cross them with other actions and reference bodies. For example, among the actions planned to reduce the risk of river flooding, waterway monitoring, and maintenance were related to sustainable drainage. This led to the identification of cross-cutting actions in the territory and the development of synergies to adapt municipal regulations and promote river and coastal contracts.

(c) Participatory Process and Role of Communication in Favouring the Success of the Plan

The participatory process underpins the entire planning process, which involves three main phases: identification of climate risks in the area; identification of the objectives for the plan; and identification of actions to pursue these objectives. In each of the phases, a process is developed to involve local stakeholders. The participatory process, therefore, permeates the entire process and the adaptation actions, the end result of this process, are shared deeply.

4.2. The Questionnaire for Joint SECAP Coordinators

Although the results of the questionnaire are partial and not exhaustive because only three out of six coordinators accepted the invitation, the municipalities’ difficulty in implementing the expected adaptation actions is clear (Table S2).

For Joint SECAP ‘Tresinaro Secchia’, for example, it emerges how, following the approval of the SECAP, there was a desire to give concrete and operational substance to the project under development by activating round tables for consultation and interaction to map, reach, inform, and involve local actors and stakeholders. The objective was to share mitigation and adaptation strategies, validate actions after verifying feasibility, financing capabilities, the existence of tools and projects useful for implementation and, finally, to establish priorities for the implementation of possible pilot actions. Working groups were planned on urban regeneration, environment and agriculture, industrial supply chains, and the circular economy. These groups should have been supported by a number of cross-cutting focuses, such as the agricultural-food chain, the decarbonisation of energy systems from a fossil-free perspective, and the revision of urban planning tools. The emergence of different priorities, however, (especially the National Recovery and Resilience Plan, NRRP) diverted attention from Joint SECAPs. The necessary synergy between the technical and political sides was also lacking. Some training/planning sessions were nevertheless scheduled in preparation for monitoring the SECAP actions.

Together with the difficulty mentioned above, however, it is worth noting how the adaptation actions envisaged in the Joint SECAP ‘Riviera delle Palme’ contributed to activating other projects, the first of which is the Life project on urban forestation. In addition, for this SECAP, a participatory process was tested that ran through all the different phases and led public and private actors to identify themes and types of activities for both mitigation and adaptation.

In the case of Joint SECAP ‘Venezia Orientale’, the role of the municipalities seems not to have been predominant, relying on the coordinating role of the lead municipality (San Stino) and the appointed professional. The acceleration of time required by the Regional Law that financed the Joint SECAP also made it impossible to activate a participatory process for the population and stakeholders either beforehand or while in progress. However, the work to be conducted was severely limited by the pandemic; the intention, with the compulsory update of the SECAP, is precisely to catch up.

4.3. Comparative Analysis of the Joint SECAPs

A comparison of the Joint SECAPs shows the following.

a. Definition of Priorities and Common Adaptation Objectives

Good alignment was found between the different measures analysed in the selected plans. In particular, there was strong consistency regarding the reduction of land consumption, regeneration of degraded territories, reuse of the built heritage, and agriculture, as well as hydrogeological risk management and strengthening of the ecological network. In all experiences, the climate risks focused on in the plans concern: hydrogeological risks: floods, surface water pollution; droughts and the water crisis, drinking water pollution; heat waves and the urban microclimate; fires and sea-level rise in coastal municipalities (Figure 2).

The attempt of the different plans to produce a unified framework of knowledge for assessing climate change impacts and defining shared adaptation strategies involves crossing local knowledge of impacts and related vulnerabilities with the data and plans produced by superordinate bodies. In most cases, the framework of available information emerges from a quantitative cognitive framework and from qualitative assessments shared with the heads of the various local administration sectors, other institutional levels (Region, Province, Basin Authority, River Basin Regional Park Authority, etc.), and local stakeholders (Joint SECAP Tresinaro-Secchia; Joint SECAP ‘Vesuviano’). In some plans, such as the ‘Terre Estensi’ SECAP and the ‘Riviera delle Palme’ SECAPs, focus groups will be arranged to build knowledge with input from directors and technicians from municipal services, organisations representing economic and trade bodies, etc.

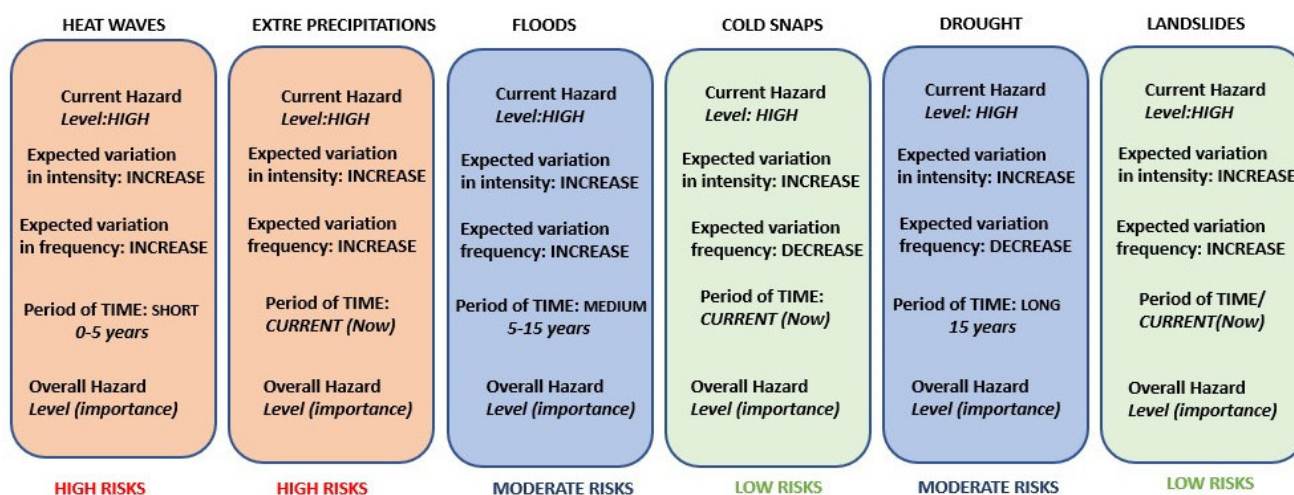


Figure 2. Joint SECAP ‘Venezia Orientale’. Climate Risks. Figure prepared by the authors based on Joint SECAP documents.

This way of working leads to interaction between different scales of interpretation and a vast field of reflection on dynamics common to an entire territory and precise factors and sensitivities on an intermediate scale (as in the Joint SECAP ‘Venezia Orientale Resiliente’). In this way, an even more detailed view can be generated, as in the Joint SECAP ‘Vesuviano’. In this plan, ‘priority adaptation actions’ are conceived as tools for ‘open consultation’ to incorporate new input and suggestions from inter-sector and inter-municipal working groups, associations, and citizens that will develop during the implementation period.

b. Implementing Adaptation Actions and Monitoring their Performance over Time

Although it is not possible to refer to the actual implementation of the Joint SECAPs action plan for any of the selected plans, an attempt has been made to understand whether these plans include mechanisms and arrangements to ensure the effective feasibility of the adaptation actions over time. It is clear that adaptation is the result of a combination of strategic actions that are implemented through a portfolio of tools, regulations, and economic investments, which only in some cases are managed on the local level, e.g., through urban-planning tools or through the completion of public works. It is also evident that these actions cannot necessarily be transferred into local regulations and legislation. In many cases, actions in the plan require close collaboration with regional or even super-regional policies, plans, and investments.

These multiple conditions require plans to go beyond the description of actions, involving as many stakeholders as possible and defining integrated, inter-sector strategies and policies for action. In this sense, it is important for the Joint SECAP ‘Val d’Agno’ that future planning tools are consistent with the indications contained in the policy document.

Traffic plans, mobility plans, urban-planning tools, and building regulations will have to define strategies and choices consistent with the principles outlined in the Joint SECAP and monitor the quality of the choices made, including their environmental quality. As public bodies, the municipalities are therefore called to oversee various aspects (as highlighted in the Joint SECAP ‘Vesuviano’): owning and managing their own assets (buildings, vehicles, and lighting); planning, programming, and regulating the territory and the activities affecting it; and promoting, coordinating, and participating in large-scale information and encouragement initiatives. To play these multiple roles and thus ensure the feasibility of the actions, it is important, according to the Joint SECAP ‘Vesuviano’, to identify effective indicators, compensation mechanisms, and measures for continuous monitoring. Other arrangements made by the selected plans concern in the Joint SECAP ‘Venezia Orientale Resiliente’, the request for appropriate moments of interaction with the

other territorial authorities and stakeholders. There is, in fact, an awareness that drafting the plan does not represent an endpoint in the process, but the starting point.

According to the Joint SECAP 'Vesuviano', equally fundamental are several moments for review and monitoring that yield continuous improvements in the process. In fact, this plan envisages the use of annual reports that must present a summary framework with updated actions and an annual SECAP/UN SDGs report, whose basic function is to measure the effectiveness of one of the strategic objectives of SECAP 2030: to build sustainable cities or communities that are more equitable, supportive, liveable, and beautiful, consistent with the goals set out in the *Sustainable Development Goals (SDGs)*.

The Joint SECAP 'Valle dell'Agno' expects that certain principles present in the plan actions concerning both socioeconomic and environmental aspects in a super-municipal perspective will be integrated into local urban planning tools. This transposition must address, for example, residential, commercial, and production building expansion, avoiding their insertion in unsuitable areas. Indeed, these areas may show high hydrogeological vulnerability, and in this case, it is necessary to eliminate or resize them, or envisage the protection and enhancement of natural elements through protective works, while encouraging their use by citizens and tourists, etc.

The implementation of the Joint SECAP is also related to other projects and programmes on the local and broader scales, as in the case of the Joint SECAP 'Terre Estensi' with reference to the Europe Interreg 'Perfect' project on urban green infrastructures and the Life 'Rainbo' project for assessing the impact of climate change on urban areas.

c. Capacity of the Plans to Manage Complexity

The complexity of the multilevel and multi-actor approach specific to Joint SECAPS must be managed to avoid conflicts and overlapping skills. Among the plans analysed, the Joint SECAP 'Terre Estensi', for example, envisages a protocol of understanding between the public administrations and various stakeholders.

The protocol is therefore designed as a public–private pact for sharing information, in which the lead municipality coordinates the work and shared activities and informs stakeholders about climate change adaptation issues, shares actions and steps in drafting the plan, and supports local stakeholders in coming together to carry forward their own joint initiatives.

The signatories of the protocol are in turn committed to cooperating with the lead municipality and other stakeholders in achieving the objectives of the plan. For the Joint SECAP 'Vesuviano', the 'Protocol of Intent' is stipulated between public and private subjects. The municipalities undertake to coordinate work and activities between the different thematic groups (environment, energy, transport, sustainable mobility, culture, etc.) and the different institutional levels (Region, Province, Basin Authority, Civil Protection, and Municipalities); carry out activities through the Municipal Office for Environmental Sustainability (UCSA) as an 'information desk' for all stakeholders, acting as a catalyst for calls for tenders and funding, particularly from the EU; and share the plan 'action sheets', periodically reporting on progress, etc. At the same time, private subjects undertake to collaborate with municipalities and other stakeholders to reach the expected objectives.

Management of relationships between the various plan participants in the Joint SECAP 'Venezia Orientale Resiliente' is more complex, with an 'Area Resilience Manager' envisaged to coordinate and promote actions. In the same plan, each of the municipalities also identified a political and a technical manager. These figures constitute the working group of the Steering Committee and the Technical Committee (Figure 3).

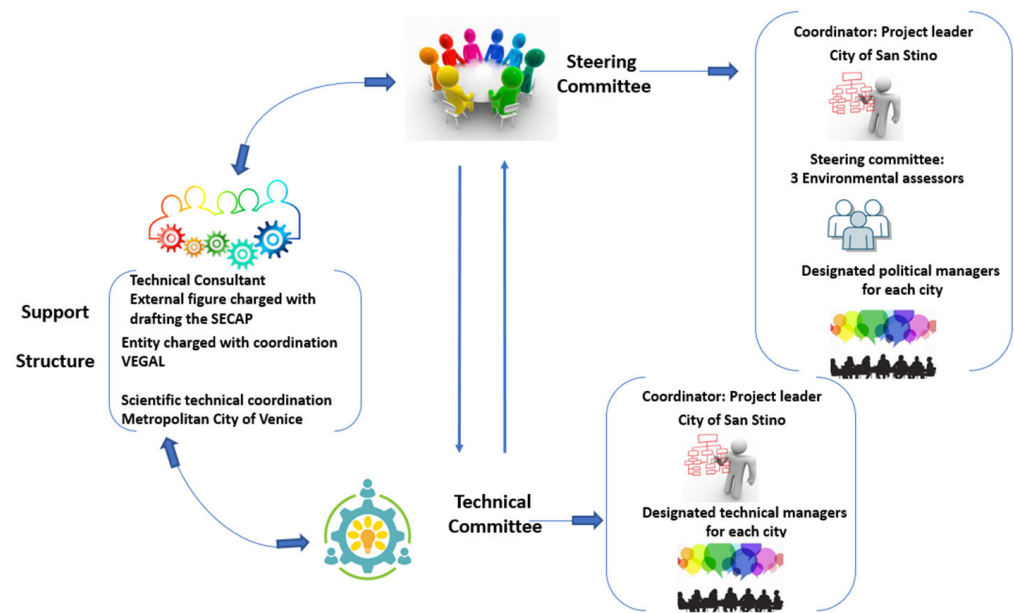


Figure 3. Joint SECAP “Venezia Orientale Resiliente” the Steering Committee and the Technical Committee working group. Source: Diagram prepared by the authors based on documents in the plan.

All those involved in the administration rely on external both public and private support structures, which provide advice, technical assistance, and adequate staff training. Priority actions for mitigation and adaptation are decided at coordination meetings, along with their implementation and monitoring, timeframes, responsibilities, and tasks, the actors involved, and the economic resources required. For smaller groupings—for example, the Joint SECAP ‘Valle dell’Agnò’—coordination is entrusted to more agile structures with the involvement of both the technical and political municipal offices concerned (public works, urban planning; environment; accounting) through periodic technical and political meetings. This also applies to the Joint SECAP ‘Tresinaro Secchia’, which involves the activation of a technical working group among the municipalities in the Union to share the path of the plan. For the Joint SECAP ‘Riviera delle Palme’, the involvement of the entities and stakeholders at each step in the plan is entrusted to focus groups and questionnaires, which are used to build consensus on adaptation actions. The participation process is, therefore, an element permeating the entire process, from the initial stages of acquisition and discussion of critical issues and climate risks to the final stage of preparing the list of interventions that the municipalities intend to develop (Figure 4).

d. Construction of Measures to Encourage the Acceptance and Sharing of Adaptation Actions

All the plans place importance on communication with the local population, in some cases it is also directed toward experts. This is conducted with the support of various instruments: focus groups, meetings, and sometimes a communication plan. In particular, the Joint SECAP ‘Vesuviano’ states that ‘...without participation, there is no SECAP.’ From individual citizens to families, students, and associations, from entrepreneurs to professionals, from public administrators to municipal technicians, and from social workers to primary school children, everyone should be informed about climate change and energy-saving issues. Hence, the commitment through the UCSA to schedule meetings with schools of all levels, involving teachers and families (also by means of an information booklet); with citizens and environmental associations.

The Joint SECAP ‘Val d’Agnò’ plans to explain climate issues to the local population through public meetings. The Joint SECAPs ‘Tresinaro-Secchia’ and ‘Venezia Orientale Resiliente’ envisage a communication plan to support the path that will lead to approval of the individual plans and the subsequent public presentations. In the Joint SECAP

‘Terre Estensi’, focus groups will be activated with the participation of municipal service managers and technicians, energy operators in the area, and organisations representing economic and trade parties. Training also acquires a central aspect in dissemination.

The Joint SECAP ‘Vesuviano’ involves meetings and training courses with experts for the various categories of technicians, economists, entrepreneurs, certifiers, plant engineers, and builders.

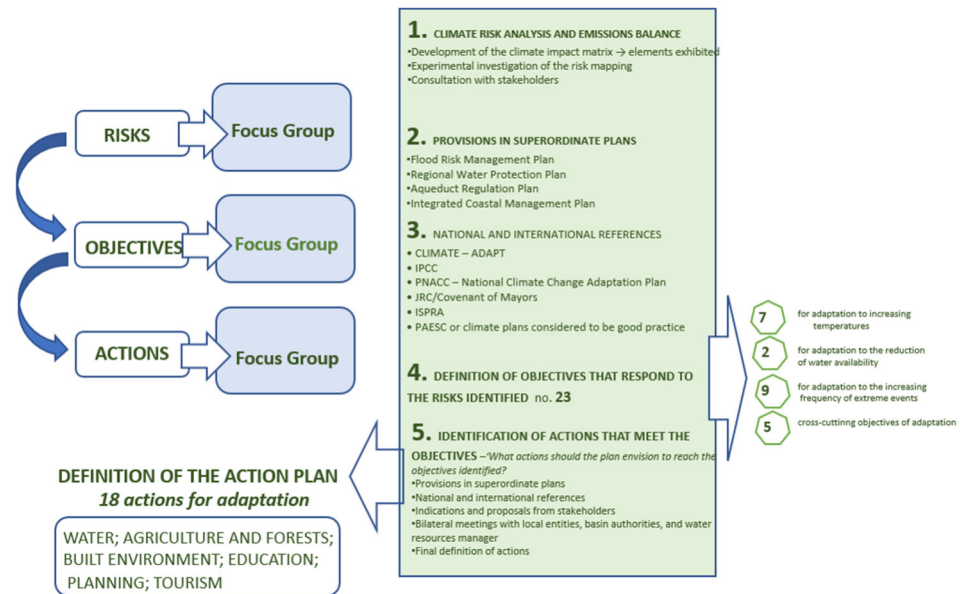


Figure 4. Construction process in the Joint SECAP ‘Riviera delle Palme’. Source: Diagram prepared by the authors based on documents in the plan.

5. Conclusions

Local communities and administrations play an important role in managing and protecting their territorial resources from the impacts of climate change. They are responsible for land use regulations, building regulations, transport, and environmental quality issues [61]. They must also establish measures and guidelines for territorial management and alert/inform citizens about risks. However, a unified picture of risks and vulnerabilities, which clearly do not cut across administrative boundaries, is often overlooked. This lack of a broad vision has repercussions for the actions planned for adaptation to climate change.

Climate change governance is instead a complex and multi-level process that requires overcoming traditional analytical divisions between plans, actors, and the scales of investigation and the project [62] to seek balance and integration among a series of choices to counter effects that are still uncertain and difficult to measure in both time and territorial terms [63] and to strengthen collaboration and reduce conflicts [64]. While building synergy between different sectors and competencies of the public administration and between the latter and local actors is deemed to be the correct path towards adaptation, work needs to be conducted to foster a strong two-way correlation between vertical and horizontal levels of governance [65].

Indeed, it has been shown that a traditional top-down approach implemented and enforced hierarchically is not a realistic solution, nor does a bottom-up approach on the local scale alone achieve the desired effects [66]. More complex governmental dynamics featuring different forms of competition, cooperation, networking, and mutual learning have proven to be more effective [67].

In view of these reflections and as emerging from the case studies in this article, the use of Joint SECAPs, especially in small municipalities, may provide a good opportunity to test a multi-level governance process [68]. This model involves multiple actors in the sense of a ‘multi-impulse system’, in which different governance impulses coming from different points in the system can act as a strong, centralised tool [58,69].

Sharing the knowledge framework and recognising the risks and vulnerabilities of territories in the municipal network is a good starting point, essential for building shared adaptation actions. It is more complex, however, to follow the framework of intentions with concrete actions in the territory, provide useful indications for improving supra-local policies, and transfer knowledge to other public and private sectors. To reach these objectives, some of the Joint SECAPs examined provide for the construction of an interface between experts, administrators, and technicians on different levels of public administration to ensure that the framework of knowledge, needs, and performance are shared and involve decisionmakers.

The plans have therefore relied on coordination structures, either within the administrations or external, which in some cases act as a 'Single Office' or 'Agency'. In addition to promoting the implementation of adaptation actions, they are also designed to promote other possible, common projects and interventions to optimize human and economic resources and create critical mass with regard to the superordinate bodies. In other cases, the municipal network is entrusted to a specific managerial figure; in still other cases, these figures take shape as an 'information desk' for all stakeholders and act as a catalyst for calls for European and national tenders and funding. The common usefulness of these different figures/bodies [70] is to identify opportunities to implement the plan in the years to come, enhancing the ability of local governments to seize opportunities arising from the adoption of common strategies, which could be economically attractive, and which individual municipalities would probably not have adopted otherwise.

In light of the experiences presented in this article, it can certainly be said that the construction of a Joint SECAP plan, especially in the case of small municipalities in countries such as Italy that lack a national framework for climate planning, can contribute significantly to building a climate-adaptation strategy. The condition for ensuring the effectiveness of these plans, however, lies in stimulating institutional collaboration between neighbouring territorial authorities, through structures and coordinating figures capable of supporting public administrations and local stakeholders in building adaptation actions and providing perspectives on implementation.

From the experiences analysed, there are also some recommendations that should be pursued to effectively replicate the Joint SECAP model emerging from these experiences in other territorial contexts:

- Ensure policy consistency. Working both vertically between levels of government and horizontally between different actors on a given governance level to assess potential contradictions and synergy to minimize contradictions and exploit and expand interactions.
- Guarantee participatory governance and strategic planning on the relevant scale. Favouring reflection and understanding on how climate change and the climate protection policy will affect local communities and territorial development, helping to define a way to integrate climate protection and resilience in urban development planning.
- Guarantee citizen and stakeholder involvement throughout the adaptation design process.
- Address monitoring, reporting, and evaluation: selecting criteria to assess adaptation policies to validate the quality of performance achieved and possibly to make changes within an ongoing process of improvement and verification.
- Overcome the lack of personnel and skills in small-medium administrations, implementing structures or either internal or external figures in the public administration to coordinate activities to build knowledge, define actions for the plan, and share possible proposals for the future among the different institutional actors and local stakeholders.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su15118738/s1>, Table S1: Analytical Investigation of the Joint SECAP Plans; Table S2: The Questionnaire for Joint SECAP coordinators.

Author Contributions: Conceptualization, R.D.; methodology, R.D.; formal analysis, R.D., C.C. and S.M.; investigation, R.D. and C.C.; writing—original draft preparation, R.D. and C.C.; supervision, R.D.; project administration, R.D. and C.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created.

Acknowledgments: We thank the joint-SECAP project coordinators for their availability: Sergio Trevisani-Joint SECAP Riviera delle Palme; Stefano Pellizzon: Joint SECAP Venezia Orientale Resiliente; Giovanni Ferrari: Joint SECAP Tresinaro Secchia.

Conflicts of Interest: The authors declare no conflict of interest.

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Table S1: Analytical Investigation of the Joint SECAP Plans

Plans	Adaptation strategy			Subjects and tools for coordinating and implementing the adaptation actions	Feasibility and synergy in the adaptation actions	Participatory processes and communication activities implemented
	Identification of knowledge, risks, and impacts	Objectives and priorities	Adaptation actions			
<p>Unione Tresinaro Secchia Joint SECAP</p>	<p>References: National Framework and Regional Climate Change Policy; climate data from Emilia Romagna Regional Environmental Protection Agency (Agenzia regionale per la protezione ambientale, ARPA).</p> <p>Vulnerabilities/Risks Droughts and water shortages; Floods; Heavy rainfall; Landslides; Fires.</p> <p>The impacts and related vulnerabilities identified on the national and regional levels are cross-referenced with the information available for the Unione dei Comuni Tresinaro Secchia.</p>	<p>Objective 1: Adaptation to temperature increases</p> <p>Objective 2: Fighting overuse of water</p> <p>Objective 3: Preserving land quality</p> <p>Objective 4: Forecasting hydrogeological risk</p> <p>Objective 5: Limiting waterproofing</p> <p>Objective 6: Increase in forested areas and green area management</p> <p>Objective 7: Preventing the deterioration of cultural goods</p> <p>Refinement of the objectives in reference to two territorial areas: - larger hilly area: - larger plain area</p>	<p>Action 1.1: Actions for adaptation and cooling in the urban area (buildings and open spaces)</p> <p>Action 2.1: Actions to reuse and recover water</p> <p>Action 2.2: Replacing, where possible, crops with others that use less water</p> <p>Action 2.3: Actions to reduce waste</p> <p>Action 3.1: Actions to promote agricultural practices that favour the reduction of processing, etc.</p> <p>Action 4.1: Continuous updating of the local climate monitoring system</p> <p>Action 4.2: Actions for continuous/biannual verification of the cleanliness of rivers and canals</p> <p>Action 4.3: Actions to prevent and monitor landslides</p> <p>Action 5.1: Depaving actions</p> <p>Action 5.2: Actions to limit land consumption in urban-planning tools undergoing revision</p> <p>Action 6.1: Actions for greening and forestation</p> <p>Action 7.1: Actions and projects to secure buildings and make conservative restorations</p>	<p>- Activation of a technical working group among the municipalities in the Unione to share the Joint SECAP path.</p> <p>- Meetings with stakeholders to define a path to construct the Joint SECAP</p>	<p>The actions identified present different levels of detail and identify possible further insights and integrations through interaction with the stakeholder working groups.</p> <p>Each action sheet contains references to: - description of the action; - responsible subjects; - stakeholders; - possible impacts; - collaboration with other projects and plans by the entities themselves or promoted by others; - monitoring system and the related indicators; - available resources and supply entities.</p>	<p>Preparation of a communication plan to support the path leading to the approval of individual Joint SECAPs and subsequent public presentations.</p>

Plans	Adaptation strategy			Subjects and tools for coordinating and implementing the adaptation actions	Feasibility and synergy in the adaptation actions	Participatory processes and communication activities implemented
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Terre estensi Joint SECAP inter-municipality association	<ul style="list-style-type: none"> - Characterization of the climate in the area in question; - Short- and long-term future climate scenarios; - Vulnerability and risk analysis for the territory of interest; <p>Vulnerabilities:</p> <ul style="list-style-type: none"> - Heat waves - Cold snaps - Floods - Extreme precipitation - Wind storms/tornadoes - Droughts - Fires - Increasing yearly average temperature - Reduction of total annual precipitation <p>Risks</p> <ul style="list-style-type: none"> - Urban overheating - Limited water availability - Damage to crop lands/changes in agricultural yields - Alteration of ecosystems - Increase in climate-sensitive illnesses - Damage to buildings and the historical/cultural heritage - Endurance of infrastructure - Physical risks for people 	<p>Identification of territorial areas of particular interest in relation to their vulnerability and importance under the environmental, economic, and social profiles</p> <ul style="list-style-type: none"> -Alpine and Apennine areas -Po district. 	<p>The proposed adaptation actions were also developed in accordance with the indications in the National Climate Change Adaptation Strategy</p> <p>25 Actions regarding: increasing temperatures, decreased rainfall, and an increase in extreme weather events.</p> <p>Actions:</p> <ul style="list-style-type: none"> - Water risk prevention - Smart water network - Drought observatory - Mettiamoci in (idro)rete - RAINBO project - Sustainable irrigation - Un'altra agricoltura - Adattiamoci - Mangiatoie sulle mura - Ecological networks - PROTECH2SAVE project - Demolizione? Sì, grazie - Resilient public buildings - Networks vs climate change - Resiliencw centre - Verde Binario - Città Giardino - PERFECT project - Containing land consumption - Civil Protection - Uffa che afa - Tourism 365 - Un centro di verde - Peri-urban agriculture - First aid -AdapTPL 	<p>Protocol of understanding between the public administration and private parties.</p> <p>As the leader, the City of Ferrara is committed to coordinating the work and activities, raising awareness, and informing stakeholders about climate change adaptation issues, sharing actions and steps to prepare periodic statements on the progress of the Joint SECAP, and supporting subjects present in the territory.</p> <p>The signatories of the protocol are committed to working with the City. At the same time, private parties are asked to provide public administrations with information on their planned interventions, monitoring the results.</p>	<p>Each action is illustrated through a specific action sheet.</p> <p>The action sheet contains:</p> <ul style="list-style-type: none"> - a description of what is envisaged and all information relating to the definition of responsibilities and implementation methods (timing, costs, monitoring, actors involved). 	<p>Activation of focus groups and preliminary sessions to present the shared path (participation of managers and municipal service technicians; energy operators; organizations representing economic and trade parties; mobility operators).</p> <p>Co-definition of interconnected frameworks, contexts, and future project actions for climate mitigation and adaptation.</p>

Plans	Adaptation strategy			Subjects and tools for coordinating and implementing the adaptation actions	Feasibility and synergy in the adaptation actions	Participatory processes and communication activities implemented
	Identification of knowledge, risks, and impacts	Objectives and priorities	Adaptation actions			
Venezia Orientale Resiliente Joint SECAP	<p>Vast area plans; municipal-scale tools; operational tools for adaptation; National climate reference framework (PNACC)</p> <p>Importance of risks with reference to the sector:</p> <ul style="list-style-type: none"> - buildings; transport; - energy; - water; waste; - territorial planning; - agriculture and forestry; - environment and biodiversity; - health; - civil protection and rescue; - tourism. <p>Risk and Vulnerability Assessment:</p> <ul style="list-style-type: none"> - heat waves - cold snaps - extreme precipitation - floods - rising sea levels - droughts - storms - landslides - fires <p>Risk levels: low, moderate, high</p>	<p>Objectives for large uniform areas according to environmental characteristics, settlement dynamics, and socioeconomic identities;</p> <p>Local planning indications, but also common lines of action for similar areas, thus working in an integrated manner.</p> <p>Objectives:</p> <ol style="list-style-type: none"> 1. Recovering the landscape of the reclaimed land, making it sustainable and suitable for slow tourism. 2. Reduction of water-related hazards 3. Good agriculture practices. <p>Sustainable cultivation for responsible use of resources and preserving soil fertility.</p> <ol style="list-style-type: none"> 4. Forestation in areas with a higher degree of risk 5. Planning new information and risk management Tools. 	<p>Actions are identified per sector and on three levels: for individual municipalities; for large uniform areas — coastal areas, Portogruaro, and Sandonatese; and for entire territories of the 22 municipalities.</p> <p>List of primary actions for adaptation</p> <p>For mobility: masterplan of eastern veneto – cyclable; management of transport services bicycles (e.g. ‘interbike ii’ project);</p> <p>For tourism: psl 2014-20 punti superficie linee - environmental tourism itineraries</p> <p>For territorial planning: implementation metropolitan city sitm; water plans; pat – building regulation – intervention plan;</p> <p>For environment and biodiversity: forest area management association of the plains; river contracts; veneta coast contracts; wet area contracts; ridiamo il sorriso alla pianura padana; urban forestation; species/habitat management in green infrastructures (e.g. ‘engreen’ project); regional park management (‘terre dell’acqua/terre risorgive’ project); marine ecosystem management (e.g. ‘fishing for future’ project). for civil protection: updating civil protection plans;</p> <p>For water: flood monitoring (e.g. visfrim project); implementation of integrated coastal area management guidelines initiatives of the local interregional assembly ‘ausir’ initiatives of the basin council ‘laguna di venezia’ management of rainwater collection points</p> <p>For agriculture and forestry: enhancement of good practices in agriculture; biodistrict biovenezia; agro-ecological transition of viticulture (e.g. ‘ecovinegoals’ project)</p> <p>viticulture emissions balance (e.g. ‘winezero’ project); support For organic farms (e.g. ‘territori bio’ project)</p> <p>natural environmental enhancement</p> <p>For agriculture: agriculture (e.g. ‘r.a.i.v.o.’ project); enhancement of the ‘sustainable tourism landscape’ regulation for pesticide use;</p> <p>For waste: circ. economy – communication</p> <p>For good practices: veneto agenda 2021-2027; resilience manager; ‘adriaclima’ project on climate scenarios. etc.</p>	<p>The group of municipalities (22) has a highly organized coordination structure: the lead municipality coordinates relations between the political/administrative bodies (Steering Committee) and technicians (Technical Commission).</p> <p>All actors in the administration rely on external public and private support structures that provide consultation, technical assistance, and appropriate staff training in the different areas of the PAESC. Among these: Metropolitan City of Venice, external appointed technical consultants, and VeGAL.</p> <p>Several coordination meetings to establish: priority mitigation and adaptation actions, ways of activating and monitoring them, the timeframes, responsibilities and tasks, the subjects involved, and the necessary economic resources.</p> <p>The project envisages the establishment of an Area Resilience Manager charged with coordinating and promoting SECAP negotiation/promotion actions on behalf of private subjects operating in the territory.</p>	<p>Each sheet contains: the objective, description, implementing policy tool, sponsor; stakeholders; impacts, vulnerabilities, and risks addressed; effects on mitigation; estimated costs, implementation period, and monitoring</p>	<p>In the start-up phases of the SECAP formation activities, the administrations expressed the willingness to build a plan for communication and involvement. The Metropolitan City held training start-up activities (aimed at both technicians and administrators) and subsequent in-depth activities related to SECAP. The administrations have also acted to search for appropriate moments of interaction with other competent territorial authorities and stakeholders. The moments for review and monitoring set out in the SECAP allow for a continuous improvement of the process. Pact signatories agree to submit a biennial ‘Implementation Report’ following the submission of the SECAP ‘for evaluation, monitoring, and verification purposes’. In conjunction with these activities, the municipalities will inform citizens of the results obtained and the state of health of the territory. A significant part of the actions in the plan are also aimed at activating non-structural actions (referred to in the plan as ‘indirect actions’) that testify to the desire to continuously and permanently involve and empower local residents.</p>

Plans	Adaptation strategy			Subjects and tools for coordinating and implementing the adaptation actions	Feasibility and synergy in the adaptation actions	Participatory processes and communication activities implemented
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Valle dell'Agno (Aggregation of municipalities) Joint PAESC	<p>Descriptions of the natural context of each municipality; Demographic trends; Wind; Economic activities</p> <p>Climate adaptation; European context; European Strategy on Adaptation to Climate Change; National Climate Change Adaptation Strategy (SNAC)</p> <p>Climate change Analysis of temperature and precipitation</p> <p>Risk and vulnerability assessment:</p> <ul style="list-style-type: none"> - Hydrogeological imbalance - Precipitation and flooding - Droughts and heat waves - Loss of biodiversity and degradation of the natural environment 	<p>The primary goal of the adaptation actions is to identify concrete activities that can increase resilience regarding the critical issues identified for each of the main sectors already facing the challenge of climate change. These may be summarized in four categories of intervention: passive defence, active defence, insurance defence, and abandonment. They regard:</p> <ul style="list-style-type: none"> - Hydrogeological imbalances - Precipitation and flooding - Droughts and heat waves - Loss of biodiversity 	<p>With regard to hydrogeological imbalances, the actions for adaptation concern:</p> <ul style="list-style-type: none"> - Urban-planning regulations and territorial planning - Green areas and reforestation - Data mapping and sharing - Rainwater management in urban areas <p>With regard to precipitation and flooding;</p> <ul style="list-style-type: none"> - Detention basin in the Municipality of Trissino - Urban-planning regulations and territorial planning - Green areas and reforestation - Rainwater management in urban areas <p>With regard to droughts and heat waves:</p> <ul style="list-style-type: none"> - Raising the awareness of citizens and students - Promotion and resilience of agricultural production <p>With regard to the loss of biodiversity:</p> <ul style="list-style-type: none"> - Raising the awareness of citizens and students - Green areas and reforestation - Promotion and resilience of agricultural production 	<p>Collaboration of different sectors of the municipal administration, both technical and political. With respect to monitoring and management of the SECAP after approval and also following possible changes in the organization, the offices that will have to be activated and coordinated are, in particular</p> <ul style="list-style-type: none"> - Public works; - Urban planning; - Environment; - Accounting. <p>Planned technical and political meetings</p>	<p>The sheets contain a description of the intervention; the area of reference; the objectives; the responsible subjects; the timeframe; and the intervention costs.</p>	<p>Meetings with stakeholders and citizens were planned in order to:</p> <p>Promote the SECAP and define certain actions in agreement with local actors (in particular, companies and bodies in the area and schools). Promote SECAP among the population by explaining its related issues and possible future actions.</p>

Plans	Adaptation strategy			Subjects and tools for coordinating and implementing the adaptation actions	Feasibility and synergy in the adaptation actions	Participatory processes and communication activities implemented
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<p>Vesuviano (Aggregation of municipalities) Joint SECAP</p>	<p>General European and national frameworks. Italy and the PNIEC 2030.</p> <p>Local cognitive framework: - Geological, geomorphological, and hydrogeological aspects of the territory - Weather-climate aspects of the territory</p> <p>Risks: - hydrogeological risk: flooding - risk of heat waves - risk of prolonged drought</p> <p>Vulnerable areas: based on the risks, identification of 'vulnerable areas' and possible 'priority actions for adaptation'.</p>	<p>Medium- to long-term objectives on hydrogeological risk: – Recovery of river dynamics (where possible): ecological regeneration of rivers - Natural water retention measures (NWMR) - Returning space to the rivers - Territorial control Empowering residents Purification through decentralized systems (e.g. phyto-purification) and compatible reuse - Reclamation Systematization of information and dissemination in a form comprehensible to citizens - Accountability for sustainable use etc. Long-term objectives for 'droughts and lack of water': - Containing withdrawals from the deep water table. - Ensuring an adequate flow rate (minimum ecological flow) of surface water even in critical periods. - Promoting efficiency in the civil water distribution network and recovering at least half of the network losses -Pursuing policies to reduce domestic water consumption to values of 100 litres/inhabitant/day - Reduce consumption of drinking water for non-domestic use, etc. Medium- to long-term objectives on 'heat wave risk': - Adopt a municipal regulation for public and private green areas - Identifying and promoting tree species that are better able to adapt; - Encourage projects for the widespread generation of public green areas; - Designing and implementing 'green roofs' – Encourage private individuals (households and businesses) to plant on private property, etc.</p>	<p>The action sheets are structured according to 'critical issues' and 'sectors of intervention'. One or more action sheets were defined for each sector of intervention</p> <p><i>Field of action:</i> Extreme rain and flooding: - - Slowing runoff and promoting the absorption of rainwater; - - Municipal emergency plan and interventions in high-risk areas; etc. <i>Field of action:</i> - Hydrogeological imbalance and surface water pollution - River contract and major project for the Sarno River <i>Field of action:</i> Decreasing water consumption - Recovery of stormwater for various uses and saving drinking water - Recovery of drinking water losses from the city aqueduct etc. <i>Field of action:</i> - Heat waves and urban microclimate - Reforestation and urban regeneration - Protecting the population at risk of heat waves. Web portal of public green areas <i>Field of action:</i> - Preventing extreme events - Creation of a weather-climate monitoring network in all municipalities -Priority actions for adaptation Identification of vulnerable areas and possible 'priority actions for adaptation'.</p>	<p>Protocol of understanding between the public administration and stakeholders (individuals or associations).</p> <p>The municipalities are committed to: a. Coordinating work and activities between the different thematic groups (environment, energy, transport, sustainable mobility, culture, etc.) and the different institutional levels (region, province, basin authority, civil protection, municipalities); b. Providing an 'information desk' (UCSA OneStopShop) for all stakeholders on the issues of climate change adaptation and energy savings; acting as a catalyst for calls for tenders and funding, in particular from the EU. c. Sharing actions and steps to prepare and implement the action sheets by periodically reporting on the progress; d. Supporting area subjects in coming together and moving their own initiatives forward. The signatories of the protocol are committed to: a) Working with the City and other stakeholders involved in achieving the objectives of the SECAP. b) Publicizing the actions promoted, the projects undertaken, the results obtained.</p> <p>Creation of an Integrated Management System (IMS) of municipalities to implement the actions in the SECAP.</p>	<p>The sheets are organized into: objectives; period of implementation risks avoided; cost estimates; competent entities; beneficiaries/entities involved; monitoring indicators</p> <p>- The annual SECAP report should state the progress of work in the action sheets and possibly allow for improvements and corrections</p> <p>- Annual SECAP/UN SDG report This annual report plays a key role in measuring the effectiveness of SECAP 2030 as outlined in the UN SDGs. The sheets are designed as operational and indicative tools and are therefore susceptible to adaptation to change (in standards, technology, planning, and regulations) that may occur during the long period of SECAP implementation (2020–2030) Some of these may also be fully implemented within planning (PUC) and regulatory (RUE) tools</p>	<p>Three key moments are expected: 1) Involvement of the city's governance structure and the various municipal sectors and offices in all plan tools, projects, and ongoing programmes (including and especially European ones). 2) Involvement of the main 'actors' (stakeholders) belonging to the different sectors (industrial production, agriculture, schools of all levels, wholesale and small distribution, transport system, environment, cultural and social associations), acting in the area as both 'solution bearers' and 'beneficiaries' of the actions themselves. 3) 'Participatory' drafting of action sheets (not only a list of possible, technologically feasible actions, but also and especially identifying: the key players, costs, timeframes, and regulatory/cultural/economic barriers and how to overcome them).</p> <p>The training and information capacity of the SECAP to be promoted in the territory, also and especially through the 'energy and sustainability desk' in interaction with stakeholders and citizens in general</p>

Plans	Adaptation strategy			Subjects and tools for coordinating and implementing the adaptation actions	Feasibility and synergy in the adaptation actions	Participatory processes and communication activities implemented
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Riviera delle Palme Joint PAESC	<p>Identification of 73 RISKS:</p> <p>27 INCREASING TEMPERATURES heat waves, spread of harmful insects and alien species, increasing risk of fire</p> <p>6 DECREASING PRECIPITATION reduction of water availability</p> <p>40 EXTREME EVENTS river flooding, urban flooding, coastal flooding, strong wind, cloudbursts, hail, increase in landslide risk</p>	<p>23 ADAPTATION OBJECTIVES</p> <p>7- PROMOTE ADAPTATION TO INCREASING TEMPERATURES</p> <p>2- PROMOTE ADAPTATION TO THE REDUCTION OF WATER AVAILABILITY</p> <p>9- PROMOTE ADAPTATION TO INCREASING FREQUENCY OF EXTREME EVENTS</p> <p>5 – CROSS-CUTTING OBJECTIVES OF ADAPTATION</p>	<p>ADAPTATION ACTIONS</p> <p>- BUILDING</p> <p>- ENERGY</p> <p>- TRANSPORT</p> <p>- WASTE</p> <p>- INDUSTRY</p> <p>- OTHER SECTORS</p> <p>Stakeholder priorities</p> <p>WATER</p> <p>Adaptation of the sewer network</p> <p>Adaptation of the water network</p> <p>Monitoring and maintaining bodies of water</p> <p>Pilot interventions for reusing and recovering water resources</p> <p>AGRICULTURE AND FORESTRY</p> <p>Adaptation of the irrigation network</p> <p>Resilient Agriculture desk</p> <p>NATURAL ENVIRONMENT AND BIODIVERSITY</p> <p>Interventions to protect and defend the coast</p> <p>BUILT ENVIRONMENT</p> <p>Interventions for sustainable urban drainage</p> <p>Interventions for urban reforestation</p> <p>Interventions in areas at risk of landslides</p> <p>EDUCATION</p> <p>‘Let’s Adapt’ campaign</p> <p>‘Save the Water’ campaign</p> <p>CIVIL PROTECTION AND FIRST AID</p> <p>Optimizing the civil protection system</p> <p>Strengthening early alert systems</p> <p>PLANNING</p> <p>Adaptation of municipal regulations</p> <p>Activation of green infrastructure planning tools</p> <p>Promotion of river and coastal contracts</p> <p>TOURISM</p> <p>Year-round tourism</p>	<p>Consultation with stakeholders was a central part of the planning process, from the initial stages to its conclusion. A group of experts acted as facilitators within 3 focus groups that worked to identify the risks, objectives, and actions.</p> <p>The focus groups were followed by bilateral meetings with the individual administrations involved, with whom in-depth comparisons were made to effectively identify and describe the actions in the plan. Seven actions address the reduction of the risk of river flooding, the main one being Monitoring and maintenance of bodies of water (A-ACQ-03), integrated with sustainable drainage (A-EDI-01) and supported by two cross-cutting territorial-planning actions (A-PIA-01 – Adapting municipal regulations, and A-PIA-03 – Promoting River and Coastal Contracts).</p>	<p>The eighteen actions for overall adaptation selected by stakeholders regarded one or more climate phenomena. Among actions to reduce risks related to extreme events, the group of actions regarding urban flooding prevails: Adaptation of the drainage network (A-EDI-01) and urban forestation(A-EDI-02). Twenty-seven percent of the actions instead regard rising temperatures. In particular, reducing the effects of heat waves is addressed by 10 actions, which cross-reference all sectors.</p>	<p>Participation in the plan process</p> <p>The plan process is based on three central steps:</p> <ul style="list-style-type: none"> • Identification of climate RISKS in the territory • Identification of the OBJECTIVES that the plan aims to reach • Identification of the ACTIONS to pursue these objectives. <p>Three essential steps, developed through a process of involving the local community, which actively participates in identifying and prioritizing the RISKS-OBJECTIVES-ACTIONS.</p> <p>Consultation in the area with numerous local actors in addition to the four administrations.</p> <p>The participation process is therefore an element permeating the entire process, from the initial stages of acquisition and discussion of critical issues and climate risks present in the territory, to the final stage of preparing the list of interventions that the municipalities intend to develop. The resulting list of actions is shared deeply.</p>

Table S2: The Questionnaire for Joint SECAP coordinators

Questions Asked to the Joint SECAP Coordinators	Joint SECAP “Riviera della Palme”	Joint SECAP “Venezia Orientale”	Joint SECAP “Tresinaro-Secchia”
<p>The Joint SECAP process</p> <ul style="list-style-type: none"> • What were the steps following the city council’s approval in compliance with the CoM? 	<p>The Joint SECAP has still not been approved by all the municipalities in the network.</p>	<p>The Joint SECAP was approved in 2021 together with adherence to the CoM for energy and the climate. The municipalities then uploaded the project to the Covenant of Mayors platform. A progress report is expected within two years of approval in the city council.</p>	<p>The Joint SECAP was approved in 2021 by the Unione dei Comuni Tresinaro-Secchia. The Joint SECAP plan was uploaded to the Covenant of Mayors platform.</p>
<p>Difficulties experienced</p> <ul style="list-style-type: none"> • What were the main difficulties faced in the relationship between municipalities and between municipalities and superordinate bodies when constructing the adaptation actions? 	<p>Activating a series of focus groups on the issues of mitigation and adaptation to climate change, with the participation of political and technical representatives from the municipalities, trade associations, environmental groups, neighbourhood committees, local institutions (Region, Province), local ATO.</p>	<p>Since 1993, the presence of a permanent conference with annual financing has helped to increase collaboration between municipalities and higher-level entities.</p>	<p>The difficulties regarded priorities (especially the NRRP), which have diverted attention from SECAP, although contact with municipalities in the Union was maintained. The lack of a ‘relationship’ between the technical and political parts, which we are trying to recover.</p>
<p>Collaborative relationships activated</p> <ul style="list-style-type: none"> • Has construction of the Joint SECAP favoured the development of concrete projects and/or works/interventions for the territory regarding the issues of climate change adaptation? • What role did internal municipal offices play? • Whose role was it to coordinate the adaptation actions implemented? 	<p>A project called A_GreeNet financed by the EU LIFE fund is currently underway, which capitalizes on the Joint SECAP project financed through Interreg Italy-Croatia funds. In turn, this plan has generated and developed the Joint SECAP ‘Riviera delle Palme’.</p> <p>It should also be noted that a convention is being drafted pursuant to Art. 30 of the Consolidated Legal Text on Local Entities to define a structure of governance, activation, and coordinated management to implement the Joint SECAP. The City of San Benedetto del Tronto maintains its role as coordinator of Joint SECAP activities.</p>	<p>Financing through Regional Law 16/1993 has long required administrations to look for city planning in different respects.</p> <p>The Joint SECAP has inspired the new area planning document of Eastern Venice for the 2021–2027 period.</p> <p>The internal offices of the municipalities did not really contribute to drafting and implementing the Joint SECAP because the head municipality, professionals, and Eastern Veneto Development Agency (Agenzia di Sviluppo del Veneto Orientale, VEGAL) coordinated the project.</p> <p>Many of the data and activities necessary for the PAESC (Action Plan for Energy and the Climate (Piano d’Azione per l’Energia Sostenibile e il Clima, PAESC) were already known to VEGAL.</p>	<p>Round tables were activated for consultation and interaction to map, reach, inform, and involve local actors and stakeholders.</p> <p>The objective is to share mitigation and adaptation strategies, validate actions after verifying feasibility, financial possibilities, the existence of tools and projects useful for implementation, and, finally, to establish priorities for the implementation of possible pilot actions. Unfortunately, various priorities blocked the path, so some training/planning sessions were scheduled in preparation to monitor the SECAP actions.</p>
<p>Involvement of local populations and area actors</p> <ul style="list-style-type: none"> • How did activities for stakeholder/local population participation and involvement influence the success of the project? • Will they also play an important role in the future? How? 	<p>As indicated in the answer to the first question, public and private subjects worked to identify issues and types of activities for both mitigation and adaptation.</p> <p>The success of the meetings shows that each participant played an important role that will be decisive in the future of Joint SECAP activities. Systems of communication and publication were envisaged to confirm the participation of subjects already involved and others who are becoming interested in the issues of climate change due to today’s difficult environmental situations.</p>	<p>The only negative aspect of the funds of Regional Law 16/93 regard time, due to which the project must be completed within 4–5 months. This is particularly demanding for work such as the PAESC.</p> <p>As a result, it was not possible to involve the population and stakeholders either beforehand or while in progress. Work was done afterwards, but this was very limited by the pandemic because the work was carried out in the second half of 2020. The intention is precisely to catch up on this front with a necessary update to the SECAP.</p>	<p>Round tables for consultation have been envisaged to build the working groups:</p> <p>Round table 1: Urban regeneration Round table 2: Environment and agriculture Round table 3: Industrial chains and the circular economy</p> <p>These round tables could have been supported by some focuses on cross-cutting issues:</p> <p>FOCUS 1: The agricultural chain FOCUS 2: Decarbonization of energy systems from a fossil-free perspective FOCUS 3: Review of urban-planning tools.</p>



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Local Climate Adaptation and Governance: The Utility of Joint SECAP Plans for Networks of Small–Medium Italian Municipalities

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Published in:

Sustainability 2023, Volume 15, Issue 11, 8738



Academic Open Access Publishing
since 1996

Basel, May 2023