

RESEARCH ARTICLE

**Inner Areas and Green Economy in Campania Region: The Carditello Royal Borbonic Site Case Study**

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**Abstract:** In Italy, within the 'National Strategy on Inland Areas', 'belt areas', 'peripheral areas' and 'ultra-peripheral areas' have emerged and been recognised for the first time since 2013, as well as 'intermediate areas'. The area presented in the paper is atypical, although it presents some recurring characteristics in other intermediate areas close to Italian metropolitan areas. It is an area near of Naples, in the region of Campania, which gravitates around the Royal Bourbon Site of Carditello with a past of considerable historical interest and an unfortunate recent past, which has led it to be in a particularly disadvantaged condition. The paper deals with a topic with little reference literature, at least as far as the Italian reality is concerned; mixed areas, partly 'intermediate' and partly 'Belt'. After a careful Swot analysis, adapted to the territorial context of the area under consideration, focusing on its considerable potential, pointing out some problematic nodes and indicating ways to overcome them, seizing and creating some opportunities for possible sustainable development, the paper proposes a perspective scenario that aims at the sustainable enhancement of the area.

**Keywords:** inner areas, green economy, territorial capital, local community, Campania region

## 1. Introduction

In Italy, since the Second World War, areas remote from cities and metropolitan areas have recorded isolation and a decrease of investment flows oriented rather towards urban and coastal areas to the detriment of hill and mountain areas. In these areas, this has resulted in reduced employment opportunities, limitation of land use, and a decrease in the provision of basic public services with the consequent decrease in population and ageing of the population. Consequently, due to the decline in public investment, the inland area has been affected by the depletion of its resource potential and thus the possibility of generating innovation and benefits for local communities. These areas, emptied of their original functions and strongly linked to their role as suppliers of foodstuffs to the nearest city, have become fragile in environmental, physical and eco-systemic, registering a progressive degradation of the landscape heritage and revealing a considerable phenomenon of social and economic impoverishment. The effect of the Italian government's erroneous policies has been a reduction in the number of inhabitants and, above all, of the young levers of the population and those of working age. One of the most alarming socio-demographic consequences for these territories' future is the population ageing process in most small and medium-sized towns throughout Italy and, with higher percentages, in Southern Italy. These areas have also become difficult to access, as they are excluded from the main road network often only connecting urban areas and metropolitan cities, fragile concerning structures and infrastructures (especially digital infrastructures), precarious, often with poor development and vulnerable to the environmental front [1]. with low productivity and reduced employment, with antiquated lifestyles and economic development, despite the significant wealth of environmental and cultural values. phenomenon was particularly present from the 1970s until the first decade of the 21st century, when the characteristics of inland areas, including those in southern Italy, were valorised and when development based on local identities was revalued, in a reversal of previous development policies. [2]. It was only a decade ago that the Italian government began to take a serious look at inner areas by commissioning a team of scholars to draw up a comprehensive document on the state of the art of inland areas. The study and the rather detailed analysis were collected under the title: "National Strategy for Inner Areas (SNAI)" [3]. The SNAI, conceived as an experiment of a territorial policy within the 'Community Programming 2014-2020', 2013 intended to revise previous logic in testing the effectiveness of a new model of place-based policies of territorial cohesion and community resources. The objective is that the territorial capital (buildings and settlement systems, tangible and intangible historical heritage, cultivable surface, practical knowledge, landscapes and ecosystems) of hitherto neglected inland areas participate in and contribute to the growth of the country. Snai's objective is to monitor demographic aspects and improve the quality of life in inland areas, the quantity and quality of essential services through to institutional reorganisation, active protection of the territory, valorisation of natural and cultural resources, relaunch of local productions and the improvement of digital services. And so the debate on internal areas [4] Aggravated by the health crisis of COVID-19 and its socio-economic impacts, it was found to be one of the main problems of government institutions. When 25% of the Italian population can be considered in a state of economic and social fragility as supported by benefits, pensions and employment in smaller local activities ([1], [5]). This is the context for the area studied, the results of which

are summarised in this paper, which aims to contribute to improving the projects of an area that has had a notable past but which at present fails to activate mechanisms capable of fuelling economic development processes. In particular, the area is located near the Real Site of Carditello, province of Caserta, in the Campania Region. The study and in-depth study, from a historical-urban point of view, was made possible thanks to the participation of an ISMed research team in the "National Operational Project" (PON) entitled "Innovation for Data Elaboration in Heritage Areas (IDEHA)"<sup>1</sup> (**Innovation for Data Elaboration in Heritage Areas**). In particular, the proposed area has for many years been hostage to bad policies and criminal organisations that have controlled and controlled the territory, with the absolute absence of the state.

## 2. Method and materials

The definition of a strategy aimed at fostering sustainable development in inland areas, from the environmental, social and economic point of view, is based partly on the 'territorial capital' of these territories such as:

- natural resources;
- the cultural heritage;
- cognitive resources;
- the viability of the local population;
- production potential (agriculture, tourism and industry).

The territorial capital of the inner areas is currently little used also because of the process of de-anthropization [6]. In a local development strategy, unutilised capital and policies to activate under-utilised capital are considered one of the main measures of development potential. Focusing on the large extent of from a demographic and spatial point of view of the Inland Areas, one can see the extent of their growth potential and how important their economic weight is on a national scale. [6].

### 2.1 Characteristics of intermediate areas

The paragraph collects some references to identify the characteristics of the intermediate areas, as mapped by the "National Strategy for the internal areas". According to the definition and identification contained in Snai, the internal areas involve 60% (180,000 sq m. km) of the entire area of the national territory, 52% of municipalities (over 4,000) and 22% of the population (about 12,000,000 inhabitants), of which 15% reside (about 1,700,000 inhabitants) in the intermediate areas. In the internal areas identified based on the 'National Strategy of the Internal Areas (Snai)', the most significant decline occurred throughout the Apennines and in Sicily. [7]. In the period between 1971 and 2011, the Italian population grew by 10% and at the same time in the intermediate areas the increase was 12%. and the elderly population (over 65 years) in particular increased by 30%. The immigrants present, however, have mitigated the phenomenon of ageing with a presence that in percentage increased from 1.8% to 5.4% from 1971 to 2011. At the same time, utilised agricultural area (UAA) decreased by 39% between 1982 and 2010 in inland areas, while it did not decrease in inland areas. The Sau has grown in zones with intensive agriculture and in inner areas where the agricultural sector has quality productions such as viticulture. The decrease in the cultivated area is accompanied by a rise in the forest area, which has more than doubled since 1948 and covers, according to 2010 data, more than a third of the national territory. The internal areas of the regions of southern Italy has a stronger agricultural vocation than those of the Centre-South. This is why many inland areas are places of nature and animals and more than 70% of Sites of Community Interest (SCIs), Special Protection Areas (SPAs) and Protected Nature Areas are (Ministry of Environment and Energy of Italy. [8]. The inner areas of Campania present areas of economic-social distress, especially in Irpinia [9]., An area that was impacted by the earthquake on November 23, 1980., whose impact is still perceptible today.

### 2.2 The case study in Campania Region: the mixed area (Intermediate and Belt) and the Carditello Royal Borbonic Site

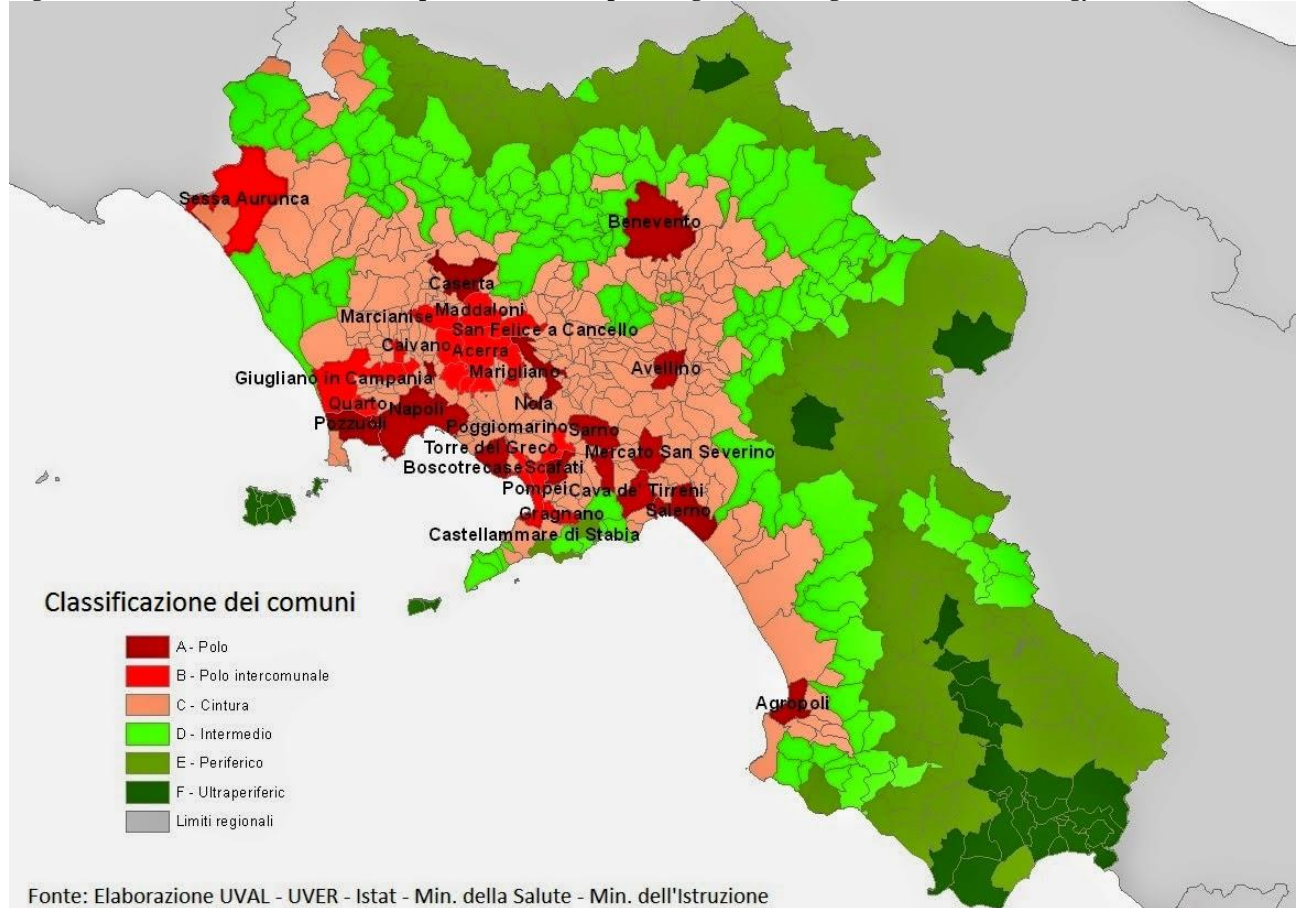
The case study is focused on an area also called the 'terra dei fuochi' [10].

It is located between Caserta to the east, the end of the Regi Lagni to the south, the Volturno river to the north and the coastal area to the west. The Caserta conurbation, considering the intensity and characteristics of daily exchanges, is part of the north-western periphery of the metropolitan area of Naples, which reaches three million inhabitants as **Figure 1** shows [7].

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<sup>1</sup> The Project "Innovation for Data Elaboration in Heritage Areas (IDEHA)" set the aim of realising a completely open-source intelligent system able to connect information validated by scientific research for a better knowledge of tangible and intangible Cultural Heritage distributed throughout the national territory (Cfr. [www.ideha.cnr.it](http://www.ideha.cnr.it)). The project was co-financed by the European Union - ERDF and ESF, PON Research and Innovation 2014-2020, whose scientific coordinator was the Institute of Cultural Heritage Sciences (ISPC) of the National Research Council (CNR) and in which 9 other CNR institutes, 4 universities and 5 companies participated. One of the case studies presented and explored was the Real Site of Carditello proposed by both the Institute of Mediterranean Studies (ISMed) and the ISPC, both institutes of the CNR. The ISMed group proposed the valorisation of the area in which the "Real Sito di Carditello" is located together with the surrounding areas, identifying an intermediate area that presents notable historical-environmental and cultural characteristics worthy of being recovered and valorised.

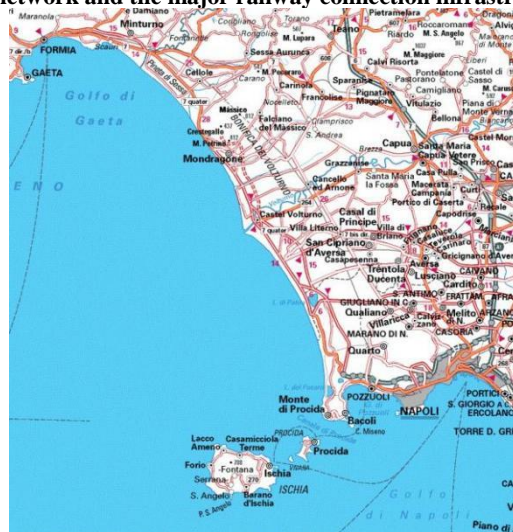
**Figure 1. The classification of the municipalities in the Campania region according to the 'National Strategy on Inner Areas'**



**Notes:** Brown pole; Red inter-municipal pole; Orange belt; Light green intermediate; Dark green peripheral; Very dark green Ultraperipheral; Grey regional limits

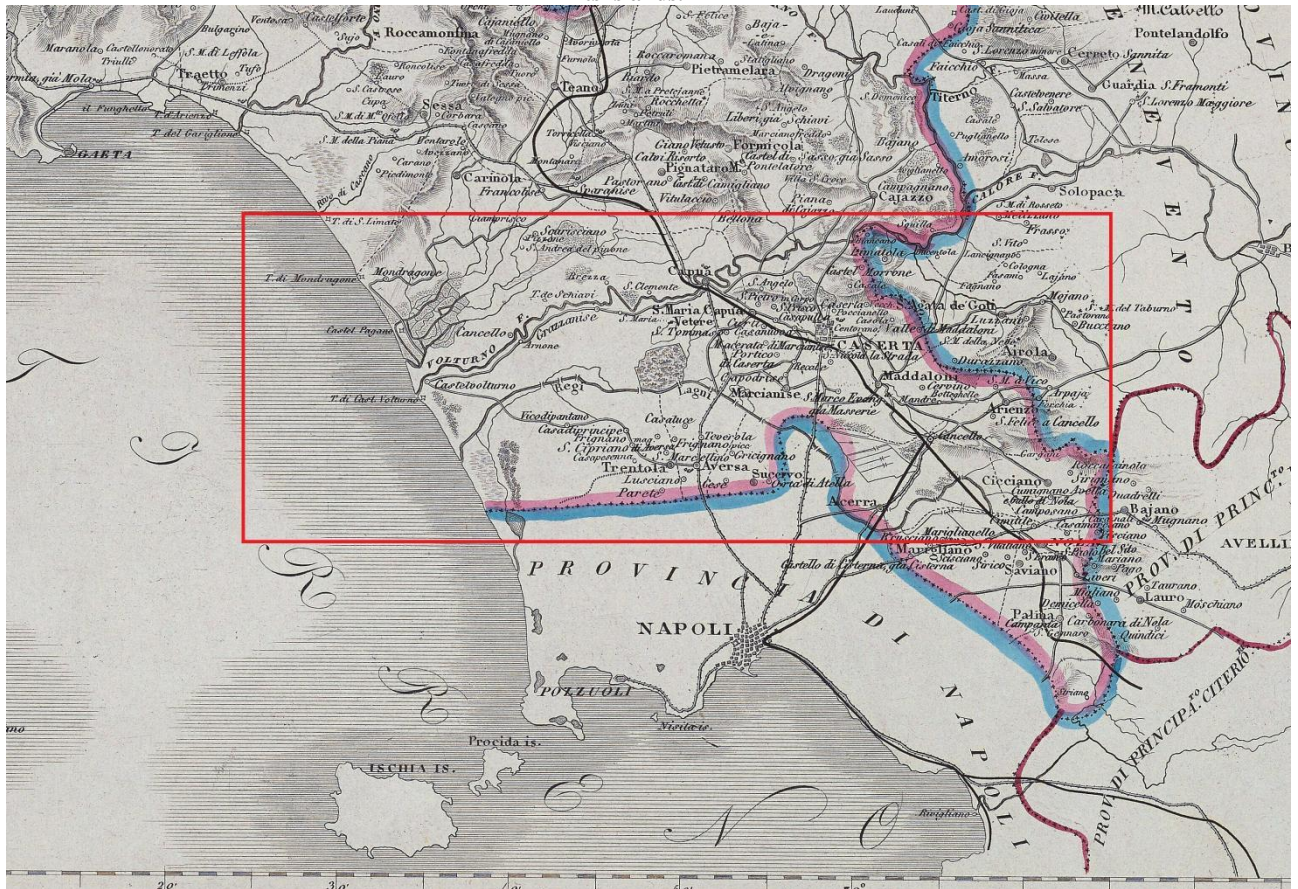
Although the Caserta conurbation is composed of no less than 22 municipalities, proximity to Naples fails to become an autonomous urban system [11]. The municipalities that also partially contribute to circumscribe the study area (**Figure 2**), are all part of the province of Caserta and located in the northern area of the Campania Region.

**Figure 2. Extraction of the map of the Province of Caserta showing the study area with the main urban centres, the main road network and the major railway connection infrastructures.**



**Note:** The area is part of 'Campania Felix' or 'Ager Campanus', as shown in Figure 3 [12].

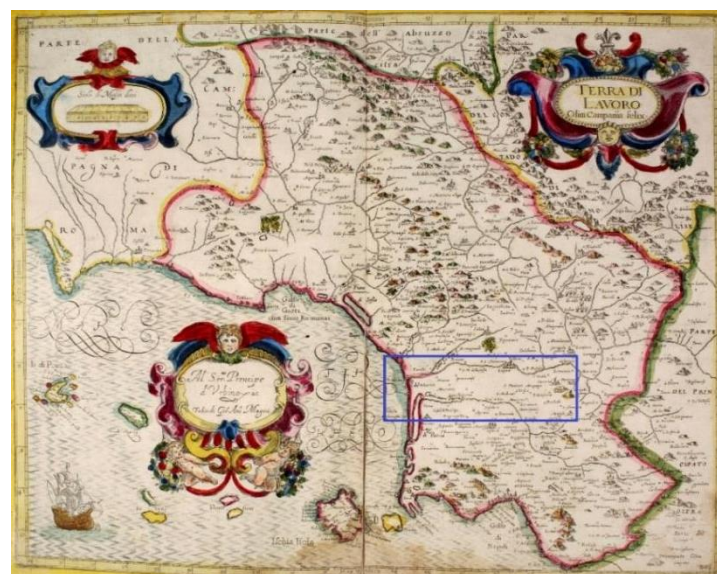
**Figure 3. Map of the Province of Terra di Lavoro taken from Physical, historical and statistical chorography of Italy and its islands.**



From the Norman era (12th century) onwards, the ancient Campania Felix, with its much larger margins, was referred to as 'Terra Laboris', as also highlighted in 16th, 17th and 18th Century maps, where it is depicted in a larger area also because, over the centuries, cultivated areas increased steadily (Figure 4) [13].

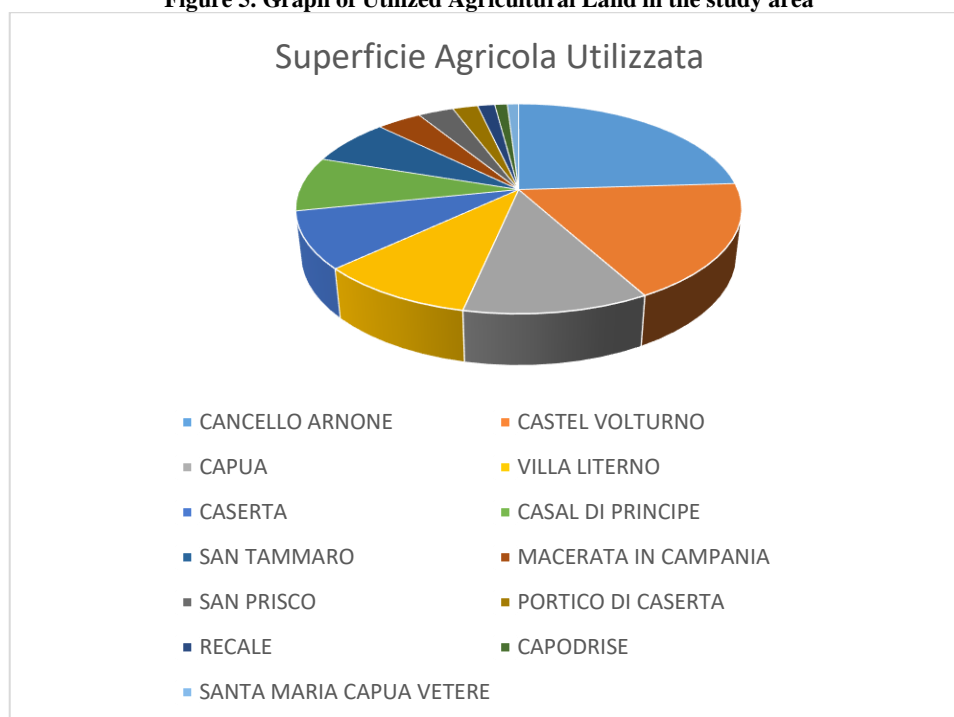
In particular, the Royal Site of Carditello was located in an area of 2100 hectares. The structure currently occupies about 50,000 square meters, with a built-up area of about 13,000 square meters.

**Figure 4. Map of 'Terra di Lavoro' by Giovanni Antonio Magini of 1620, showing the box (in blue) of the area under study**



**Table 1. Used and unused agricultural land in the study area**

MUNICIPALITY	USED AGRICULTURAL AREA (SAU) IN HA					UNUSED AGRICULTURAL AREA IN HA		TOTAL HA
	SEMINATI VES	FRUITS	MEADO W/ PASTUR E	CULTU RE/ LIGNEO US	WOOD S	Unused agricultural area	OTHER	
CANCELLO ARNONE	3.075,27	58,88	19,07	15	12,51	76,46	168,71	3.425,90
CASTEL VOLTURNO	1.780,41	2,7	165,58	0	441,9	5,29	162,57	2.558,45
CAPUA	1.083,28	403,09	38,86	2,2	1,99	23,37	62,65	1.615,44
VILLA LITERNO	1.166,88	160,67	6,82	0	0	33,97	12,41	1.380,75
CASERTA	272,64	311,02	125,36	0	417,59	83,58	31,95	1.242,14
CASAL DI PRINCIPE	1.111,26	74,43	7,12	0	0	2	0	1.194,81
SAN TAMMARO	950,16	34,55	23,24	1	0	3,06	8,69	1.020,70
MACERATA IN CAMPANIA	483,93	31,97	8,48	0	0	13,32	15,5	553,2
SAN PRISCO	106,46	166,43	0	0	91,23	72,8	2,09	439,01
PORTICO DI CASERTA	273,66	9,69	1,98	0,55	0,85	3,03	20,8	310,56
RECALE	199,57	1,42	2,2	1,4	0	1,64	5,92	212,15
CAPODRISE	153,35	0,13	0	0,05	0	0,33	0,59	154,45
SANTA MARIA CAPUA VETERE	130,99	3,84	1,98	0	0	3,42	0	140,23
TOTAL	10.787,86	1258,82	400,69	20,2	966,07	322,27	491,88	14.247,79

**Figure 5. Graph of Utilized Agricultural Land in the study area**

Concerning the agricultural area used by Table 1 [14], it is evident what the relative sizes of the municipalities contribute to defining the area under study as highlighted in the map in Figure 5. From Table 1 it can be seen that the size of the agricultural area of the

municipality of San Tammaro, where the Real Sito di Carditello is located, is particularly small. It follows that activities related to the green economy tend to define "a complex system of territorial offerings" aimed at creating vertical and horizontal networks for the strengthening of the "value chain." Of course, the current system, lacking the coordination necessary to define the goals of revitalization of the area, requires the commitment and resources necessary to achieve them. In this scenario, the particularity of the selected case study lies in the identification of projects aimed at overcoming critical issues marked by synergistic strategic planning shared by public and private actors, an expression of the area.

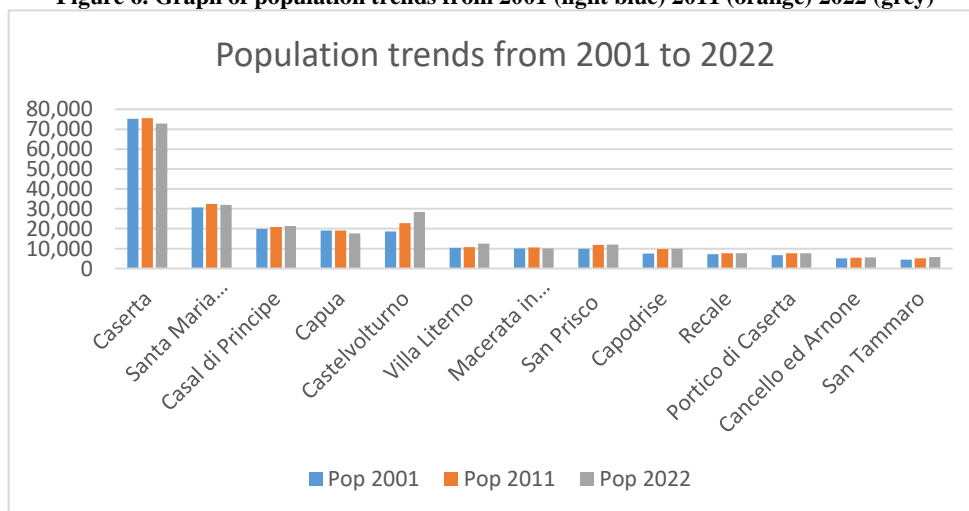
### 2.2.1 Statistical-demographic characteristics of the area

Caserta, the capital of the Province of the same name, is the city with the largest number of inhabitants and constitutes one of the more important centres for the entire area, even though it suffers, in its endowment of services and facilities, from the proximity of the metropolitan city of Naples, which is by far the most important centre in the Campania region and the entire South of Italy. The overall population of the study area, as of 2022, will not reach 250,000 units distributed over an area that does not exceed 400,000 square kilometres and with an average density of 650 inhabitants/km<sup>2</sup>. In general, there was a population increase in both the 2001-2011 and 2011-2022 decade, although more substantial (about 15,000) in the 2001-2011 decade and less so in the following one (about 4,000 more inhabitants), with a very different distribution in the areas. Capua, Caserta, Macerata in Campania, Portico di Caserta and Santa Maria Capua Vetere are the urban realities that have recorded the greatest losses in the number of inhabitants, while all the other municipalities have recorded population increases ranging from 0.09% (7 inhabitants in absolute terms) in Recale to 12.89% in the municipality of San Tammaro (653 inhabitants in absolute terms), which includes the Royal Site of Carditello. as **Table 2 [15]** and **Figure 6** shows.

**Table 2. Population trend from 2001 to 2022, surface areas and population density of the municipalities that are part of the "Area Intermedia Real Sito di Carditello".**

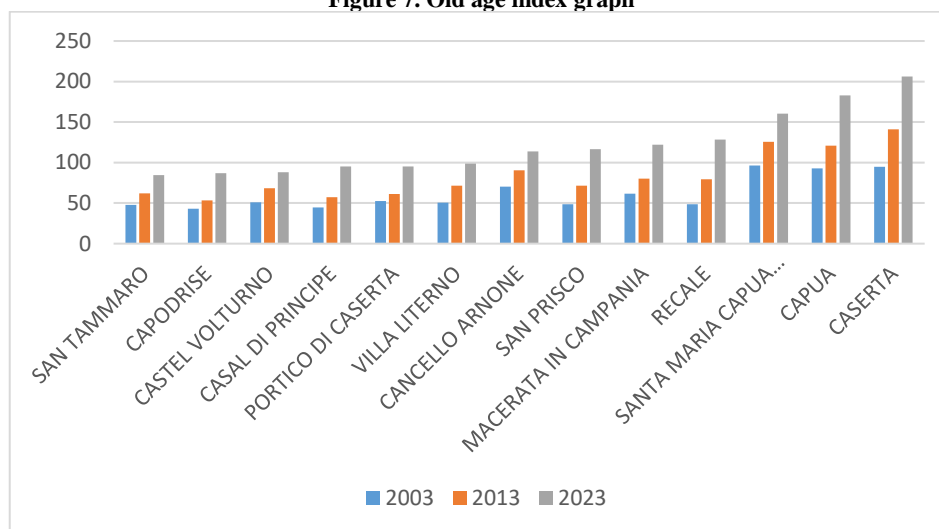
Municipalities	Pop 2001	Pop 2011	Pop 2022	And %	km	D
Caserta	75.208	75.640	72.805	-3,75	54,07	1.347
Santa Maria Capua Vetere	30.745	32.503	31.906	-1,84	15,92	2.004
Casal di Principe	19.859	20.828	21.298	2,26	23,51	906
Capua	19.041	19.036	17.609	-7,50	48,6	362
Castelvoturno	18.639	22.882	28.436	24,27	73,94	385
Villa Literno	10.364	10.715	12.437	16,07	61,82	201
Macerata in Campania	10.136	10.558	10.057	-4,75	3,44	1.318
San Prisco	10.015	11.903	12.110	1,74	7,79	1.556
Capodrise	7.508	9.773	10.007	2,39	3,44	2.913
Recale	7.147	7.611	7.618	0,09	3,22	2.366
Portico di Caserta	6.733	7.719	7.732	0,17	1,91	4.043
Cancello ed Arnone	5.153	5.428	5.559	2,41	49,3	113
San Tammaro	4.400	5.064	5.717	12,89	36,97	155
Totale	224.948	239.660	243.291	1,52	383,93	

**Figure 6. Graph of population trends from 2001 (light blue) 2011 (orange) 2022 (grey)**



**Table 3. Age-old- index in ascending order of municipalities under analysis.**

INDEX OLD AGE	2003	2013	2023
SAN TAMMARO	47,8	61,9	84,7
CAPODRISE	43,2	53,5	87,0
CASTEL VOLTURNO	50,8	68,3	88,2
CASAL DI PRINCIPE	44,6	57,3	95,2
PORTICO DI CASERTA	52,4	61,3	95,2
VILLA LITERNO	50,6	71,4	98,8
CANCELLO ARNONE	70,5	90,5	113,8
SAN PRISCO	48,8	71,4	116,5
MACERATA IN CAMPANIA	61,7	80,2	122,1
RECALE	48,7	79,3	128,5
SANTA MARIA CAPUA VETERE	96,5	125,8	160,4
CAPUA	93	120,9	183,0
CASERTA	95	141,0	206,3

**Figure 7. Old age index graph**

**Table 3** and related **Figure 7**, which show the summary indicators of the old-age index of the population of the totality of municipalities in the Caserta province area, indicate the low dynamicity of the ratio of the elderly population (65 years and over) to the young population (0-14 years). This is due to the limited turnover between generations and, in particular, younger ones. It is precisely on this aspect that the activities put in place aim to attract the new generations by involving them in a process of development territorialization based on the preservation and enhancement of local cultural, environmental, landscape and economic specificities.

### 2.2.2 The Carditello Royal Borbonic site

The Royal Site of Carditello is an architectural complex of considerable historical and cultural value dating from the middle of the 18th century. Very close to Caserta (approx. 20 km) and not far from Naples (approx. 30 km), the Carditello site was conceived by Carlo di Borbone in the mid-XVIII century as a place for hunting and horse breeding, later transformed, after the XVIII century, wanted by Ferdinando IV di Borbone, into a model farm for wheat cultivation and the breeding of prized breeds of horses and cattle. It is set in a reclaimed area with the presence of forests and aquatic swamps. The site was immersed in an area of 2100 hectares, in one of the most fertile and flat areas of the Caserta countryside (currently the municipality of San Tammaro, halfway between Naples and Caserta) " [16].

### 2.2.3 The historical and contemporary landscape of land drainage

The area under study is part of the alluvial plains (Garigliano Plain - Lower Volturno Plain - Regi Lagni Plain - Sebeto Plain - Sarno Plain) that offer man-made landscapes built through reclamation activities over a long period, starting from the Roman age up to the 1960s, with a peak of interventions carried out during the twenty-year fascist period. The first reclamation works were started by Don Pedro de Toledo as early as 1539 [17]. From 1593 the planning and direction of the works were entrusted to Domenico Fontana with the appointment of Engineer Major of the Kingdom for the reclamation of the territories north of the capital (Naples): the Opera dei Regi Lagni, consisting in the separation of high and low waters. [18], [19]. The hydrographic

network of these areas, together with the anthropic canalisation system, strongly influenced the structure of the landscapes, contributing to determining the characteristics of the settlement and road layout and a particular design of the agricultural plots (mainly conducted with arable, cereal, fodder and industrial crops in open fields, with few arboretums and promiscuous arrangements). "Agriculture owes everything to the Regi Lagni, an important opera that led, in the 16th and 17th centuries, to the reclamation of the plain where the royal site of Carditello also stands, once a stagnant and unhealthy marshland that stretched from Nola to Aversa as far as the sea" [16]. The work of channelling and purifying the waters of the Clanio River, based on a project by Giulio Cesare Fontana, began in 1539 and was completed in 1935. Today, instead of malodorous and malarial ponds, ploughed land stretches as far as the eye can see. The Regi Lagni, a name probably derived from a deviation of the Etruscan toponym Clanis, are about fifty kilometres long and cover an area of about 1000 square kilometres.

#### 2.2.4 The Domitian Coastal Plain Landscape

The landscapes of the coastal plains present the typical appearance of sandy Tyrrhenian coasts, with retro-dunal depressions, dunes and beaches, which in the past had an important biological function as a transition belt between natural terrestrial and marine ecosystems. These landscapes, endowed with a high scenic value, have suffered in recent decades from a rapid increase in urbanised areas and growing tourist pressure, which has resulted in a detriment to landscape quality and a trivialisation of the perceived. Over large areas, the landscape is characterised by eucalyptus and replanted pine forests. Peculiar to the Domitian area is the landscape of grazing buffalo herds with their characteristic 'caramoni' (natural or artificial pools). The rural landscapes of the area are characterised by the presence of farms and farmsteads well integrated into the surrounding environment, but unfortunately often in a state of abandonment or disfigured by subsequent incongruous interventions. In an almost entirely flat area with little slope, the lower course of the Volturno River widens its bed and takes on a meandering, slow-flowing course. It skirts the city of Capua (in Roman times called Casilinum) and flows near Castelvoturno after a course of 175 km (with a catchment area that measures 5,500 sq. km). Near the mouth is the Oasi dei Variconi, one of South Italy's last coastal brackish wetlands.

#### 2.2.5 The 'Foce Volturno and Costa di Licola' regional nature reserve, wetlands and Sites of Community Interest (Sic)

The regional nature reserve 'Foce Volturno and Costa di Licola' is a protected natural area of the Campania Region established in 1993. It occupies an area of 1,540 ha between the province of Caserta and the metropolitan city of Naples. Along the southern bank of the Volturno River, more precisely at its mouth in the territory of the municipality of Castelvolturno, lies one of the most important wetlands of naturalistic interest in Campania and one of the most studied in the South: the Oasi dei Variconi. The area, due to its morphological and naturalistic peculiarities that allow the conservation and reproduction of various animal species, both allochthonous and autochthonous, including the nesting of migratory birds, has also been recognised as being of considerable Community importance by the Ramsar Convention for the protection of Europe's main wetlands and lakes. Over time, the oasis has become an ideal place of refuge for thousands of birds that move en masse each year, making spectacular migrations, up to thousands of kilometres long, to the African continent. This phenomenon is favoured by the location of the Domitian coastline, which is almost in the centre of the Mediterranean basin, making it a favourite stopover for numerous bird species travelling from one continent to another. Among the bird species that can be observed in the Variconi nature reserve at certain times of the year are the pink flamingo, blackcap, kingfisher, robin, red woodpecker and grey heron. The entire protected area, which covers 1,504 hectares consisting of brackish water ponds, high dunes and Mediterranean maquis woods, encompasses not only the mouth of Campania's main waterway but also Lake Patria and part of the Domitian coastline from Mondragone to Licola (**Table 4**).

**Table 4. List of sites of community interest in the case study area.**

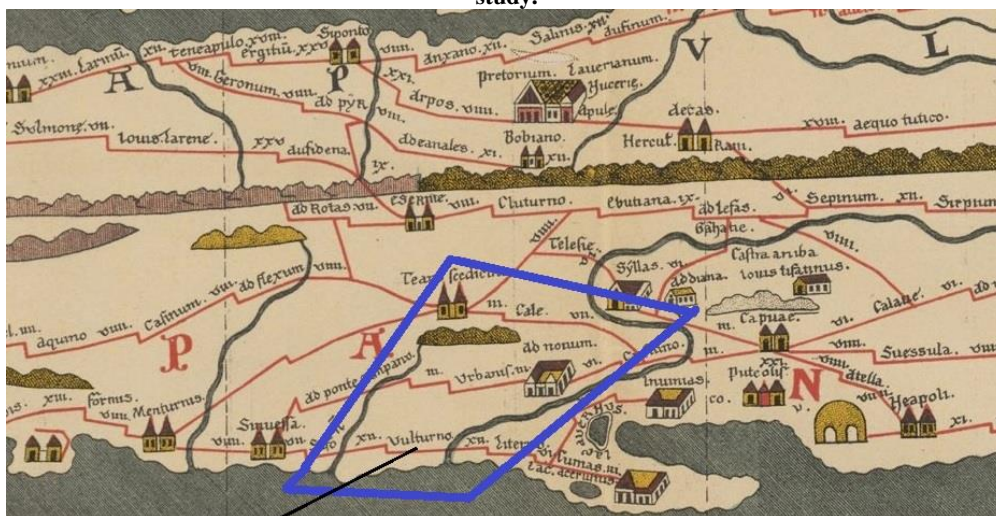
Code	Toponym
IT8010020	Pineta di Castelvoturno
IT8010021	Pineta di Patria
IT8010028	Foce Volturno - Variconi
IT8030009	Foce di Licola

#### 2.2.6 Traces of Cultural Heritage

The area in question also preserves substantial and very interesting traces of the past, in addition to the Real Sito di Carditello, covering approximately 2,500 years of history. The most important of these is a section of the Appian Way, the 'Regina Viarum' from the Roman era, one of the oldest and most important in the network of the Roman Empire, a section of the Roman road known as the 'Domitiana', traces of the Roman centuriatio, the medieval site of Casertavecchia, the basilica of Sant'Angelo in Formis, the historic centre of Capua with its 16th-century walls and several small but very interesting museums where rare traces of the pre-Roman period (5th-4th centuries BC) and the Roman period (5th-4th centuries BC) are preserved. BC) and the Roman period with some Etruscan evidence (**Figure 8**).



**Figure 8. Extract fragment V of the Peutingeriana table<sup>2</sup> with the identification (with blue perimeter) of the area under study.**



The Via Appia, considered by the Romans to be the *regina viarum* (queen of roads) [20] was a Roman road linking Rome to Brundisium (Brindisi) where the port from which the trade routes to Greece and the East originated. Construction began in 312 BC and was completed in 190 BC. [21].

The Via Domitiana, of modest mileage, is the road built around the year 95 AD to improve connections between the port of Puteoli, today's Pozzuoli, and Rome [22].

*Ager Campanus I*. It was created in 131 BC, following the Lex Sempronia Agraria of 133 BC, with Tiberius Gracco, Gaius Sempronius Gracchus and Appius Claudius Pulcro triumviri agris iudicandis adsignandis, and measured 705 metres, or 20 actus [23].

Casertavecchia is the medieval centre of Caserta that used to be called Casa Hirta, located at the foot of the Tifatini Mountains, four hundred metres above sea level and 10 km from the 18th-century centre of Caserta.

### 3. Results

An analysis with a method similar to the SWOT adapted to the singularity of the area, is reported as a result of the research conducted. In particular, the potentialities, both natural and anthropic, historical and contemporary, were highlighted; the problematic nodes, the present and future development opportunities, both those deriving from economic and social policies and strategies and the threats to the system, present and possible future ones. Finally, a scenario was composed as a final compendium of the individual components highlighted and, put together, they defined the proposed future scenario.

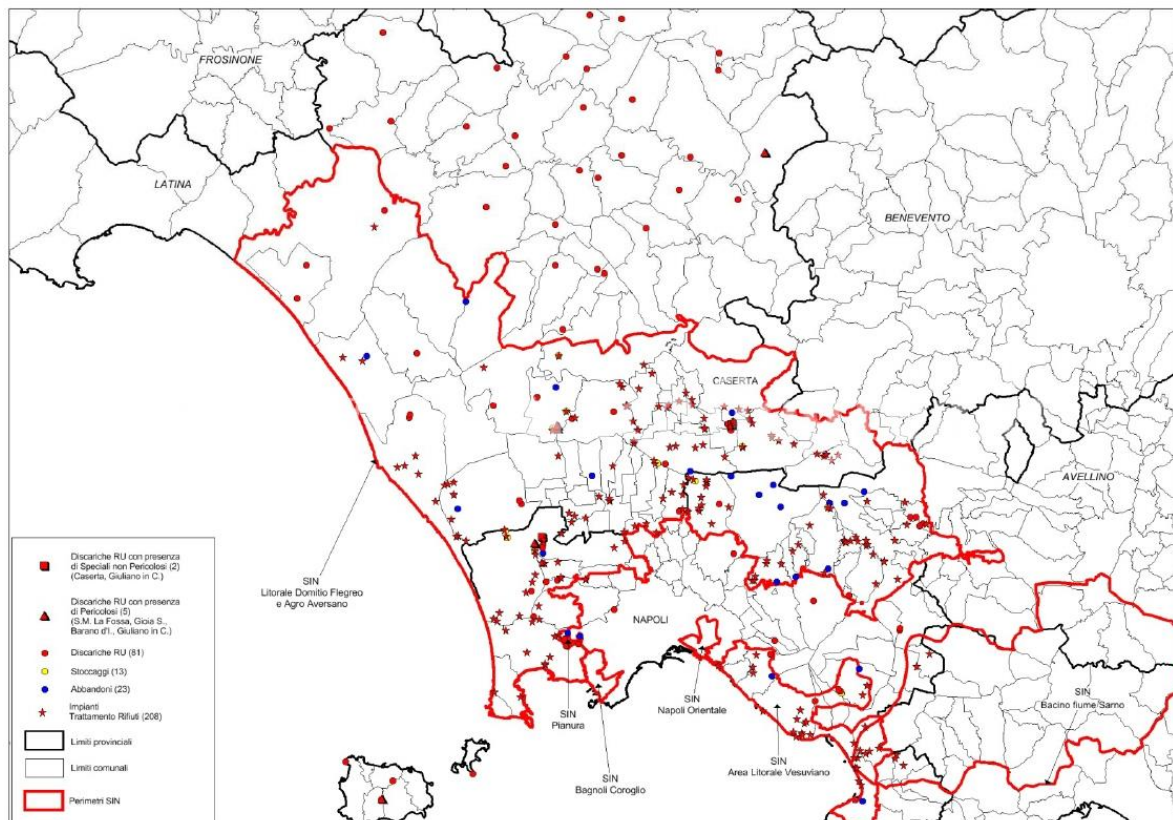
#### 3.1 Strengths

About the mapping of the intermediate areas realized by SNAI, the highlighted area in **Figure 9** [24], which lies between The river Volturno, the Regi Lagni, Carditello, the city of Capua, Santa Maria Capua Vetere, the Royal Palace of Caserta and Caserta Vecchia. The local economy is dynamic and varied. In addition, the presence of a rich environmental, historical-artistic and archaeological heritage makes the area even more attractive.

##### 3.1.1 The monitoring station at the Royal Site of Carditello

Since 2017, the bio-monitoring station used as an environmental survey environment monitoring station has been activated at the Royal Site of Carditello. Among the trees that surround the Royal Site, an environmental bio-monitoring station has been installed consisting of beehives in which experts constantly monitor bees. The bees are used as a sensor in movement in a circumscribed area, patrolling a surface of approximately 7 square kilometres every day and carrying out up to 10 million micro-samples daily, offering the possibility for scholars engaged in monitoring this natural activity to detect the state of environment health produced by the bees.

<sup>2</sup> The Tabula Peutingeriana, named after the humanist and antiquarian Konrad Peutinger, is a 12th-13th century copy of an ancient Roman map showing the roadways of the Roman Empire. It is kept in Austria, at the Hofbibliothek in Vienna. It was drawn up before 79 A.D., as Pompeii is shown, and it was undoubtedly updated until 330 as it shows Constantinople was founded in those years. The most accredited hypothesis spoke of a road map starting from 64 BC and updated up to 375 AD. In 2007 it was included in the UNESCO Memory of the World Register.

**Figure 9. Map of discarded and waste burning sites with the intermediate area under analysis (blu rectangle)**

As of 2021, an 'Operations Centre' has been set up at the Reggia di Carditello, with the task of coordinating and integrating the actions of the various regional players involved in monitoring and controlling the territory and the environment. The 'Monitoring Station' manages a digital platform where all the data collected, using a common language, by the following bodies converge: the Campania Regional Environmental Association, ARPAC; the Zooprophyllactic Institute; Systems for Meteorology and the Environment, SMA Campania; Local Health Authorities Departments, ASLs; the Universities. Another very interesting initiative, to be launched in 2021, is the creation of the 'Mulberry Path', the approximately 9-km-long path linking the Carditello Royal Palace to the Capua town centre station to be followed on foot, by bicycle or by handbike. The mulberry tree (the mulberry is one of those virtuous plants in which the storage of carbon, which is captured through photosynthesis and transformation into biomass, is greater than the total emission) has for centuries represented a resource of immense value for the territory since its leaves were used to feed the silkworm, bred as far back as an antiquity to produce the precious fabrics of the eighteenth-century silk factories of San Leucio built by the Borbone (Unesco Heritage). For some years now, the Royal Site of Carditello has enjoyed the support of a specially established organisation, the Carditello Royal Palace Foundation, which is in the process of setting up a model farm and an experimental centre, relaunched with the breeding of horses of the prized 'Persano' breed, the production of mozzarella and typical local wines, the cultivation of mulberry plants (jasmine cultivation) and the breeding of silkworms (silkworm breeding). Finally, the establishment of the Environmental Observatory on the 'Terra dei Fuochi' is planned, in an area that has long been the victim of waste spills by organised crime and is now the subject of attention and projects for protection and sustainability [25].

### 3.1.2 Heritage connections

At present, the traditional cultural landscapes of the Mediterranean are considered among the most efficient models of integration between anthropic activities and the natural environment as the millenary, widespread and diversified action of man aimed at utilising resources through agro-sylva-pastoral practices and the use of technologies aimed at conservation but not exploitation, has maintained high levels of biocenosis diversity. The most evident result of this positive model in terms of ecological benefits is the worldwide recognition of the Mediterranean basin as biodiversity hotspots for the high number of endemic organisms and habitats present.

### 3.2 Weaknesses

Certainly, the strong fragility of Carditello is caused by the adjacent environment area (Figure 9). The Agenda 21 indications focused on the rehabilitation of Carditello focus on the fact that the actions planned on the territory can not be limited to the preservation of the architectural structure but must also include an environmental rehabilitation that covers the entire basin of the Regi Lagni, clearing the reclamation area. The synergy between the various public and local stakeholders is required for this.

### 3.3 Opportunities

The area of the Foce Volturno Regional Nature Reserve and the Licola coast lends itself to nature excursions where trekking and birdwatching are possible. Since Carditello is located in the centre of The north is where the river Volturno flows., of the Clanio now called Regi Lagni to the south, and since there are considerable land reclamation and water channelling works in this area, it could be thought of as a site for observing, monitoring, controlling and enhancing these very important components that characterise the area together with its high hydrogeological fragility. The 'European Network for Rural Development' was set up by the European Commission's Directorate-General for Agriculture and Rural Development in 2008, to help member states effectively implement their 'Rural Development Programmes', identify and collect good examples, promote transnational cooperation and share research and innovations. Among the main stakeholders are 'National Rural Networks', competent administrations and institutions in the member states, 'Local Action Groups' and European rural development organisations. In the 2nd World Water Forum held in The Hague in 2000, "River Contracts" were defined as "forms of agreement that allow the adoption of a system of rules in which the criteria of public utility, economic performance, social value, environmental sustainability are involved on an equal level in the search for effective solutions for the upgrading of a river basin" in which the "usability of the river course, the creation of river parks, service and/or pedestrian cycle paths" aimed at the cultural and tourist enhancement of the area will be included. The recovering of the river's historical heritage, which over time has developed urban and rural cultures linked to the life of the River; the strengthening of the role of social aggregation of a recreational, sporting and educational nature and tourist enjoyment; the generation of public spaces, urban, rural and naturalistic landscapes of high quality; the enhancement of educational projects of high didactic-cultural value that promote respect for the waters from the younger generations [26]. In Amorosi, a small town but very sensitive to environmental issues and close to the area under study, a new park respecting the naturalness of the area, the Volturno River Park, has recently been created. This area along the banks of the Volturno River has been equipped with tables and benches, with an area for outdoor educational activities and fishing. The concept of the park is a good practice born of the administration's intention to bring its population closer to the environment and nature of its territory, also investing in training. With regard more particularly to built-up areas, other opportunities are offered by Law No 158 of 6 October 2017, 'Measures for the support and enhancement of small municipalities' (with a resident population of up to 5. 000 inhabitants), to acquire and redevelop real estate, disused railway stations or cantonment houses, safeguard and recover the cultural assets of the dioceses, spread ultra-wideband infrastructure, encourage the use of postal services, and promote the consumption and marketing of agricultural and food products from short supply chains or kilometre-wise (Articles 11 and 12). Law No. 158 is also added to the possibility offered in the implementation of intervention 2.1 'Attractiveness of Villages' of the 'National Recovery and Resilience Plan' for abandoned villages or those at risk of abandonment, which aims to 'counter depopulation and encourage lasting, inclusive and sustainable economic growth, full and productive employment and decent work for local communities.

### 3.4 Threats

Over the centuries, floods have occurred periodically in the lower reaches of the Volturno River, the most recent occurring in October 1949, November 1968 and November 1979. In 1949 and 1968, the waters of the Volturno exceeded a height of four metres. The Campania Region coastal area represents an extremely delicate system on which multiple uses and interests are concentrated, generating strong pressures on the various environmental components and whose management has become critical as the development of this strip of land has not been kept within acceptable limits [26].

### 3.5 The project scenario and green economy

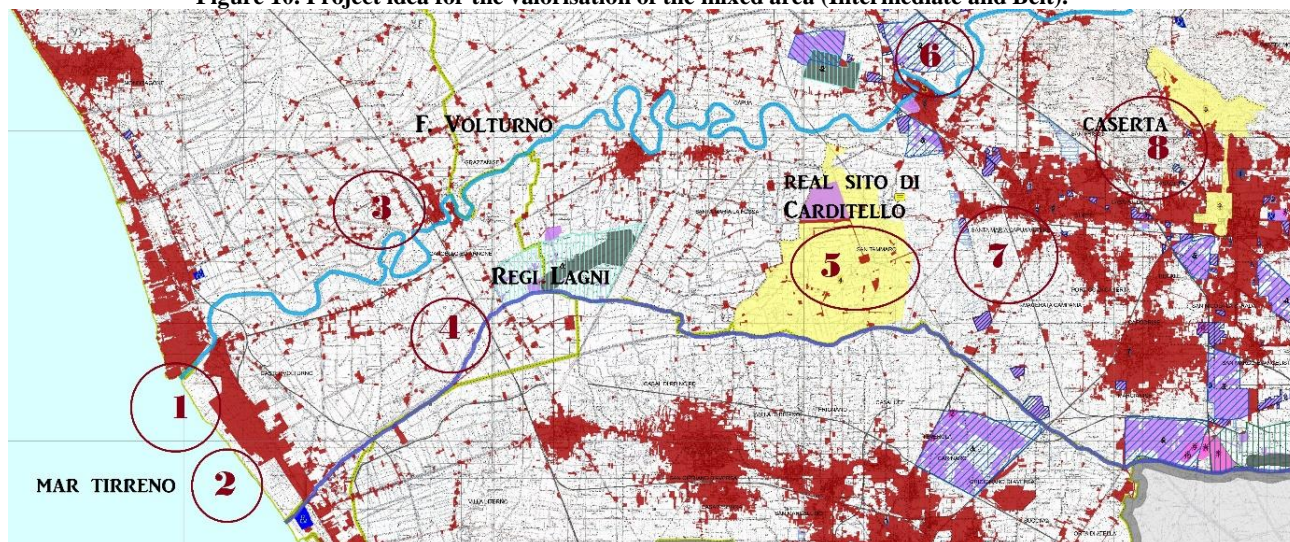
The constitution of itineraries, conceived as a system and not as individual monuments, would determine a strategy of valorisation and socio-economic development of an area, the Terra dei Fuochi, strongly compromised in terms of environmental degradation, but rich in a heritage of high cultural and identity value. In 2014, as part of the great thematic itinerary 'Journey in Campania: in the footsteps of the Grand Tour', promoted by the Campania Region, again as part of the Action and Cohesion Plan, an initial hypothesis of a Bourbon itinerary was defined to rediscover Campania's cultural heritage. With the 'The splendours of the Bourbons' itinerary, a tourist-cultural route has been constructed, networking the main architectural excellences of the Bourbon period along three thematic lines: Royal Bourbon splendours (Royal Palace of Portici and Quisisana); Palaces of Kings and Queens in Bourbon Naples (Royal Palace and Capodimonte); Royal architectures (Royal Palace of Caserta, San Leucio and Carditello). In addition to this first itinerary that is already up and running, the following itineraries are listed and also summarised topographically in **Figure 8**:

- 1) The River Park Itinerary;
- 2) The itinerary for the valorisation of the Variconi Oasis, a wetland according to the Ramsar Convention;
- 3) The itinerary in the Foce Volturno nature reserve and the Licola coastal strip;
- 4) The land reclamation itineraries and the landscape of the Regi Lagni land reclamation;
- 5) The archaeological itineraries: The Via Appia, the traces of the "centuriazione", the Roman amphitheatre of Santa Maria, the theatre of Teano, with its pre-Roman city walls and the archaeological museum together with the Capua museum, the bridge at the mouth of the Volturno river of the remains of the Roman bridge;
- 6) The itinerary of medieval and 18th century architecture.

The latest available edition of the Greenitaly report, dated 2022, is titled *A Human-Sized Economy Against Crises*. The pandemic and, even before that, the series of economic crises that have swept through Italy have posed a dilemma regarding current production and energy governance models, which are still too wasteful and polluting. The Greenitaly report, referring essentially to the 1987 Brundtland report, states that investment in the green economy and companies' sustainable practices will make them more competitive in the marketplace. This is an ambitious goal that puts the supply chain at the centre of this momentous transition. The UN's 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals are largely related to environmental protection. Refocusing production models in a new light can create new professional figures, safeguard the Earth's resources, and improve the way the international community can cope with economic, energy, and food crises.

The GreenItaly report, mentions these Agenda goals: in particular, No. 12 promotes a shift to sustainable consumption and production models including, of course, the green economy. When it comes to the green economy, the Campania region ranks among the top five regions (2017-21 data) in terms of the number of eco-investing companies with about 46 thousand. Equally important is the issue of employment. For the year 2021, in the distribution of green jobs by region, the Campania region recorded nearly 186 thousand, about 11.7 per cent of total employment in the region. In the ranking regarding the absolute number of contracts related to green jobs whose activation was expected by companies in 2021, Campania is still among the top five Italian regions with 126,700 units (Figure 10).

**Figure 10. Project idea for the valorisation of the mixed area (Intermediate and Belt).**



**Note:** Legend: 1) Oasi dei Variconi (wetland according to the Ramsar Convention); 2) Special Protection Area, Site of Community Interest and Regional Nature Reserve Foce Voltorno and Costa di Licola; 4) Reclamation System of Regi Lagni 5) Royal Site of Carditello; 6) Historic Centre of Capua; 7) Historic Centre of Santa Maria Capua Vetere and Roman amphitheatre; 8) San Leucio, Section of the Appian Way (Regina Viarum), Roman "Centuriation" Traces, Historic Centre of Caserta, Royal Palace of Caserta (Unesco Heritage Site) and Old Caserta (Elaboration by Antonio Bertini on a cartographic basis taken from: Territorial Coordination Plan of the Province of Caserta, extract of table b5.1.2. - Settled territory. The evolution of the settlements).

The report also contains data referring to provinces: Naples ranks third nationally in terms of companies that have made eco-investments or were planning to do so (2017-21). By percentage incidence of green businesses on total businesses in the province, Caserta's figure stands out, placing it fourth in Italy. Still Naples can again boast a third place in the national number both for contracts related to green jobs (2021) and for incidence on the total in Italy. Wanting to focus on one of the leading sectors, it is impossible not to associate the Campania region with the restaurant industry and, by extension, the entire agrifood chain. Without wishing to mention the host of excellence-certified Protected Designation of Origin (PDO), Controlled Origin (DOC), Protected Geographical Indication (PGI) and many others, businesses in the region have long embraced innovative methods of production, whether at the stove or in industrial laboratories.

The Borbonic Royal Site of Carditello is a hub, a site of art, but also an activator of economic and entrepreneurial forces, social innovation programs, responsible tourism, circular economy projects, creative digital visions, qualified training, carried out in collaboration with universities in Campania, welfare projects and personal physical and mental health care. In the processes of development and growth in the private-social sector in general, the acquisition of skills and resources from outside are ways that are activated and are necessary to be able to achieve economic results failing a single organization, even if multifunctional, to contain all the necessary resources and skills within. This is also evident in the cases examined in the territory of action of AgroRinasce, in which the most successful experiences encountered in the course of the evaluative research, also became such through the construction of collaborations and networks with other actors: collaboration and functional networks to access other financial resources, but above all the skills necessary for the growth and market positioning of the economic activities developed. The paths of valorization and consolidation examined have seen the growth, together with the cooperative/association entrusted with the confiscated property, of a network of relations of the same cooperative/association with other subjects inside and outside the territory of reference. The strategies through which the collaborations with other subjects were built and activated, however, were not similar for all the subjects encountered but saw different approaches; approaches that also changed throughout the history and path of the individual initiative as the situation evolved and the activities implemented. In the Campania Region, the green economy sector plays a major strategic role in the development of the regional economy.

According to the GreenItaly 2022 Report [27], carried out by the Symbola Foundation and Unioncamere, Campania has 46,020 companies that have made eco-investments in the 2017-2020 period. Even in the case study of Carditello, there are important initiatives consistent with the main assumptions of sustainable development (natural resources, economy, social development and rural governance). The activities undertaken are largely mixed and involve collaboration between the public (municipalities, Region, Regional Reserves Authority, Consorzi di Bonifica dei Regi Lagni) and private parties interested in investing in projects that are attentive to biodiversity conservation, control of the impact on the environment and local communities. The area that gravitates around the real site of Carditello can count on the presence of a conspicuous natural capital largely unused and constituted by the Foce Voltorno and Costa di Licola Regional Nature Reserve (established in 2003) on which insist Sites of Community Interest and the wetland of global interest of the Variconi oasis nature reserve. An important project involves the Variconi Nature

Reserve in Castel Volturno, which is the most emblematic example of the many now-disappeared marshes that stretched back to the time of the Roman Empire in so many areas of the Tyrrhenian Sea and in which man has carried out reclamation. The oasis is a Wetland of International Importance according to the Ramsar Convention to Special Protection for the European Union, counted among those rare areas that are located along the migratory routes of avifauna, where work is carried out for maintenance and protection to the arrangement of suitable habitats for the conservation and management of migratory wild bird populations. Spring and especially late summer, with the arrival of autumn, are the seasons when birds (including herons) protagonists of migratory crossings mainly from the African continent stop to rest. This area is a naturalistic paradise that has been able to save itself from the surrounding devastation of past decades because it is full of permanent and temporary ponds against which no reclamation has been able to do anything. One of the opportunities presented to the area under study in the field of green economy, seizing the solicitations produced in the II World Water Forum held in The Hague in 2000 in which "River Contracts", were defined, is that of the recovery of the river's historical heritage. Along the banks, in about three millennia, urban and rural cultures related to the life of the river have developed; the enhancement of the role of social aggregation of recreational, sports and educational types and tourist enjoyment; the generation of public spaces, urban, rural and naturalistic landscapes of high quality; the enhancement of educational projects of high educational-cultural value that promote respect for the waters, especially about the younger generations. The Real Sito di Carditello moreover lies between the Volturno River and that of the Clanio River, the latter now identified, after many anthropic interventions that have regularized its course since Roman times, with the toponym of the "Regi Lagni," and is located in a barycentric position concerning an area full of water reclamation and channelization works, also of historical interest, with a high hydrogeological fragility that together with the final part of the course of the Volturno River, constitute a hydrological system whose observation, monitoring, control and valorization constitute another important component to increase a green economy in the area [19].

The coastal area of the Campania Region also represents a value to be defended since a large part of the region's economy is based on it and is, also, an extremely delicate, but identity-based system on which multiple uses and interests are concentrated, generating strong pressures on the various environmental components [26]. Around this area, private individuals can be offered the management of guided tour services with expert faunists, botanists, and geologists, where birdwatching can also be practised, excursions can be made along the course of the Volturno River where there are also typical fishing systems that could become supportive to carry out an economic-recreational activity for sport fishing. Another mixed public-private activity definitely within the green economy could be environmental monitoring in terms of air quality.

Close by in the Carditello Museum a biomonitoring station with bees has been located for a few years now. These insects can be considered travelling sensors capable of returning a range of information through the bees themselves and honey. The implementation of the project, which is already operational, uses bees as sensor vectors to detect and monitor the quality of the area and the surrounding environment. Thanks to the presence of bees and the monitoring of their health status, it is possible to have data on the presence of heavy metals in the air, water and vegetation. The environmental monitoring campaign is promoted by the Real Sito di Carditello Foundation, in collaboration with the Campania Regional Environmental Agency and the Campania Region itself. The initiative is part of the "Carditello Charter" a protocol of understanding with the Ministry of the Environment and Protection of Land and Sea that envisages the creation of the Terra dei Fuochi Environmental Observatory in Carditello, a site capable of resisting the wounds of time and malfeasance and now an active cultural place sensitive to protection and sustainability projects. Another activity implemented in the area is related to the cultivation of mulberry trees to produce silk and bring back the Bourbon artisanal-industrial activity linked to the historic San Leucio silk factories. the Mulberry Path was created in 2021 as part of the enhancement project promoted by the Foundation to reaffirm the historical identity of the area. The cultivation of mulberry trees - once used to breed silkworms destined for the production of the fine silks of the nearby Royal Silk Factory and Colony of San Leucio - by the will of Queen Maria Carolina was extended to the lands of the Carditello Estate, which included one of Capua's historic suburbs: the current Gelso Boscariello district, where a 100-year-old white mulberry tree is still preserved. The itinerary - starting from the Capua train station and proceeding along Via Boscariello, until it reaches cross-country paths in the Selvetelle locality of the Municipality of San Tammaro - crosses these places and continues to the Real Site of Carditello. Finally, another activity that could find more space in the area is the study of methods for the recovery of polluted and abandoned sites found near the Real Site of Carditello. There are already studies conducted by universities in Campania that are doing their best to find solutions compatible with the environment and the soil in a biological way, that is, by resorting to the characteristics of certain plants that can attack and digest the impacts of the spills carried out in the last four decades. Not secondary, finally, is the role of some associations that are very active in the social sphere that carry out the task of "Sentinels" of the Variconi nature reserve providing an excellent example to the new generations that are involved through the schools, middle and high schools of Castel Volturno, with the days dedicated by the environmental movement to the "Plastic Free day."

#### **4. Discussion**

From a national perspective, inland areas have significant economic development potential, from which policies have failed to adequately benefit. So the "Strategy for inner areas", its progressive setting, including and plotted, can help change the scenario, improving the standard of living of residents, contributing usefully to the development of the entire country and participating in the European Union's territorial cohesion objective. ([5], [28], [29], [30]. Studies produced by the Agenzia del Ministero per il Mezzogiorno e la Coesione Territoriale' (Agency of the Ministry for the South and Territorial Cohesion) say that a quarter of the Italian population (around 15 million) lives in inland areas, which exceeds 60% of the total national territory (about 180,000 square kilometres) and include more than four thousand municipalities (the total number of Italian municipalities is 8000). Inland areas are of national importance for two other reasons: the social costs determined by their condition and widespread hydro-geological instability. Hydro-geological instability is an example of this along with the current way in which human landscapes are used in inland areas. Last but not least, the reduction of biological variety or the dispersion of customary knowledge, i.e. know-how, are not secondary. The priority objective must be to produce a reversal and improvement in demographic trends, a reduction in emigration from these areas, the attraction of new and younger residents and a recovery in the birth rate [31], [32]. Further elements to be considered, from a national perspective, are the low degree of accessibility to basic goods - health, education, and mobility, to which virtual connectivity (internet access) must now be added - for the resident population. The low accessibility of basic

services, today considered in Europe as essential services that identify the "right of citizenship", greatly reduces the well-being of the resident population and limits the range of choices and opportunities of individuals - including potential new residents. The Inner Areas must be considered a territorial laboratory in constant evolution whose integration on a national scale, both economic and social and cultural. A systemic analysis is needed in the general context, and then focusing on identifying the boundaries of inland areas, on a regional scale. Only after identifying the differences, it is necessary to calibrate the different actions that must be activated. [32]. Identifying diversity amongst the local systems of inland areas is the first pass at recognising their reality. The connection between 'environment' and 'economy' that has characterised the Italian territory has produced habitats of living, production techniques (and practical knowledge), consumption patterns, but also cultural practices that, in their overall interdependence. Analysis of inland areas can be carried out for certain dimensions [33]. The demographic one is certainly the first fundamental dimension to be considered. Although at a different level, the inland areas have reached an ageing rate that does not guarantee a satisfactory generational turnover. Many territories can be expected to suffer a demographic collapse in the medium and long term and, in any case, to record a reduction in the working population. Of course, there are signs of demographic recovery, but they are limited and in any case poor. Interesting is the analysis of the flow of migrants that has involved most of the inland areas in the last decade. A further element to be considered is the expansion of basic services that experienced a significant qualitative and quantitative reduction. Together with internal elements, the development strategy for inland areas must also consider externalities. [10].

The overall process of deindustrialization and the process of establishment of productive activities and services have affected inland areas but without having a decisive impact on the increased industrialisation. Another factor to evaluate is the transformation of the competitiveness of the territory as a result of the increase of new territories with a tourist vocation, also in Europe, competitive in terms of characteristics with Italian ones. Changing consumer choices and the effects of climate change are further factors of instability in the future development trajectories of inland areas. It seems therefore necessary to diversify the tourist offer and to study new strategies, which are defined through accurate analyses. Finally, we would like to make a final reflection that stems from our experience of the places studied, and from the exchange with the communities living in those places. Italy's inner areas, if one analyses all the parameters, are not synonymous with depressed or poor areas, because those few residents 'the remaining ones' lead an average, decent standard of living, congruent with their needs. Those who have remained in these centres far from the metropolitan areas and the medium and large cities have little incentive to improve their condition as they find their standard of living balanced against their expectations. For the most part, these are people who have chosen to live far from the hectic life of densely populated areas, to prefer an environment where the environmental quality is better, where human relationships are daily and constant over time and therefore more meaningful. This has resulted in the fact that often these inland territories, far from the cities, are not in a social and economic crisis as many people think, but reside almost in limbo in which there is little impetus towards activities that create evolution, changes to the status quo, developments and, therefore, also valorisation of the copious resources, both material and immaterial, that do exist. It must be said, however, that even in the There are very varied inland areas in the territory of the same region.. Hence the difficulty in developing an effective strategy for all areas.

## 5. Conclusion

The Snai marked a change in the policies of conservation and improvement of inland areas, whose vulnerability, together with the important opportunities, had never been a problem to be addressed in a general and programmatic way. Since then, the inner areas have been strategic in conception, mapping out a focused action plan based on specific criteria, centred on a sense of territorial identity. [34].

. This methodology makes it possible to overcome rigidly established boundaries in order to give new space to concerted initiatives, planned and governed according to the needs of territories and local populations. The analysis has led the authors to focus on the area that has two strategic aspects: against the presence of illegal landfills, toxic waste and quarries that have damaged the environment, with very strong consequences for people's well-being. However, it must be said that the reclamation of the area conducted in the last few years have helped to reduce the impact on local communities and the landscape. It is no coincidence that one of the contributions of the researchers of the Institute of Mediterranean Studies to the Pon Ideha project, Innovations for data processing in the field of cultural heritage, has had the objective to characterize various interconnected developments that regard is the naturalistic-territorial aspects that landscaping and the historical-artistic and architectural-urban patrimony. COVID-19 has determined a new way of living in the territory thanks to the possibility of using work remotely and seizing the opportunities of the territory. [35]. The possibility of achieving better tangible results requires adequate funding to support actions aimed at adapting essential services to local communities in a way that makes good practices sustainable and stable. The realisation of these results is also dependent on the National Recovery and Resilience Plan ("PNR"), which represents a great opportunity to reduce the historical gaps in our country and to give a concrete signal of a renewed interest on the part of institutions in intermediate areas, places where living conditions require specific interventions.

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## Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

## Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

## Data Availability Statement

The data that support the findings of this study are openly available in IDEHA.

<http://www.ponricerca.gov.it/comunicazione/example-projects/industrial-research-and-experimental-development-projects-in-the-12-specialization-areas/ideha/>.

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