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GIS and Tourism: Developing strategies for new touristic flows after the Covid-19 pandemic

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Master thesis, 30 credits, in *Geographical Information Science*

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Abstract

The goal of this article is to propose, through the use of GIS software, an interdisciplinary method to suggest new touristic flows after the Covid-19 pandemic. Specifically, the aim is to identify those sites of cultural and landscape interest that are little known but with great artistic, cultural, historical and environmental value that could give new vigour to the tourism sector. In the first phase, the work carries out a survey of the economic and social literature on the current state of the tourism segment, with particular reference to the Italian territory. A strategy is then proposed through multi-criteria evaluation using weighted analysis in a GIS environment for the identification of new sites wherein public or private entities could invest their resources. This model is tested on a sample case selected in the borders of the Campania region, bringing out its potential. At this stage, the research is limited to the identification of such sites, deferring the analysis of other factors that could affect the selection process to further investigations.

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1 Introduction

The Covid-19 pandemic was an unprecedented health, social and economic emergency, with serious consequences for the growth prospects of many countries and multiple sectors. One of the sectors that suffered most was the macro-sector of tourism, which is an industry strongly connected with the processes of globalization. The pandemic event showed the vulnerability of tourism systems on the global, national and local levels, generating a scenario characterized by strong uncertainties, unfavourable prospects and widespread fragility. After years in which there has been a significant expansion of the tourism sector, the limitations on the freedom of movement of people and the suspension of many economic activities have strongly affected the operating conditions and economy of tourism companies, with consequent weakening and impoverishment of the territories.

The world scenario has drastically changed, with significant impacts especially in those countries that, like Italy, have always had a strong touristic vocation. The crisis has crossed the entire Italian tourism chain, with very pronounced losses for the activities of travel agencies, tour operators, air transport, trade fair-congress operators, accommodations and restaurants. The suffering was greater in metropolises and cities of art, and more contained in open-air destinations.

The crucial question that, in this critical moment, it is legitimate to ask is: Is there a strategy that can offer some hope for a touristic revival after the pandemic?

After a survey of the main global and national tourist indicators in the pre- and peri- Covid-19 phases, it was considered necessary to analyse the major changes that have occurred on the demand and supply fronts, highlighting the structural changes that could transform the morphology and geography of the Italian tourism system in the medium term. More specifically, the research aims to identify a strategy that allows the generation of new diversified touristic flows for new enhancement of the environmental, historical, artistic and cultural territories, with a specific focus on the Italian destination of the Campania Region.

1.1 The situation: Tourism in the past, present and future

2019 is a year destined to become a watershed date in the history of tourism (and not only there), having created a strong discontinuity between what was previously “normality” and what has been destroyed of this normality. The change is so radical that the current phase has been defined as the

era of the “new normal” (Angeloni 2021), demonstrating the fact that “nothing will be the same again”. Tourism first of all testifies to a strong break with the past.

To document the revolutionary impact of the pandemic on tourism, it is sufficient to compare some data relating to the global and Italian tourism context in the phase before and during the Covid-19 pandemic.

According to the estimates of the United Nations World Tourism Organization (UNWTO), in the pre-Covid-19 phase, that is in 2019, tourism in the world generated 1,460 million international arrivals, registering an average annual growth rate of 3.7%, with international tourism revenues of approximately \$1.480 billion (UNWTO World Tourism Organization 2020a). Furthermore, according to the estimates of the World Tourism & Travel Council (WTTC), the Travel and Tourism macro-sector contributed to generate 10.3% of GDP and 10.4% of employment in the world, with 330 million employed in 2019 (World Travel & Tourism Council 2020a).

This favourable scenario was deeply upset by the recent pandemic, as can be seen from the data of the UNWTO and the WTTC. In 2020 there were 1 billion fewer international tourist arrivals, with a loss of 1.3 trillion dollars in export revenues compared to 2019 (UNWTO World Tourism Organization 2021).

Similarly, it is possible to outline the prospects for Italian tourism in the pre- and peri- Covid-19 era. Based on the surveys of the Italian National Institute of Statistics (ISTAT), in 2019, arrivals in Italian accommodation establishments (hotels and non-hotel) amounted to 131.3 million, made up for 65 million by the arrivals of residents abroad (49.5%) and for 66.3 million by the arrivals of residents in Italy (50.5%) (ISTAT 2020a).

For greater clarity, it is important to provide further details on the articulation of the two origin markets that generated the 2019 presences in Italy. Figure 1 and Figure 2 show, respectively, the main 10 countries and the main 10 Italian regions from which tourists come who, in 2019, contributed to the volumes of international presences (220.6 million) and domestic presences (216 millions). As can be seen, the main country that has fuelled incoming flows in Italy is Germany (with 58.7 million presences, i.e. with a share of 26.6%), followed at a great distance by the United States (7.4 %) and France (6.3%). Instead, the Italian Region of origin that generated the highest

number of domestic presences is Lombardy (with 46.8 million presences, corresponding to 21.6% of the total domestic presences), followed by Lazio (10.1%) and from Veneto (9.6%).

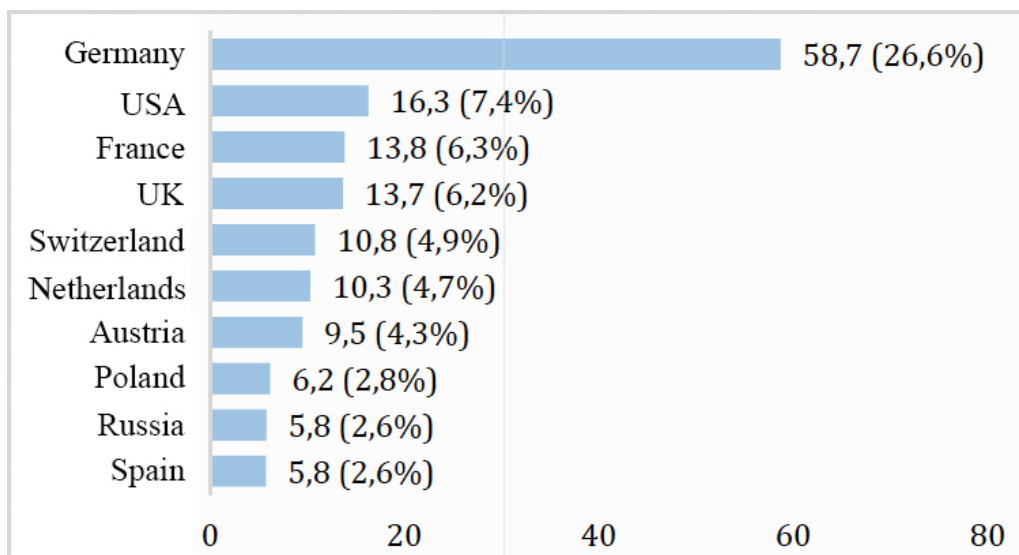


Fig. 1: Top 10 countries of origin for incoming presences in 2019 (millions, percentages)

Source: ISTAT 2020, p.21

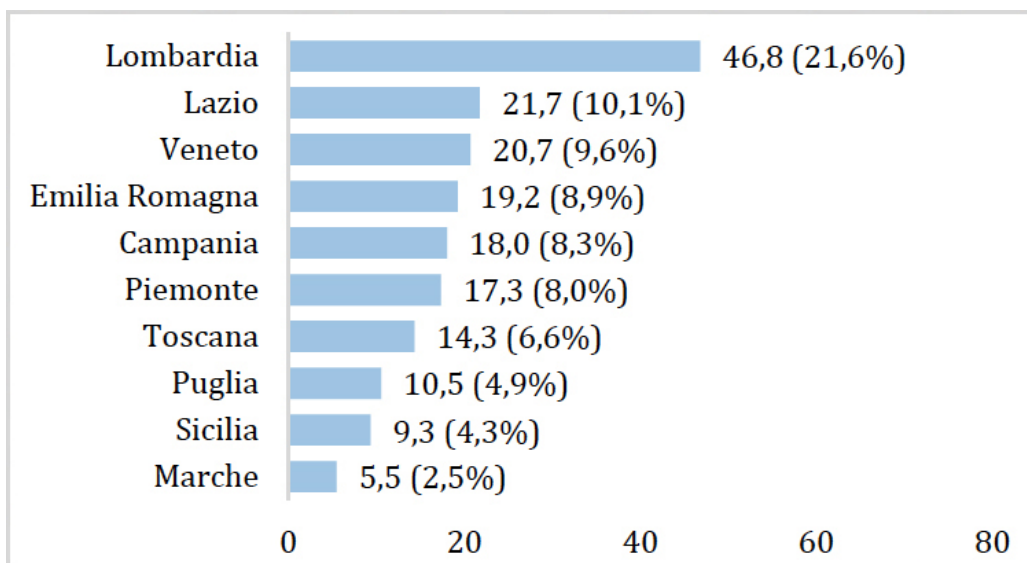


Fig. 2: Top 10 Regions of origin for domestic presences in 2019 (millions, percentages)

Source: ISTAT 2020, p.13

Furthermore, the WTTC estimated that, in 2019, the total contribution of the Travel and Tourism sector to GDP was 13% for Italy, while the contribution to employment was 14.9%, with 3.476 million employed in the sector (World Travel & Tourism Council 2020b). In 2019, revenues for international travel to Italy reached 44.3 billion euros (Banca d'Italia 2020). Finally, again in 2019, Italy ranked fifth in the UNWTO world ranking (UNWTO World Tourism Organization 2020b) for the number of international tourist arrivals (after France, Spain, the United States, China), but sixth

place for the value (in dollars) of income from international tourism (after the United States, Spain, France, Thailand, the United Kingdom).

The Italian performance in tourism has also suffered and will suffer a significant setback due to the pandemic. According to the Research Department of the Italian National Tourism Agency (ENIT), total international and national visitors decreased in 2020, compared to 2019, by almost 57 million (Ufficio Studi ENIT 2020a). In particular, 2020 records a reduction of 40 million international tourists and a decrease of 16 million Italian tourists. Furthermore, in 2020, compared to 2019, total tourist overnight stays are downsized by 186 million, with a contraction in tourist spending of almost 71 billion euros. Finally, the total contribution of the Travel and Tourism sector decreased by 5.8 percentage points (from 13% of GDP in 2019 to 7.2% of GDP in 2020).

It can therefore be agreed that Covid-19 is an unprecedented crisis, especially when compared to other pandemic or extraordinary events such as SARS in 2003 or the economic-financial crisis that exploded in 2008, as highlighted in the research of Angeloni (2012, p. 5).

Pending vaccination coverage for Covid-19, the defence strategy adopted by many governments to contain the contagion, has provided for the introduction of restrictive measures to the freedom of assembly and movement, with lockdown periods more or less extended from a spatial and temporal point of view, and more or less targeted from an economic point of view. The most stringent measures have imposed the suspension of production activities deemed not essential for the life of citizens in the current situation. The Italian tourism industry has been deeply affected by the restrictive measures, since the interpretation of tourism as a discretionary and non-essential activity has prevailed.

Despite the psychological, economic and social inconveniences, the health emergency does not seem to have extinguished the desire to travel of tourists during the summer of 2020, even if it has profoundly changed their attitudes, needs and behaviours. The various surveys, illustrated below, demonstrate a paradigm shift in tourism demand, namely the emergence of a new way of spending the holiday.

Through a survey carried out between 24 and 30 August 2020, the Research Department of ENIT (2020b) photographed the holidays of Italians through interviews with about 4,000 tourists. The survey revealed that 41% of the sample of Italians could not take a vacation in summer 2020, while

59% of respondents took at least one vacation period outside their residence. In 97% of cases, respondents chose Italy as a place for their summer vacation. On average, the stay lasted 7 nights and the spending budget was 850 euros.

If the seaside destination was the favourite destination for tourists also in the summer of 2020, the mountain holiday would have, however, suffered a smaller reduction than in 2019. According to the latest projections of the Ufficio Studi ENIT (2020a), the mountain destinations are the areas that, in terms of travel (both international and domestic), would have recorded a smaller contraction in 2020 (-43%) compared to 2019, while the coastal (-57%) and city (-55%) locations would have recorded major reductions. In 2020, and again compared to 2019, the South would have been slightly less penalized (-50%), if compared to the Regions of the North (-53%) and the Centre (-56%).

Another interesting survey of tourism demand is provided by the Italian National Tourist Research Institute (ISNART) through the Observatory on the Economics of Tourism of the Chambers of Commerce. According to ISNART (2020), the main regions of destination of Italians would have remained substantially unchanged in the summer of 2020. As illustrated in Figure 3, Sicily, Puglia, Campania and Sardinia would have welcomed over 40% of the total of Italian tourists.

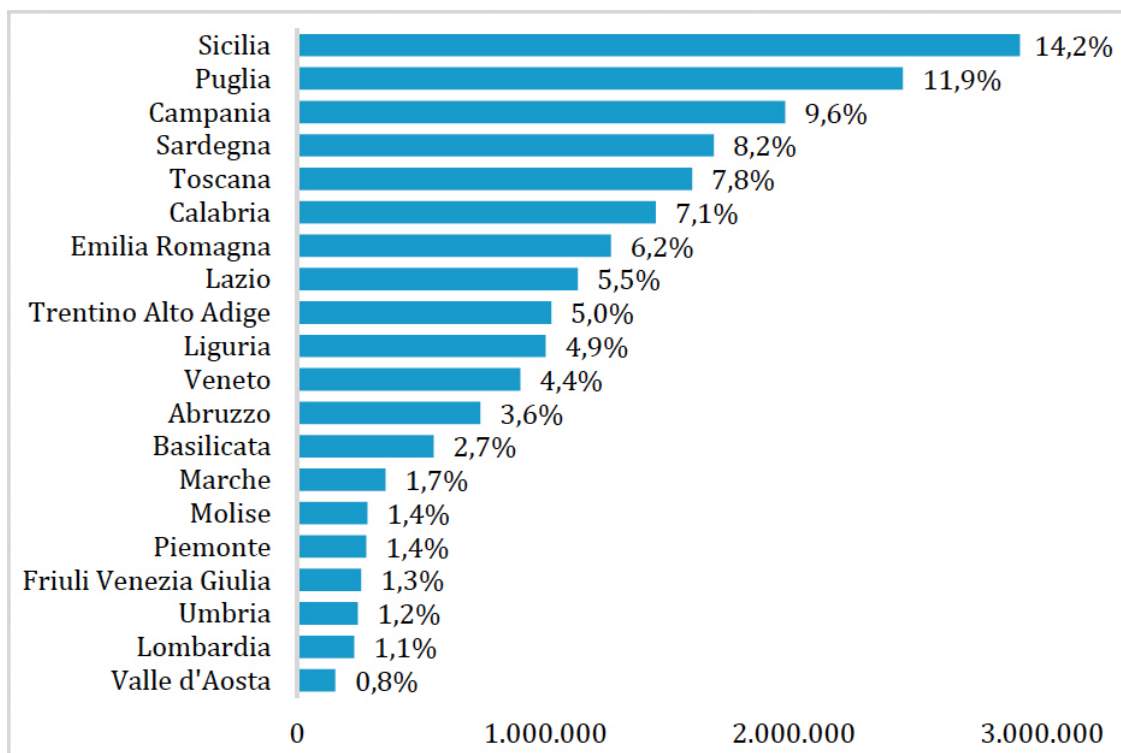


Fig. 3: Italian tourist flows by Region in summer 2020 (percentages)

Source: ISNART 2020, p.42

On the other hand, what has changed significantly is the relative weight of some holiday resorts, as shown in Figure 4. In particular, although Puglia and Campania continue to be the main reference regions for summer tourism, they show a negative balance for 2020, with respectively -10% and -22.5% fewer vacationers compared to the volumes of 2019. Sardinia also shows a negative balance, with -14% of tourists. Among the most significant drops, we note the case of Lombardy which, in the summer of 2020, would have accrued a loss of almost 78% of visitors compared to the numbers of summer 2019.

On the other side, Figure 4 suggests that domestic tourists seem to reward, compared to the past, those geographical areas where the virus has had less circulation, because the guarantees in terms of distancing were greater. This is the case of Molise, Umbria, Abruzzo, Basilicata and Friuli Venezia Giulia, which have seen their tourist attractiveness increase due to the greater isolation and / or environmental integrity of the inland areas. These are mostly regions of modest size from a demographic point of view, but with strong characterizations in territorial, environmental and naturalistic terms.

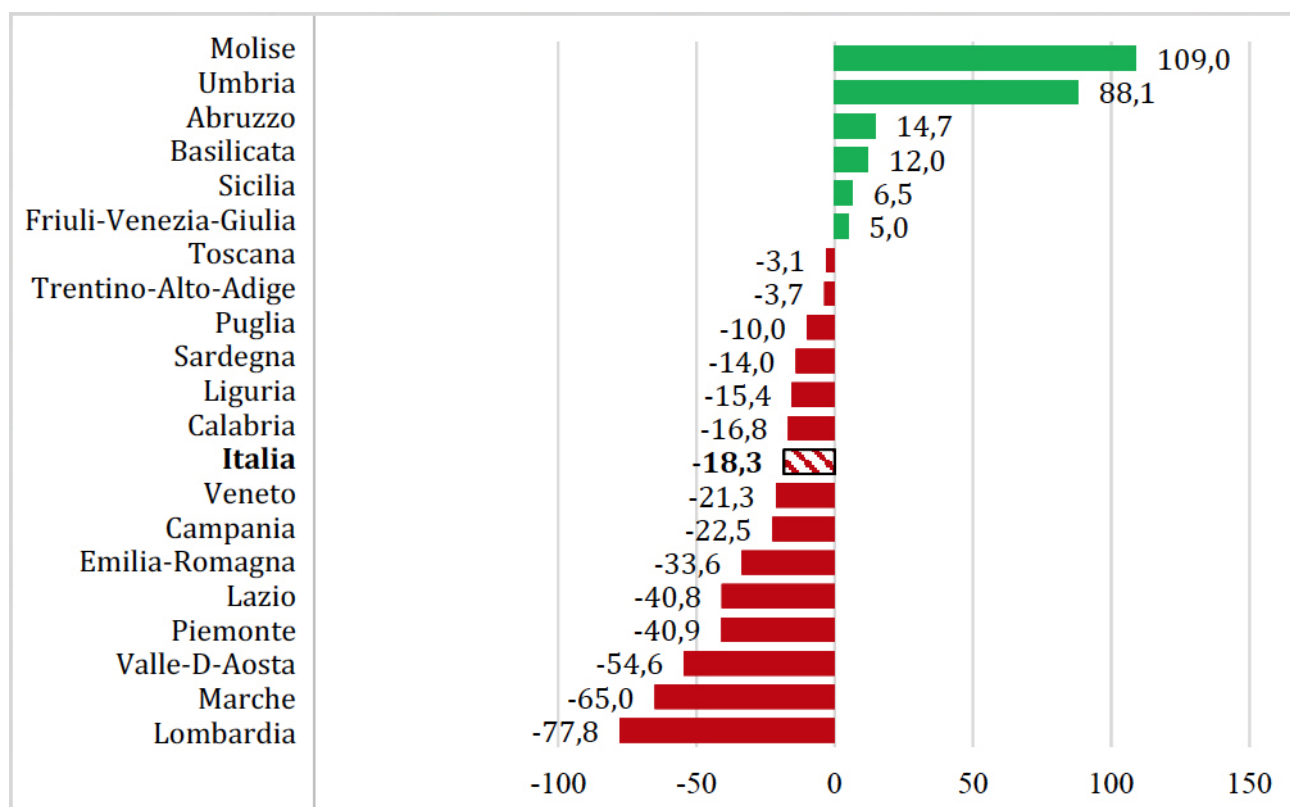


Fig. 4: Italian tourist flows by Region in summer 2020 (% change from 2019)

Source: ISNART 2020, p.15

Other important information on the dynamics of tourism demand is provided by the survey conducted online by the Centro Studi Touring Club Italiano (2020) between 8 and 10 September

2020. The survey involved the Touring community (which includes over 300,000 members) and the questionnaires filled in were over 4,700. 90% of respondents said they had taken at least one vacation between June and early September 2020. In 48% of cases, the issue of health security was the main reason given by those who decided not to take a vacation.

The Touring Club Italiano investigation unequivocally revealed how the way of doing tourism has changed, having been planned in the name of prudence. In particular, the Covid-19 would have changed the way of the vacation for 69% of the respondents. Furthermore, 72% of the sample opted for travel destinations closer to their place of residence, preferring the so-called “Proximity tourism”. But the subjects involved in the survey also adopted other prudential behaviours to limit the risk of contagion. In particular, compared to the past, 67% of the interviewees reduced participation in events or visits to museums; 59% of the participants chose less-known destinations because, presumably, less crowded; 58% of the respondents contained the attendance of bars and restaurants. Finally, 42% of the sample admitted to having downsized the relational component, avoiding making new acquaintances and making friends. This last aspect represents yet another anomaly compared to the classic tourist habits, because the holiday seems to be stripped of that relational component that typically characterizes the visitor’s behaviour, on average inclined to take advantage of travel opportunities to meet new people. Probably, compliance with the rules of distancing and the fear of contagion explain the downsizing of the desires for socialization.

Also, in the Touring Club Italiano survey, it emerged that the vast majority of vacationers chose Italy as a travel destination (94%, against 63% in the 2019 survey), while few opted for Europe (6%, compared to 30% in the 2019 survey). As for the type of experience, the seaside holiday was also the preferred formula in summer 2020 (44%, compared to 42% in 2019). In second place is the mountains, which recorded a strong increase compared to the past (26% in 2020, against the figure of 15% found in the 2019 survey). In 2020, respondents reported greater satisfaction also for the villages and the hinterland (7%, compared to 1% in 2019), and for lake destinations (3%, compared to 1% in 2019). The cities of art were the losers (chosen by 4% of the sample in 2020, compared to 10% in the previous year). Probably the fear of contagion has led to favouring more naturalistic destinations, which offer greater opportunities for carrying out outdoor activities.

As regards the Italian tourist offer, the same considerations previously formulated for the tourist demand apply. Important information can be derived from the analysis of some data for the period, published by ISTAT, as well as from Cerved (2020) estimates.

Figure 5 shows the ranking of services, ordered according to the (positive or negative) trend percentage change of the raw turnover indices of the third quarter of 2020 compared to the third quarter of 2019 (ISTAT 2020b).

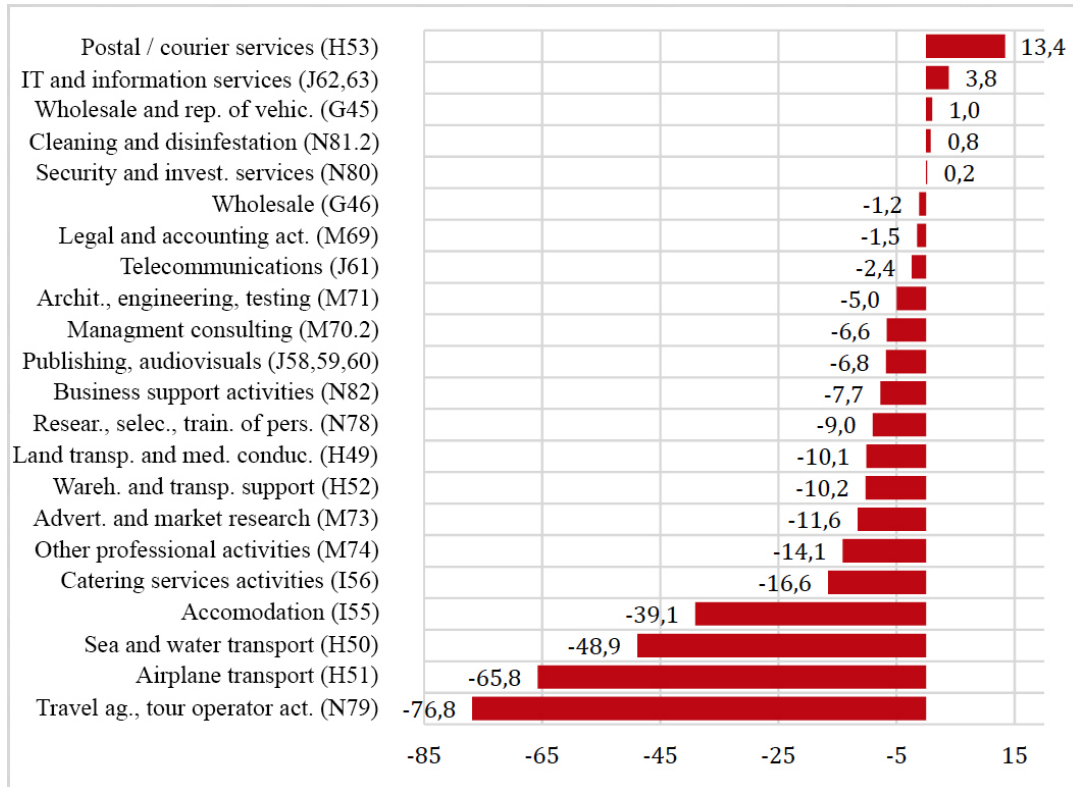


Fig. 5: Turnover from services, ranking of sectors according to trend changes: III quarter 2020, trend percentage changes in raw indices (base 2015 = 100)

Source: ISTAT 2020b, p.4

It is noted that the greatest negative trend percentage change concerned travel agencies and tour operators (-76.8%), air transport (-65.8%), sea and water transport (-48, 9), the structures that offer accommodation (-39.1%) and restaurant services (-16.6%), that is, all those companies that form the core business characteristic of the tourism industry.

However, despite the negative trend for tourism businesses, the estimates of the percentage changes in the third quarter of 2020 were much less serious than the percentage changes in the second quarter of 2020, where the effects of the restrictive measures of the spring lockdown were concentrated.

The stagnant dynamics of the economy for companies in the tourism sector is confirmed by the recent Cerved Report, which is a primary operator in Italy for credit risk analysis, as well as one of

the leading rating agencies in Europe. Cerved (2020) has developed accurate forecasts on the impact of the pandemic for 230 economic sectors. According to these estimates, the revenues of Italian joint-stock companies in 2020 fell, on average, by 13.4% in nominal terms, but with strong sectoral differences.

In particular, the Cerved Report shows that the pandemic would have affected the national economy in an asymmetrical way, saving only a few market niches, mostly dominated by large companies. For corporations, Table 1 captures this impact asymmetry, listing the 10 worst performing sectors and the 10 best performing sectors, based on 2020 revenue estimates versus 2019.

It is easy to ascertain that the sectors most penalized are those of travel agencies and tour operators, air transport companies and hotels, with an average decrease in turnover in 2020 equal to about -50% compared to the values of 2019. But the decrease in revenues intercepts only part of the problem in the formation of the economic result, also negatively influenced by the increase in costs.

Table 1: Revenues 2020/2019: sectors with the greatest decreases and increases in turnover

MAJOR DECREASES IN TURNOVER	MAJOR INCREASES IN TURNOVER
Sectors 2020/2019	Sectors 2020/2019
Travel agencies and tour operators -51,3%	Online trade 23,8%
Air transport -50,8%	Technical and industrial fabrics and textiles 11,3%
Hotels -47,1%	Pharmaceutical raw materials 7,9%
Transport management -46,7%	Pharmaceutical specialties 7,3%
Local public transport -44,2%	Modern food distribution 6,6%
Organization of fairs and conferences -40,0%	Industrial and medical gases 5,2%
Parking management -38,8%	Pasta 4,8%
Non-hotel accommodation facilities -37,9%	Medical apparatus and devices 4,5%
Catering -33,8%	Wholesale pharma and medical 3,4%
Film industry -32,9%	Cleaning products 3,0%

Source: Cerved 2020, p. 26

The economic crisis triggered by the pandemic and the severity of the measures adopted by the various world governments to contain the spread of the infection have no equivalent in recent history. Therefore, faced with such an exceptional phenomenon, every simulation or forecasting exercise suffers a large margin of uncertainty. Despite this uncertainty, some possible scenarios for the future of tourism in Italy can be envisaged.

First, the recovery is expected to be slow, with domestic demand picking up sooner than international demand. In the world panorama, it is believed that tourism demand will take a minimum period of three to five years to return to the pre-Covid-19 situation (Bremner 2020). In Italy, the recovery of domestic travel to the levels of 2019 is expected starting from 2022, while for international ones it will have to wait at least 2023 (Meglioli and Manente 2020).

In the immediate future, domestic tourism should be the main lever for the recovery of tourism in Italy. Not surprisingly, the term 'staycation' is becoming more and more widespread, a term used to designate short-medium-range travel, consumed within national borders. However, it will not be easy to educate tourists to move within the most limited national borders, above all because globalization has accustomed people to great distances, projecting them on an international dimension of travel, perceived as the journey par excellence.

But even the presence of a demand from domestic tourists cannot be taken for granted. Domestic tourist demand, as well as international demand, will be strongly conditioned by the health issue, which will be central in guiding the movements of travellers, directing them where, also for the application of suitable sanitary protocols, the risk of contagion is minimized, if not cleared. Likewise, the needs of social distancing and the ban on gathering will limit, in the short term, the resumption of group travel and trade fair-congress tourism.

More generally, it can be reasonably asserted that tourism, in the short and medium term, will be heavily conditioned by psychological, regulatory and economic factors. As for the psychological aspects, it is very plausible to imagine that the concern about the resurgence of the pandemic could further discourage tourist demand. From a regulatory point of view, it is likely to believe that the repeated measures to restrict mobility and the exercise of economic activities, together with the obligations of compliance with hygienic and sanitary standards, negatively affect the profitability and attractiveness of tourism companies. Finally, as regards the economic aspects, it is realistic to

assume that the lower spending power of travellers and the growing losses of tourism businesses will result in a reduction, respectively, of supply and demand.

Inevitably, therefore, tourism businesses will have to resign themselves to forms of “poorer” tourism, not only because international tourists will be missing, but also because it will be tourism conducted in an individual or family form that will start again first. Tourism will be poorer because the spending power of those nuclei (individuals and families) will be lower, given the slowdown or failure of many economic activities. Tourism will be poorer because the holiday has a voluptuous nature and is, unfortunately, one of the first items that an individual or a family sacrifices, or in any case downsizes, in times of financial hardship.

In fact, the tourist practice depends not only on the “will” - desirability and safety of the destination - but also on the “possibility” - time, income and freedom of movement - of individuals. Therefore, to reactivate the touristic demand, it will not be enough to solve the question of health security, but it will also be necessary to solve the question of the economic security of people who, in the absence of stable sources of income, will not be able to play the role of travellers. In this sense, it is feared that the refreshment measures envisaged by the various governments, in Italy in particular, are too late and quantitatively inadequate to support the incomes of workers and companies in difficulty.

All this, however, does not imply that the tourism market is doomed to inexorable impoverishment. In truth, interesting opportunities open up for travel experiences in lesser-known and open-air locations, and, above all, for forms of sustainable tourism (UNWTO 2013) and slow tourism (Zago 2011). Furthermore, there is room to create new types of tourism, unimaginable or unexplored before Covid-19.

1.2 Towards a new tourism solution

In recent years, before the Covid-19 pandemic, a change in preferences of tourists had already started. They have moved from a “standardized tourism”, consisting of generic components, to a tourism that takes into account the originality of the place, the authenticity and the quality of the elements that characterize it. The factors that brought about the change include the technological progress of transport, the availability of income and new information technologies. The tourist considers the holiday as an opportunity for cultural growth and aims to enter into direct contact with the territory to enjoy its authentic, unique and non-reproducible resources. The attraction towards

territorial identity arises from the curiosity of the tourist to get in touch with different cultures and traditions. Such an experience is characterized by a series of variables: the quality of the resources and the service offered, the respect and protection of the environment, the relationship with the host places and its community. When considering the tourist offerings of a territory it is necessary to take into consideration, in addition to the tangible components (for example the services offered), also the intangible components, that is a series of elements that represent the fundamental nucleus of the territorial product, resulting from the union of traditions, identity and lifestyle. The new requests from today's tourists have led to the addition to the classic attractions of global tourism (such as seaside, mountain and art cities), new attractions such as rural landscapes which, with their resources (natural, historical, cultural, food and wine, crafts, etc.), their characteristics (quality of life, health, well-being, etc.) and their physical proximity to medium and large urban systems, represent ideal areas of consumption for new tourism. The exploitation and enhancement of unexpressed rural resources through tourist activity represent expanding phenomena, required by local and administrative territorial communities in order to regain their territories, trying to preserve their traditional and cultural peculiarities. Tourist activity is seen as the key to economic development at the local level which can live in symbiosis with the environment, creating an opportunity for operators to earn income (Carta 2004). It can be a guiding factor in integrated and sustainable territorial development (Cicerchia 2009), particularly in "fragile countryside" or "nature" spaces (Castelnuovo and Ginzburg 1979). All that in tune with the new perspectives that the pandemic has raised.

Most of the work carried out in the last twenty years on the protection, enhancement and promotion of cultural and landscape heritage in Italy mainly refers to research focused on specific sectors taken individually, such as economic, historical-artistic, management and so on. The most interesting works are certainly those carried out by Throsby (2001), Quattrocioni (2012) and Golinelli (2008), where they analyse issues especially related to cultural and socio-economic aspects, with a deep approach to historical, artistic and landscape topics related to the world of tourism. All these studies lack a fundamental element to have a complete picture of the strategies to be applied for the development of new touristic flows: the potential of interdisciplinary studies. The advantage of an interdisciplinary approach allows to have a wider view on what the impacts and strengths of each individual discipline may have. Recent research has adopted this type of approach with many advantages.

It is the example of interdisciplinary research applied to the case of Mevale di Visso for the enhancement of cultural heritage in peripheral sites (Capriotti and Cerquetti 2016). This research proposes an analysis model, both descriptive and normative, which examines three categories of value identified in a previous research (Montella 2009): These include a *presentation value*, of an informative nature, inherent to the historical/cultural value and possibly artistic implicit in the heritage; a *landscape value*, extended to the context, inherent to cognitive and information services aimed at preventive and planned conservation policies; and a *production value*, of a commercial nature, concerning the externalities generated by the management of cultural heritage. This model refers to the possibility of deriving from the management of cultural heritage and, therefore, from products/services derived from it, utilities of different types, among which there is the possibility of mutual enhancement, insofar as the explication of the value of presentation increases the landscape value (Badiali and Piacente 2012) and thus the production value and vice versa. A very valid research in the development of economic-managerial and historical-artistic models which, however, presents gaps, in my opinion, on all data management and geo-spatial analyses.

Much closer to my research, at least conceptually, is the work of Meini, Di Felice and Nocera (2017), where there is a strong implementation of Geographic Information Systems, without neglecting the more theoretical aspects. With the main objective of mapping potential resources and identifying clusters, or significant aggregations, the research aims to suggest strategic options in terms of tourism-territorial enhancement. The investigation methodology for the elaboration of a reasoned framework of supply-demand meeting regards two phases: desk analysis for the socio-demographic and economic classification of the municipalities in the context of the provinces of Campobasso, Isernia and Chieti and for the analysis of the current tourist demand; field survey for the detailed analysis of the tourist offer and the degree of hospitality; analysis of world and national tourism trends with particular attention to the issues identified during the inspection and the potential for expansion of tourism services in the rural area. The final result is the creation of ad-hoc tourist routes shaped for the development of tourism in rural areas. This research, although similar to my work, differs in the substantial focus that arises on the creation of tourist routes, while in my case it focuses above all on the cultural and landscape heritage, with all the intrinsic value they have, for their enhancement and promotion.

While there have been works in the past, which have as their objective the development of modern strategies for the creation of new touristic flows, none of these have had a methodological approach such as the present research.

1.3 The core concept of the research

The core concept of the thesis is to work on GIS technologies to elaborate a methodology for locating cultural heritage and environmental sites, which could be worth invest in, in order to develop new touristic flows in Campania Region (Italy) after Covid-19 pandemic. The project aims to answer the following questions:

- Criteria selection process is one of the most important steps for collecting the needed data: which are the most relevant?
- Which are the sites suitable to generate new touristic flows?
- Where are the selected sites located?
- How is the spatial distribution of cultural heritage sites within the Campania region?
- On what type of terrain do they fall (land cover)?

1.4 The study area

The selected study area covers the whole Campania Region in Italy. Campania is a region of southern Italy, which its coasts on the west side are bordered by the Tyrrhenian Sea and the inner side on the east is delimited by the Appennini mountain chain (see Figure 6). Campania is the second most populated region of Italy as well as the richest one in terms of archaeological material after Lazio and Sicily. This region is certainly one of the most morphologically varied regions of the peninsula and for this reason, as well as for its history, is able to offer different types of tourism.

The selected area meets the search criteria to conduct an in-depth study on the identification of potential cultural and naturalistic attractions for the development of new touristic flows. In Campania, in fact, there is a very high concentration of both cultural and naturalistic assets, and the most important of these are known worldwide. Suffice it to mention the ancient city of Pompeii or the Vesuvius volcano. The latter two are so important and famous that practically all tourism in Campania is associated with these renowned places.

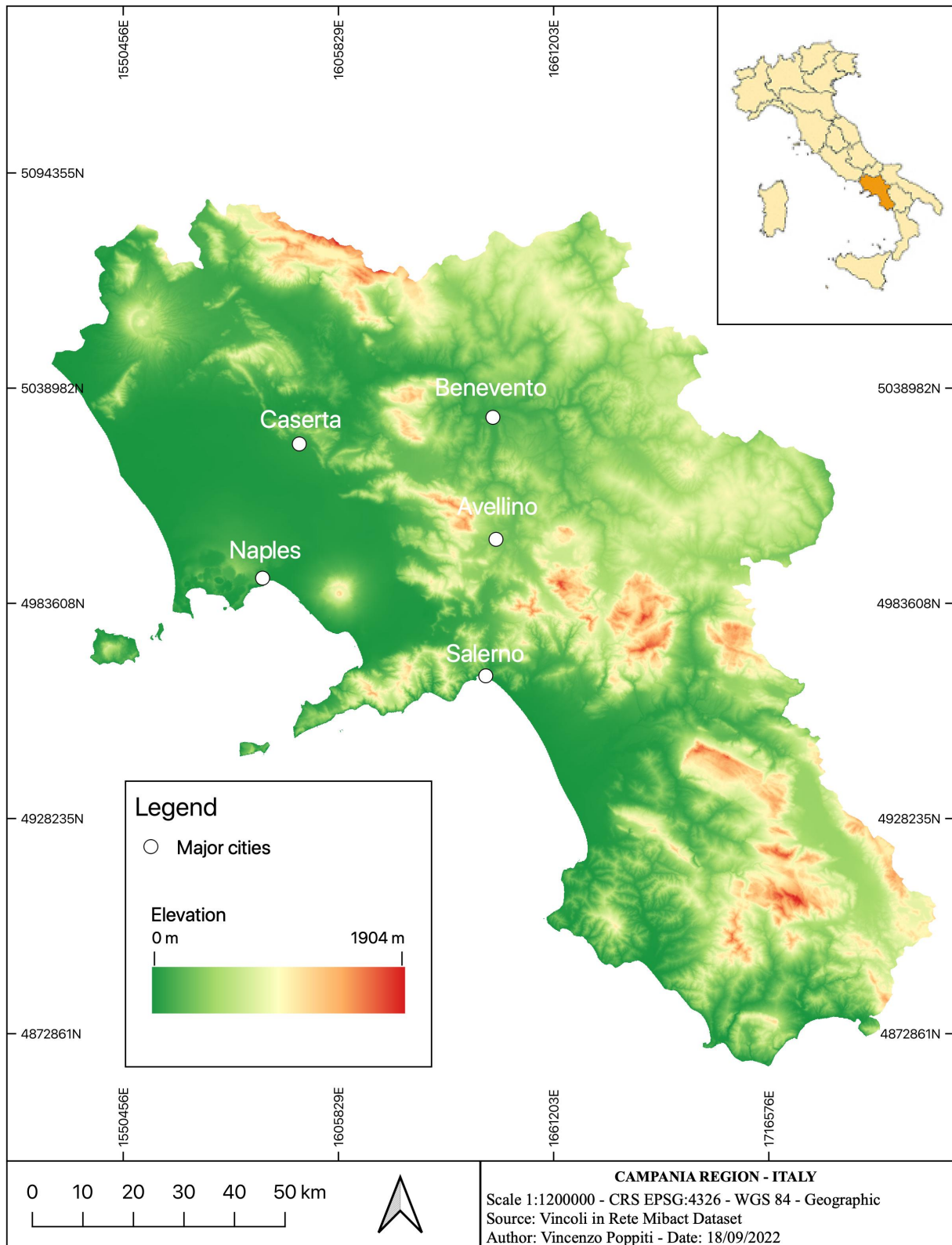


Fig. 6: The study area covers the whole Campania Region.

Pompeii, with its 66 hectares of which about 50 have been excavated (including suburban areas), is a unique set of civil and private buildings, monuments, sculptures, paintings and mosaics of such

importance for the history of archaeology and for antiquity to be recognized as a World Heritage Site by UNESCO (see Figure 7).

The ash and lapilli that buried the city following the eruption of Vesuvius in 79 A.D. have in fact allowed an exceptional conservation so that now it is possible to have a vivid image of the organization of the Roman cities, as well as of the daily life of its inhabitants. The ancient city stands on a plateau to



Fig. 7: View of a road within Pompeii site

Source: www.rometoolkit.com

control the Sarno river valley, at the mouth of which was an active port.

The visitor can enter today by

accessing one of the ancient doors, which were located along the walls, walking along its ancient streets along which it is possible to visit modest and rich houses, with their own decorative wall and floor structures, shops, the Court with its spaces and public buildings, sacred areas, thermal complexes and buildings for shows in the theatre district and in the amphitheatre. Furthermore, along the access roads to the ancient city it is possible to observe, in the four necropolises that are placed at the exit of the urban gates, monumental tombs of different types, while outside the excavation area visit some of the extra-urban residences that stood in the whole Pompeian countryside, first of all the Villa of the Mysteries. The information about the origins of the inhabited area, probably Etruscan, is uncertain and only thanks to the archaeological investigations was it possible to identify the most ancient testimonies, which date from the end of the seventh and the first half of the sixth century BC. Only in the archaeological excavations of Pompeii, there are about 4 million visitors every year (source <http://pompeiiisites.org/parco-archeologico-di-pompei/dati-visitatori/>).

The other major tourist attraction is Vesuvius. The volcano is located less than 12 km south-east of the city of Naples and about 10 km from Pompeii, in an area populated since ancient times (see Figure 8). This allowed to collect numerous testimonies on its activity, making it one of the best-known volcanoes in the world. The most famous eruption is that of 79 AD which destroyed Pompeii, Herculaneum and Stabia. The Somma-Vesuvio volcanic complex is composed of an older

cone, the Somma, characterized by a caldera, and by a younger cone, Vesuvius, which grew inside the caldera after the eruption of Pompeii in 79 AD. Since 1944, the year of its last eruption, the volcano is in a state of quiescence characterized only by fumarolic activity and low seismicity. There are no precursor phenomena indicative of a possible short-term recovery of the eruptive activity. Vesuvius is monitored



Fig. 8: View of the gulf of Naples with the Vesuvius volcano on the background

Source: www.ecampania.it

24 hours a day by the monitoring network of the Vesuvian Observatory, the section of Naples of the National Institute of Geophysics and Volcanology (INGV). The amount of touristic flow at the Vesuvius national park is estimated to be somewhere around 700,000 annual visits (source <https://www.parconazionaledelvesuvio.it/presenze-al-crateredel-vesuvio/>).

Like these two examples above, there are many other cultural and naturalistic sites, slightly less renowned, but which attract as many visitors throughout the year. On the other hand, however, there are many minor sites that are completely hidden by these great sites but which have a great cultural and naturalistic value and therefore have an intrinsic potential to be enhanced. The aim of the research is to identify these new touristic attractions for the development of new flows. The study area has many sites suitable for this purpose. To give an example, a very important monument present in the Campania region but almost entirely without touristic flow is the Grotto of San Michele Arcangelo.

The Grotto of San Michele Arcangelo is a natural cavity located on the western side of Monte Raione in the municipality of Olevano sul Tusciano in Campania, where a 9th century religious complex is located inside (see Figure 9). In the province of Salerno there are 8 caves dedicated to San Michele, but the area of Olevano sul Tusciano is one of the most characteristic since seven churches were built in the recesses of the rock. They all date back to the 9th



Fig. 9: Chapels inside the Grotto of San Michele Arcangelo

Source: @Francesco Raffaele

century and many of them contain beautiful frescoes. The first news relating to the sanctuary dates back to the decade 860/870. The cave has a perhaps unique peculiarity: it is not a cave whose walls, smoothed or plastered, have been painted, but a space within which completely independent architectures have been created and which, refusing the natural protection offered by the vault, are completed by their roof or dome cover. It contains a basilica and six chapels, with numerous and beautiful Byzantine style frescoes. This monumental complex which presents both artistic/architectural and naturalistic beauties, is well known in academia, among researchers and among art historians; it is present in many books and university articles. To underline the importance of this site is the provision of 1996 in which the World Monument Funds, a private non-profit organization that deals with the preservation of the artistic heritage in the world, inserted the Grotto of San Michele, for its particular beauty and wealth, in a special ranking of the 100 most important monuments in the world “at risk and to be saved” (<https://www.wmf.org/project/grottoes-san-michele>). However, this cultural and environmental asset remains roughly unknown (for a number of reasons which will then be analysed in this research) to mass tourism. And this is a perfect example of how a site of great cultural and/or environmental interest is not appreciated for its great potential, and the Campania region is dotted with cultural and environmental heritage like this. This research aims to identify them and develop new touristic flows towards these sites.

2 Data and methods

2.1 Data description

The territorial analysis conducted in this research was, first of all, meant to be oriented towards the creation of thematic maps of real and potential resources, to be integrated with a set of services suitable for the definition of attractors in the internal areas of the Campania region. This mapping, relating to cultural and landscape heritage, concerned a very complex first phase of data acquisition, which considered a variety of primary and secondary sources, to which precision and adequacy site inspections was necessary, also according to the acquisition of resources in GIS environment and the definition of attractors. Unfortunately, this phase that implied field verification, was not possible to realize for reasons related to Covid-19 restrictions that did not allow access to places on the spot. In any case, through the evaluation of the specificities that persist in each municipality, the vocations and potential of the entire area were identified, in order to build hypotheses of potential sites for the development of new touristic flows.

At present, the research focus is mainly on datasets obtainable via the web. All the consulted data came from the database of the Ministry for Cultural Heritage and Activities and for Tourism, also known by the acronym MiBACT. The MiBACT is the dicastery of the Government of the Italian Republic in charge of the protection of culture, entertainment, and the conservation of the artistic and cultural heritage and landscape. The database is developed within the ‘Vincoli in Rete’ project. The project, based on the IT applications existing in the MiBACT, allows access for consultation and management of the acts of protection of cultural heritage, starting from the architectural and archaeological heritage to continue with the landscape heritage, to authorized users and different types of professionals. The data necessary for the implementation of the ‘Vincoli in Rete’ project are present today in the superintendencies, in the regional departments and, centrally, within the following databases:

- the computerized database containing all the binding decrees on real estate issued between 1909 and 2003 (ex leges 364/1909, 1089/1939, 490/1999) at the Higher Institute for Conservation and Restoration;
- the Information System for the Assets Protected at the Directorate General for Landscape, Fine Arts, Architecture and Contemporary Art of MiBACT;
- the database called SITAP at the Directorate General for Landscape, Fine Arts, Architecture and Contemporary Art of MiBACT.

The data entered in the 'Vincoli in Rete' (VIR) system are obtained through the interoperability flows between the two information systems and SIGECweb, the general information system of the Central Institute for Catalog and Documentation.

Given the disparity in the sources of acquisition, it is emphasized that:

- the data contained in the measures entered in the system may be out-of-date and/or being modified on the consultation date.
- The system is subject to constant updates for the insertion of data relating to both procedures concluded, but not yet entered in the computerized databases, either in progress or future, therefore the data present in the system are not exhaustive of all the assets present in the Italian territory.
- The data in the system do not include any declarations of cultural interest for landscape protection or urban planning measures also deriving from special and/or regional laws, which are not in any case headed by the Ministry for Cultural Heritage and Activities.

For the acquisition of data, the WebGIS 'Carta del Rischio' was also consulted. The 'Carta del Rischio' is a territorial information system of scientific and administrative support to state and territorial bodies responsible for the protection of cultural heritage. 'Carta del Rischio' is also an integral part of the 'Vincoli in Rete' project, which is based on the IT applications existing in the MiBACT, allows access to authorized users and different types of professionals, in consultation and management of protection documents of cultural heritage starting from the architectural and archaeological heritage to continue with the landscape heritage. It is a set of databases (GIS) that documents the vulnerability of the monumental and archaeological heritage distributed in historic cities and in the Italian territory in relation to the main phenomena of natural risk (earthquakes, landslides, floods, meteorological and climatic conditions, pollution) and anthropic (thefts, fires, tourist abuse). The purpose of the 'Carta del Rischio' is to define a planned policy of conservative, maintenance and restoration interventions, which takes into account the economic resources available in relation to the needs of prevention and intervention in museums, churches, historic buildings and in archaeological areas (Alberti 2005).

The datasets present in these databases can be consulted and downloaded in KML, PDF, CSV and XML formats. Inside there are all the cultural and landscape heritage sites of interest for this research. Each site has coordinates, an identification code, denomination, type of property, location, competent body, scheduling body, legal condition.

The final dataset on which the analyses were carried out consisted of 9222 records for cultural and landscape heritage sites in Campania region.

2.2 Applied methodology

For this research work, a particular information system was created which represents a useful and indispensable platform for the management of all data relating to the environmental and cultural aspects of the territory examined. The implementation of these data in the geodatabase allowed to carry out specific thematic and spatial analyses that lead to the identification of new sites of cultural and environmental interest according to criteria defined starting from a plurality of variables.

The first part of the work involved identifying all the entities that describe the reality examined. They are represented by all the real resources of the territory such as physical components, accessibility, touristic affluence, historic and artistic value of the cultural heritage. The choice was made with the aim of creating a tool that allows to study in a systematic and integrated way the potential capacity for tourist attraction and the development of entrepreneurial initiatives in this direction.

Studying and knowing the relationships between territory, culture and environment involves analysing and processing very heterogeneous data, and GIS offer adequate functions for their acquisition and management. The realization and structure of the geodatabase was optimized to obtain an exhaustive platform for subsequent territorial analyses. Fundamental datasets were identified within which the different data were structured, thus highlighting the corresponding existing relationships. Therefore, there were data relating to the tourist offer services, the environmental and cultural heritage, economic activities and services in general, the nature of the land and the infrastructures. The advantage of creating a relational data structure lies in the fact that spatial analysis operations offer greater potential and thereby improve the processes of the decision-making system. By defining datasets, it is possible to make explicit a series of rules and relationships that actually exist between objects in reality. It is possible to establish criteria for data acquisition relating to fields and for all classes of objects there is a single reference system. The data structure also allowed to detect real and potential relationships between the various municipalities of the study area, highlighting the weight of each of them within the framework of resources.

The main purpose of the geodatabase is to make use of a tool in which all the data representing the existing assets are specifically integrated in order to put them in the system, making potentialities that have not yet emerged appear and make them all interact based on local economies. The analysis of the real and potential tourist offer required a long search for documents. The different material and non-material resources of the territory were identified and inserted in the data model as well as the main properties that characterize them. All material entities were georeferenced according to their actual location, while non-material ones - which refer to intangible assets - were geolocated in the centroid of the reference municipality or prevalence area. For the potential tourist demand, different segments were considered (importance of the site, tourist turnout, reachability, etc.).

To each resource was assigned a value that represents a differentiated level of attractiveness, based on the weights assigned to the different criteria. Thanks to the data structure created, it was possible to perform several series of thematic and spatial analyses in a systematic and integrated way in order to identify those little-known and little valued sites that represent great potential for new tourist flows. The analyses mainly included the common queries, i.e. selections of the objects contained in the thematic class analysed or on different classes and with different conditions, proximity analysis, overlapping and analysis with combinations of generalization functions.

The main methodological phases can be summarized as follows:

- Territory classification;
- Analysing all cultural heritages and environmental sites within the territory;
- Acquire information regarding their historical-artistic value and the touristic affluence;
- Network analysis: accessibility of the sites from urban areas and road connections;
- Weighing every site and give a score on the base of their potential to generate new touristic flows;
- Weighted overlay analysis;
- Improve tourist affluence for the selected sites;

2.3 Criteria selection and getting the data ready for the analyses

As a first step, the files with all information on the Cultural Heritage sites of Campania Region were downloaded from the public database of “Vincoli in Rete”. There were two files, a .csv with

all the info on the sites, and a .kml with the coordinates (Fig. 10). See Appendix 7.2.1 for a step-by-step description of the analysis.

In order to carry out the analyses, five factors were selected (see next paragraphs for the selection process), which would have an impact in choosing the best suitable sites. These factors were identified by consulting papers strictly related to tourism management and destination competitiveness. The works of Enright and Newton (2004), Dupeyras and MacCallum (2013) and Crouch (2011), highlighted all the indicators for measuring competitiveness and determine attributes for destination competitiveness in tourism. In these researches, the most important factors acknowledged by the authors were: the cultural heritage value, the tourism image, the tourist tradition, the diversification of the offer, the quality (perceived as satisfaction of the services received given a certain price level), accessibility (in terms of distance, frequency and direct connections with the places of origin of tourist flows), the widespread presence of tourist infrastructures and, finally, safety.

However, in the article of Pezzano et al. (2014), which proposes an application of a practical model (although it does not imply the weighted overlay system) for assessing the competitiveness of regions as tourist destinations; the ‘distance’, in a minor way, and the ‘artistic value of a cultural

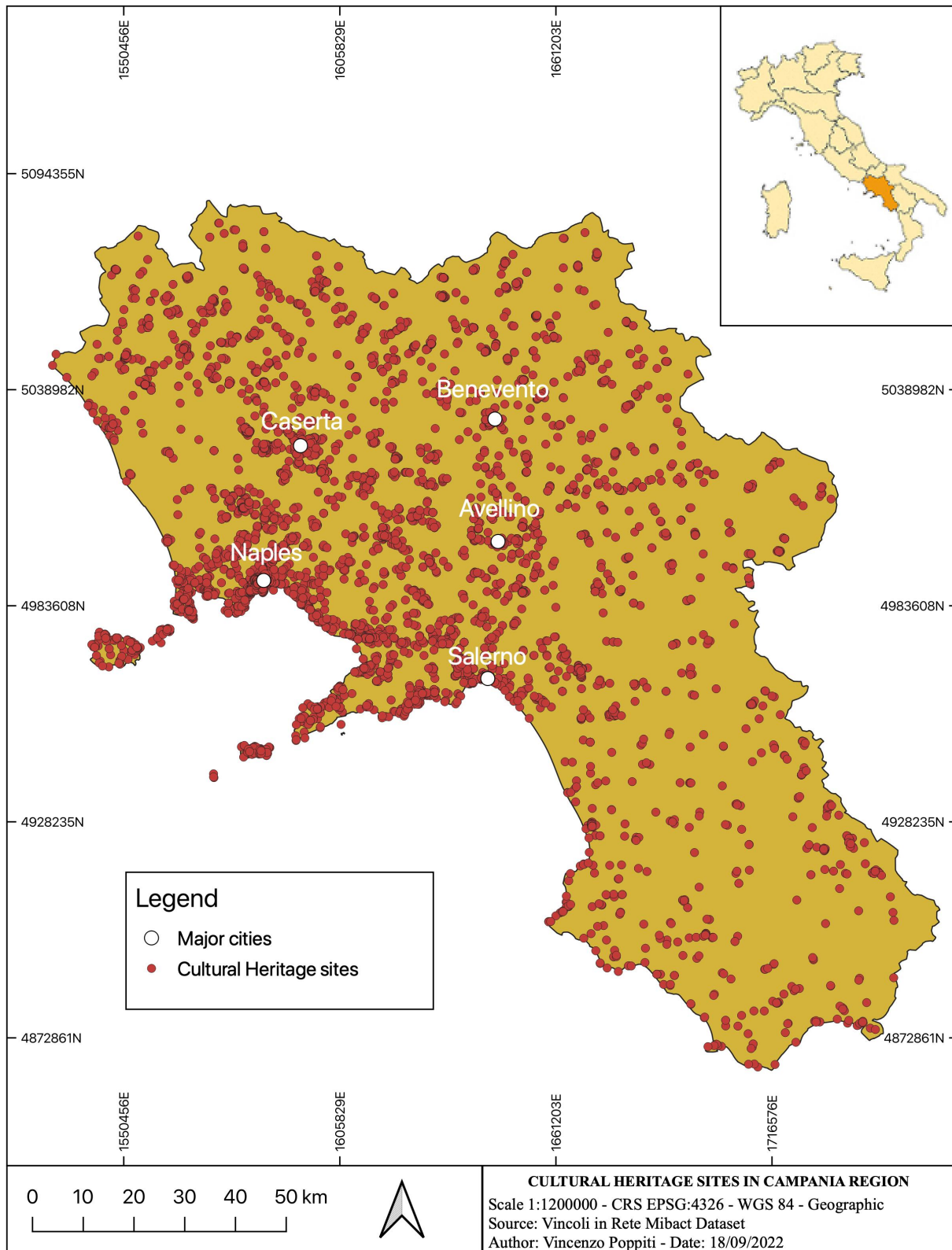


Fig. 10: Cultural Heritage sites in Campania Region

heritage’, with a major impact, are emphasized as rule factors. Most of all, the ‘touristic presence’ is seen as a predominant indicator of the “health” of a touristic destination. In addition, the two works

of Canova and Pezzano (2012) and Monteduro and Hinna (2007) propose a similar approach and the results of their researches have many aspects in common. Based on these evidences, the following factors were selected as suitable for the aim of this research:

- 1) The Accessibility (in terms of distance to reach a cultural heritage site)
- 2) The historical and artistic value of the cultural heritage
- 3) The touristic flow

As found in the study of Lucarno (2005) and Vallone & Veglio (2014), the first two factors have a fine, but very significant difference, between them.

The ‘distance’ can be seen either from a site to its closest city centre, or from a site to its closest accessible road. The difference is that although a site is close to a city centre, thus near facilities, hotels, markets, public transportations, etc., yet it can be far from the closest accessible road and difficult to reach. Meanwhile, a site quite far from a city centre, and therefore far from all the advantages listed above, is still easily accessible because the road that leads to it, ends just at its gates (Lucarno 2005). A good example to understand this difference is the case of two important cultural heritage sites in the town of Olevano sul Tusciano. In this town there is the Grotto of San Michele Arcangelo (mentioned above, see Fig. 9) and the Castle of Olevano. The first site is quite far from the city centre but it takes only 20 minutes by car to get there; the second is relatively close to the city centre. However, in the first case the road ends very close to the entrance to the site, while in the second case there is quite a long trekking path (500m) to undertake after leaving the closest road, in order to reach the site. Thus, the first site is more accessible as compared to the second one. Someone could argue that finding the distance of a site close to the first accessible road would be enough to evaluate the distance advantage. However, there is no disagreement to proving that would be better to get out of an hotel and visit the chosen destination (100m to the closest road) right next to the accommodation, rather than hiring a car or take public transport and travel some kilometres to reach the destination (1m to the closest road). Therefore, being close to a city centre is not always synonymous of being close to the advantages that an urban area could offer. On the other hand, being far from a city centre, does not necessarily mean to be out of reach in terms of distance advantage. In this way, the factor ‘distance’ has been split in ‘the distance between the site and the closest road’ and in ‘the distance between the site and the closest city centre’, as shown in the next chapters.

Regarding the ‘historical and artistic value of the cultural heritage’ factor, there is a valuable consideration to point out. As observed in the work of Vallone & Veglio (2014), a site could belong to a type of cultural heritage that for its nature would not be so valuable for tourists. In general, a silo, a well, a farm or a road, just to mention few, would not be of high interest. So, giving a score to the site on the base of their typology is very indicative of the importance of it and would limit the selection of sites suitable for our aims. A cathedral, a castle and an acropolis would always be more important than a quarry, a farmstead or an oratory. However, there may be some cultural heritages that, although they belong to a type of sites not so important, they could be exceptionally interesting. For example, an old farm, in general, would not be so fascinating, but what if it is a farm where someone very famous was born in, or it was a place of an important historical fact? On the other side, there are, for example, old churches (like hundreds in Campania region) with no particular value. Therefore, taking into account these considerations, the factor ‘historical and artistic value of the cultural heritage’ has been split in ‘the historical and artistic value of the type of cultural heritage’ and ‘the historical and artistic value of each single site’.

In light of these observations, the following factors were selected as suitable for the aim of this research:

- 1) The distance between the site and the closest road
- 2) The distance between the site and the closest city centre
- 3) The historical and artistic value of the type of cultural heritage
- 4) The historical and artistic value of each single site
- 5) The touristic flow for each single site

These five factors represent what we are really looking for; sites that are not well known but have a high historical and artistic value. Weighing these elements will allow us to select the right sites over a database of 9222 records. Later on, we will see how each of these factors have been given a weight (which one is more “influential” or “important”) for the final analysis. There are other factors that could have been taken in consideration such as the facilities nearby the sites, accommodations, public transports, the preservation of the cultural heritages (the state of decay; presence of restauration in act; environmental risk), and so on. However, contemplating the use of other factors would impact on the time spending on carrying out the research, which may be considered for future development of this study.

2.4 Calculating the distance from a site to the closest road

According to Hooper (2015), distance is a key element, and his work *'A destination too far? Modelling destination accessibility and distance decay in tourism'* shows the effects of distance on tourism. He describes what is called 'distance decay' and how this phenomenon works within this field. Distance decay is a concept developed in Geography and the basic theory behind it states that when the distance increases, the interaction between objects decreases (McKercher et al. 2008). This phenomenon can be observed in tourism too, and the statement of Hooper (2015) synthesizes it well: *"The Distance Decay phenomena plays a large part in a tourist's decision, weighing up destination attractiveness, it's competitiveness and 'pull' factors, and the factors of distance such as travel time and money"*. Figure 11 shows how interaction decrease as distance increase.

The factor we are working on 'distance from a site to the closest road' is affected by the distance decay as much as in other fields. Some studies have found that the more the distance increases, the less tourists are willing to walk to the destination site (Larsen et al. 2010). Figure 11 shows how walking trips for leisure constantly drop from 0 kilometres to 4 kilometres.

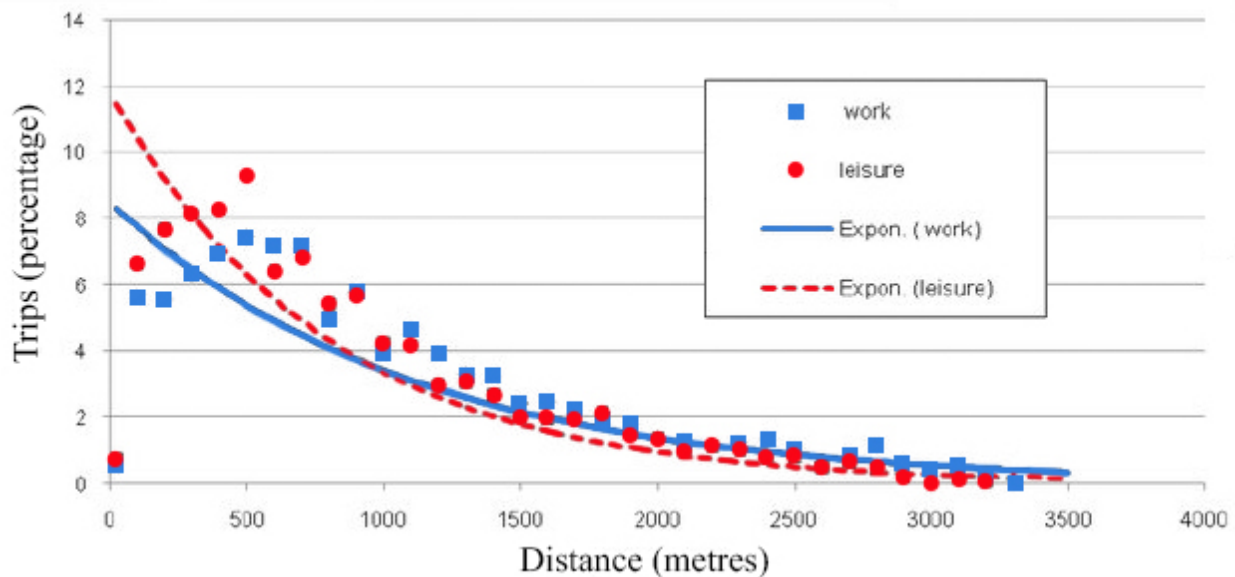


Fig. 11: Distance decay curves for walking trips

Source: Larsen et al., 2010.

From the research of Larsen et al. (2010), it has also been deduced the distances for this analysis, which are set with a range that goes from 0 km to 4 km and beyond, and are split in 9 segments with an interval of 500m. See Appendix 7.2.2 for a step-by-step description of the analysis.

In order to have values that can be used for the final weighted analysis, the distances have to be set within ranges with output values from '1' to '9' where '1' is considered a low score (it means that the site is far from the closest road), and '9' is actually a high score (the site is very close to the nearest road). This is how the ranges have been set in the column 'dist_road':

From 0m to 500m = 9

From 500m to 1000m = 8

From 1000m to 1500m = 7

From 1500m to 2000m = 6

From 2000m to 2500m = 5

From 2500m to 3000m = 4

From 3000m to 3500m = 3

From 3500m to 4000m = 2

Greater than 4000m = 1

These new scores will be written in a new field: 'dist_rd_sc' (which stands for 'distance road score'). See Appendix 7.2.2 for detailed query code.

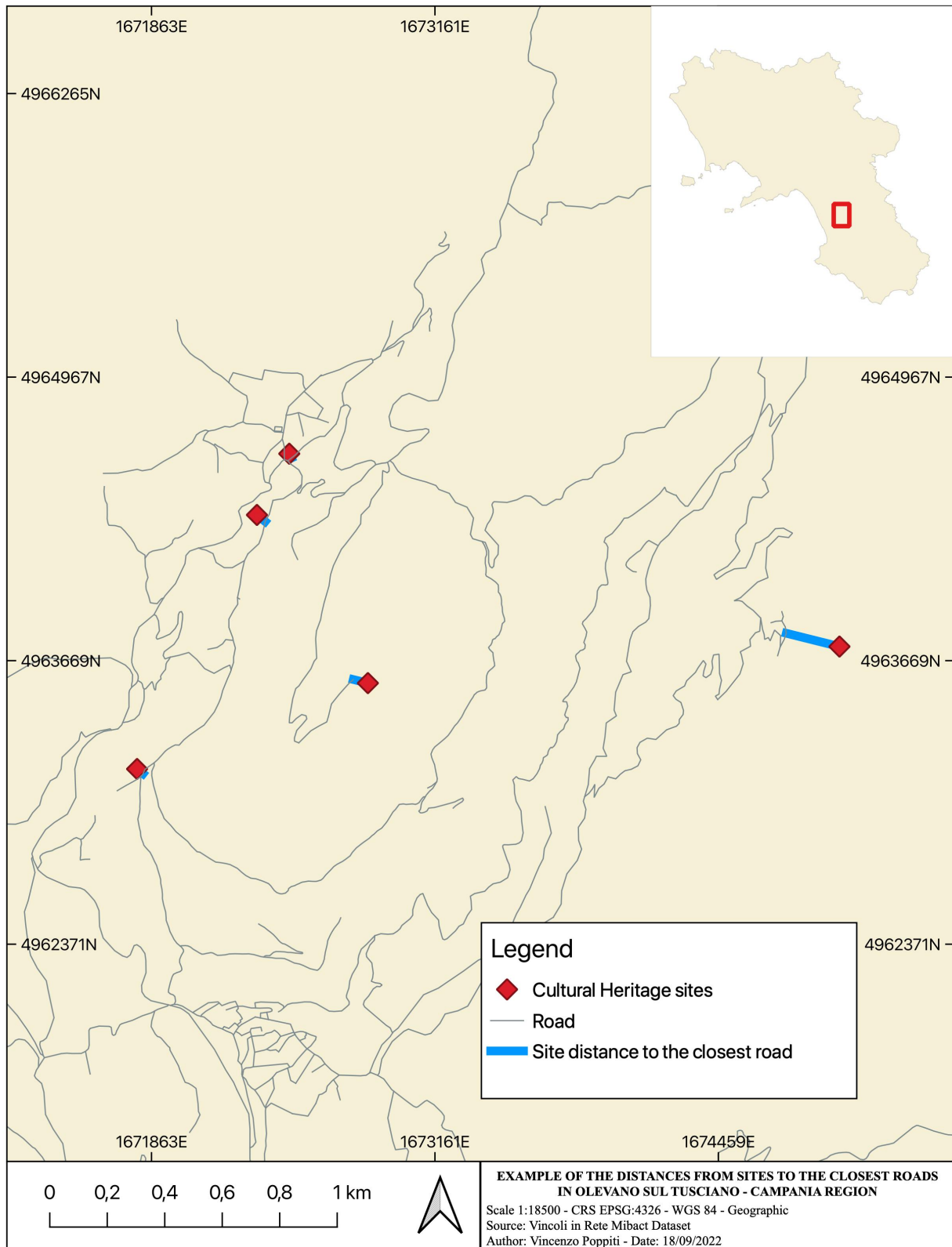


Fig. 12: An example of the distances from sites to the closest roads in Olevano sul Tusciano city.

2.5 Calculating the distance from a site to the closest city centre

The distances used for this factor are also obtained from the work of Larsen et al. (2010) and they show how trips for leisure done by vehicles constantly drop from 0 kilometres to 20 kilometres (see figure 13).

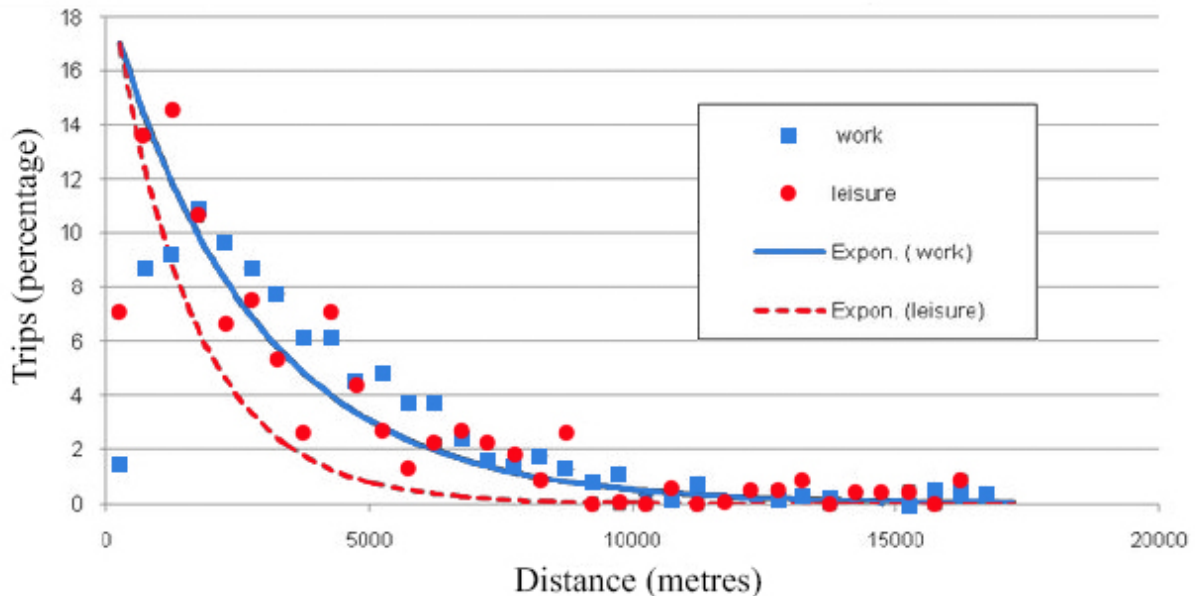


Fig. 13: Distance decay curves for trips by vehicles

Source: Larsen et al., 2010.

The distances for this analysis are set with a range that goes from 0 km to 20 km and beyond, and are split in 5 segments with an interval of 5 km. See Appendix 7.2.3 for a step-by-step description of the analysis. The result is a shape file with all the distances in metres from each Cultural Heritage site to its nearest city centre. In order to have values that can be used for the final weighted analysis, the distances have to be set within ranges with output values from '1' to '5' where '1' is considered a low score (it means that the site is far from the city centre), and '5' is actually a high score (the site is very close to the city centre). This is how the ranges have been set in the column 'dist_place':

From 0km to 5km = 5

From 5km to 10km = 4

From 10km to 15km = 3

From 15km to 20km = 2

Greater than 20km = 1

These new scores will be written in a new field: 'dist_pl_sc' (which stands for 'distance place score'). See Appendix 7.2.3 for detailed query code.

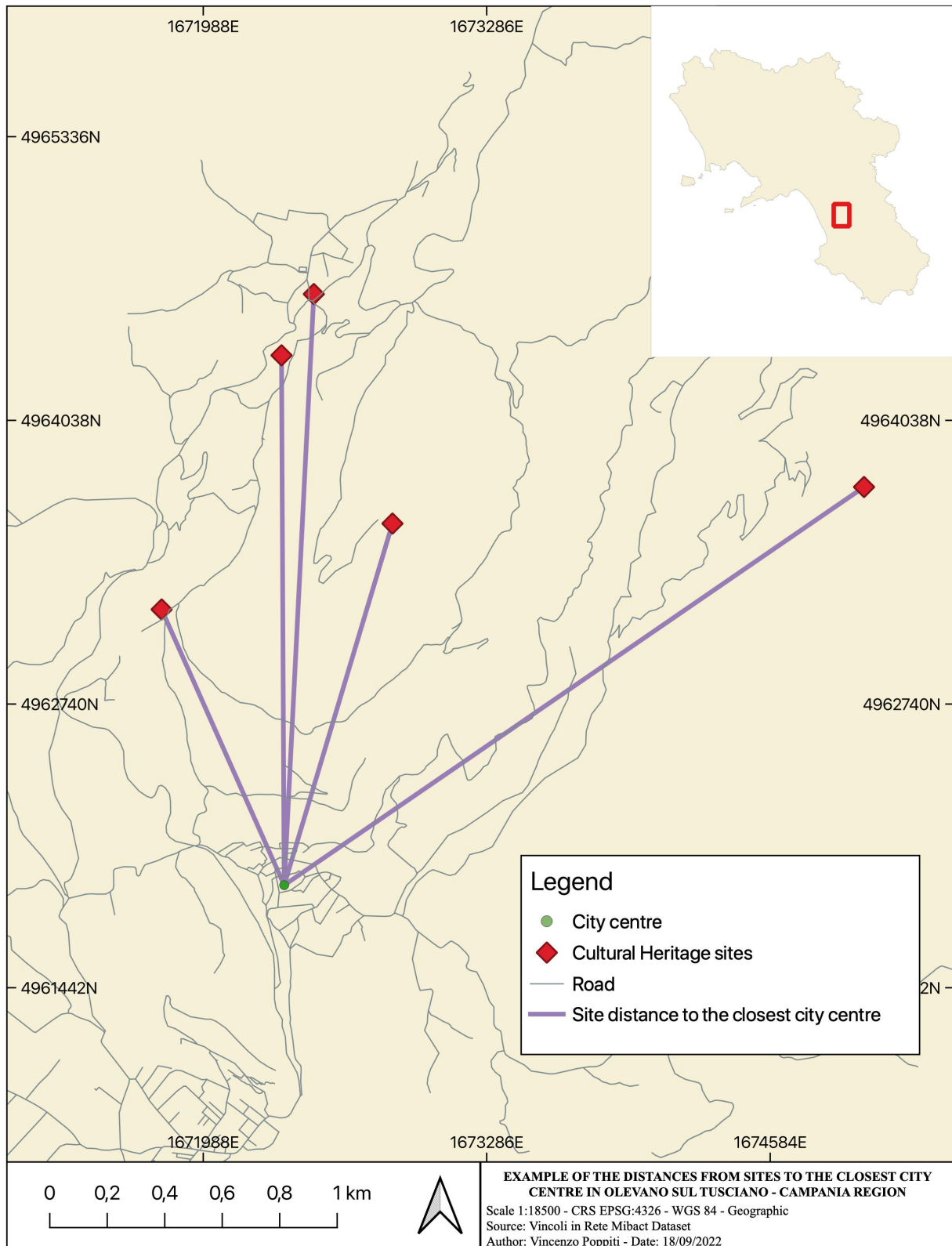


Fig. 14: An example of the distance from a site to the closest city centre in Olevano sul Tusciano

2.6 Assigning values for each type of Cultural Heritage

Every type of cultural heritage (e.g. church, castle, monument, etc.) is classified with a certain level of interest (see also Section 2.3). Unfortunately, there are very few previous studies that have explored the ranking of cultural heritage by type, and for this research only two papers were considered. Therefore, as derived from the study of Vallone & Veglio (2014) and Donato & Badia (2008), the category or type in which a site is classified, can be ranked as follows:

- High Value
- Moderate Value
- Low Value

In order to align these values to the scores required to carry out this analysis, the ranges have been adapted from text to numeric values. In the 'cultural_heritage_sites_analyses' layer I assigned each record a score on the base of the type of feature. The score has a range that goes from '1' to '3', where '1' stands for a very low score (Low Value) in terms of cultural heritage importance under the historical and artistic value, while '3' is a high ranked typology of cultural heritage site (High Value). The analysis has been carried out with the field calculator. See Appendix 7.2.4 for detailed query code.

Table 2: Assigning values for each type of cultural heritage – Example list

NAME	CODE	TYPE	SCORE
Il Carpine	1197627	Building	2
Cas.Cappellini	429080	House	2
Cas. Enrico Toti	429076	House	2
Casa Moro	472900	House	2
Epitaffio	142210	Kiosk	2
Fondo Candelara	Null	Building	2
Il Muro	1198380	House	2
Il Muro	1198380	House	2
Il Muro	1198380	House	2
Il Muro o Il Forno	1198424	House	2
La preta lo Piesche	1198342	Tower	3
La Rocca o Castello	1198416	House	2
La Rocca o Castello	1198416	House	2
SS.Rosario e S.Rocco	469462	Church	3
Villa Tosti di Valminuta	2960331	Villa	2
[nome attribuito]	24805	Building	2
Abbazia	132631	Abbey	3
Abbazia Basiliana (ruderi)	213911	Abbey	3
Abbazia della Ferrara	213946	Abbey	3
Abbazia della Trianità di Cava	213901	Abbey	3
Abbazia si S.Guglielmo al Goletto	213967	Abbey	3
Abbazia di S.Maria della Libera	213966	Abbey	3
Abbazia di S.Maria Maddalena in Armillis	213909	Abbey	3
Abbazia si S.Pietro (avanzi)	213945	Abbey	3
Abbazia di S.Vito	213984	Abbey	3
Abbazia di San Pietro ad Montes	3132492	Abbey	3
Abbeveratoio di S.Maria ad Peti	24963	Fountain	2
Abellinum (resti)	288766	Traces of settlement	2
Abitato	319115	Dwelling	1

2.7 Assigning values for each single site of cultural heritage

By consulting the general catalogue of cultural heritage from the database of the Ministry of Culture (<https://catalogo.beniculturali.it>), it was possible to assign to each single cultural heritage site a score that would reflect its intrinsic historical, artistic and naturalistic value. The collection is divided in the following groups for the Campania region:

- Historical and artistic heritage (215895 records)
- Archaeological heritage (8949 records)
- Architectural and landscaping heritage (3605 records)
- Photographic heritage (7208 records)

- Demo-ethno-anthropological heritage (1566 records)
- Natural heritage (60 records)
- Numismatic heritage (979 records)
- Science and technology heritage (204 records)
- Music heritage (69 records)

From these nine groups, only records (9222) that represent a ‘site’ with historical/artistic and naturalistic value have been included in the study. In these groups there are also other records, such as artefacts, relics, coins, etc., which have not been considered.

Every record of these groups has a section that describe its value in terms of importance as cultural heritage. These ranks are assigned to each record as follows:

- Very Important (5)
- Important (4)
- Moderately Important (3)
- Slightly Important (2)
- Not Important (1)

In order to align these values to the scores required to carry out this analysis, the ranges have been adapted from text to numeric values. The given scores go from ‘1’, which means that a site is not important or has no value under the historical, artistic and naturalistic point of view (Not Important); to ‘5’, which is the highest score for a cultural heritage site, and therefore it is of high interest (Very Important).

2.8 Assigning values for the touristic flow for each single site of cultural heritage

The criteria of touristic flow affluence was very challenging to deal with, and assigning values was not easy, especially because in some cases there were no direct data that would show an affluence in terms of touristic presence. Where there were records of touristic affluence for well-known site (e.g. Pompeii or Paestum have ticket offices, institutional websites with statistics; and so other major sites) I had the opportunity to consult the competent institution in charge for their management and compare the values (Table 3). Where no records were possible to gather, then I had to interview the institution or the keeper in charge to have an estimation of the touristic affluence.

The scores go from '1', which means that a site has a great affluence and there are many visitors every year; to '10', which is a value that indicates that there is no touristic affluence on that site.

Table 3: Example list of statistical data of visitors to the Vesuvian archaeological sites.

Source: www.pompeiiisites.org

Year	Pompeii	Herculaneum	Oplontis	B.reale	Stabia	Total Amount for all sites
2000	2.165.739	237.013	38.032	6.571		2.447.355
2001	2.255.365	249.364	36.944	8.942		2.550.615
2002	2.224.668	258.177	39.309	9.283		2.531.437
2003	2.112.412	281.676	43.045	13.350		2.450.483
2004	2.287.580	288.813	44.964	15.277		2.636.634
2005	2.370.940	284.129	47.600	14.214		2.716.885
2006	2.569.872	295.517	49.449	9.856		2.924.694
2007	2.571.725	301.786	47.351	10.975		2.588.472
2008	2.253.633	264.036	30.422	9.605	30.776	2.588.472
2009	2.087.559	292.936	40.209	8.188	32.951	2.461.843
2010	2.319.668	298.310	41.749	11.431	33.941	2.705.099
2011	2.352.189	307.941	41.718	8.544	32.669	2.743.061
2012	2.336.188	310.072	40.201	8.836	33.445	2.728.242
2013	2.443.325	356.562	45.891	8.160	33.521	2.887.459
2014	2.668.178	382.805	50.563	10.437	40.807	3.152.790
2015	2.978.884	410.069	54.104	9.254	52.861	3.505.172
2016	3.209.089	437.107	54.403	8.965	60.239	3.769.803
2017	3.418.733	487.540	55.784	9.959	51.884	4.023.900

2.9 Weighted Overlay Analysis

This final step is meant to identify the most suitable cultural heritage sites in order to develop new touristic flows. The five criteria, above selected, will now be combined together in the weighted analysis for the final result. The weights for each criterion have been assigned based on the statement of Enright and Newton (2004), Dupeyras and MacCallum (2013) and Crouch (2011) discussed in section 2.3. As pointed out, the following criteria are the most and equally important indicators for measuring competitiveness and determine attributes for destination competitiveness in tourism:

- Distance
- Historical and artistic value of cultural heritage
- Touristic affluence

However, since the first two factors have been split in two different criteria on the assumption of Lucarno (2005) and Vallone & Veglio (2014) researches (see section 2.3 for the reason behind this methodology), then the weights are also been halved.

Considering the study of Pezzano et al. (2014), Canova and Pezzano (2012) and Monteduro and Hinna (2007), the touristic presence is the most important factor, followed by the historical and artistic value. From the same studies, the factor that has less ‘weight’ is considered to be the distance (see section 2.3 - Criteria selection). Consequently, the assigned weights are as follows:

- Distance between the site and the closest road = 0.1
- Distance between the site and the closest city centre = 0.1
- Historical and artistic value of the type of Cultural Heritage = 0.2
- Historical and artistic value of each single site = 0.2
- Touristic presence for each single site = 0.4

Before applying these weights, the scores needed to be aligned on a scale that goes from ‘1’ to ‘3’ in order to carry out the weighing analysis. The scores had to be reclassified with a standard output so that the weights could be applied in the same way for all five factors. See Appendix 7.2.5 for the query code used for reclassifying these factors.

After aligning all the scores on the same standard output (1, 2, 3) the following query was applied to assign the right weight to each factor:

("Name_score"*0.2) + ("Type_score"*0.2) + ("tour_flow"*0.4) + ("dist_pl_sc"*0.1) + ("dist_rd_sc"*0.1)

The result is a list of cultural heritage sites with a final score that goes from '1' to '3'. As a consequence, the records have been grouped in three different sections:

1 = not suitable

2 = good suitability

3 = most suitable

These three levels can be seen as:

- 1) Sites that will never be good for the purpose of the research (not suitable);
- 2) Sites that perhaps will be considered in the future (good suitability);
- 3) Sites that are going to be used for the tourism market now (most suitable).

In the level 1 there are sites that have already a great touristic affluence (e.g. Pompeii, Paestum, Royal Palace of Caserta, etc.), or a very low historic and artistic importance (e.g. 20th-century farms, silos, common churches, etc.), which would be 'not suitable' for new touristic flows. The 'good suitability' level would indicate sites that have not a great final score but still may be considered in the future, once all the 'most suitable' sites have saturated the tourism market. The 'most suitable' level represents the sites to choose now to develop new touristic flows.

3 Results

The final result shows a selection of 39 sites (Table 4) over 9222 records from the database. The Weighted analysis established a final score of ‘3’ for all of them, which is the group of most suitable sites on which it is possible to develop new touristic flows.

The type of sites that dominates the selection (27) falls in the category of religious monuments (i.e. churches, shrines, convents, cathedrals, catacombs and crypts). The remaining 12 sites are mainly castles, villas, public buildings, theatres, museums and libraries.

Table 4: List of the ‘most suitable’ sites from the final weighted analysis.

NAME	CODE	FINAL SCORE
Antico Castello già del Duca di Bovino con Parco e Giardino	206278	3
Basilica di A. Maria Foro Claudio	318426	3
Biblioteca	228234	3
Cappella Rupestre di S. Michele	398105	3
Castello Lancellotti	1197941	3
Castello Pignatelli della Leonessa	206471	3
Catacomba	207351	3
Cattedrale di S. Matteo	1196733	3
Chiesa dell’Abbazia	137837	3
Chiesa di S. Biagio	138662	3
Chiesa di S. Giacomo	146951	3
Chiesa di S. Maria in Grotta	138705	3
Chiesa di S. Prisco	138596	3
Chiesa di S. Francesco	137903	3
Chiesa di S. Maria Maggiore	180135	3
Chiesa di S. Michele	137214	3
Chiesa rupestre di S. Michele	137736	3
Chiesa Superiore	138949	3
Complesso conventuale Madonna dell’Arco	3048905	3
Complesso delle Basiliche	194891	3
Convento di S. Angelo	224410	3
Cripta	180520	3
Cupola di S. Francesco	137790	3
Duomo	274728	3
Duomo di San Paolo	186353	3
Eremo Camaldolesi di Astapiana	180954	3
Ex Convento Chiesa di S. Francesco di Paola	194824	3
Ex Convento Francescani-Convitto Naz.le	224507	3
Immobile con strutture di villa suburbana di età romana	283614	3

Museo delle Carrozze	167648	3
Palazzo Abbaziale di Loreto	387230	3
Palazzo Acconcia	341077	3
Palazzo e le porte ed i soffitti in legno scolpito	342108	3
Parco monumentale di Baia	166962	3
Santuario di Monte Vergine	347299	3
Santuario di Santa Maria di Casaluce	138725	3
Santuario di S. Maria Cetrella	347263	3
Teatro Romano (resti)	280885	3
Villa Valva dei Marchesi D'Ayala	264393	3

This is the category distribution of the results, which represent the most important types of sites according to Vallone & Veglio (2014) and Donato & Badia (2008):

Building (4); Castle (3); Catacomb (1); Cathedral (3); Church (14); Convent (3); Crypt (1); Hermitage (1); Library (1); Museum (1); Park (1); Rock settlement (1); Shrine (2); Theatre (1); Villa (2).

All of them have a high score in terms of artistic, cultural, historical and environmental importance, retrieved from the general catalogue of Cultural Heritage within the database of the Ministry of Culture.

These records fall within a range of 4 kilometres distant to their closest city centre, and are considered to be very low affected by the distance decay (Larsen et al. 2010). In detail, the minimum distance from a site to its closest city centre is 146 metres, while the maximum distance from a site to its closest city centre is 3794 metres. They also are very easily accessible as the distance from a site to the closest road falls within a range of 190 metres. Specifically, the minimum distance from a site to its closest road is 0 metres, while the maximum distance from a site to its closest road is 190 metres.

In terms of touristic flow, they all score a very low presence. The range goes from a minimum presence per year (in 2019) of 79 people, to the maximum presence per year (in 2019) of 640 people.

The 39 sites are evenly distributed on the territory: mountains, hills, level grounds and coastal areas are all covered (Fig. 15). For a detailed description of the selected sites, please refer to the records in Appendix 7.1.

During the spatial analyses some thematic maps were generated as to better understand the relationship between all cultural heritage sites and territory in Campania region. As shown in figure 16, the concentration of all cultural heritage sites was greater near the major cities. The distribution of all different types of cultural heritage sites is displayed in figure 17, and figure 18 is focused on the diffusion of religious and not-religious sites. Figure 19 and 20 show the distribution of the cultural heritage sites over land cover and protected areas in Campania region.

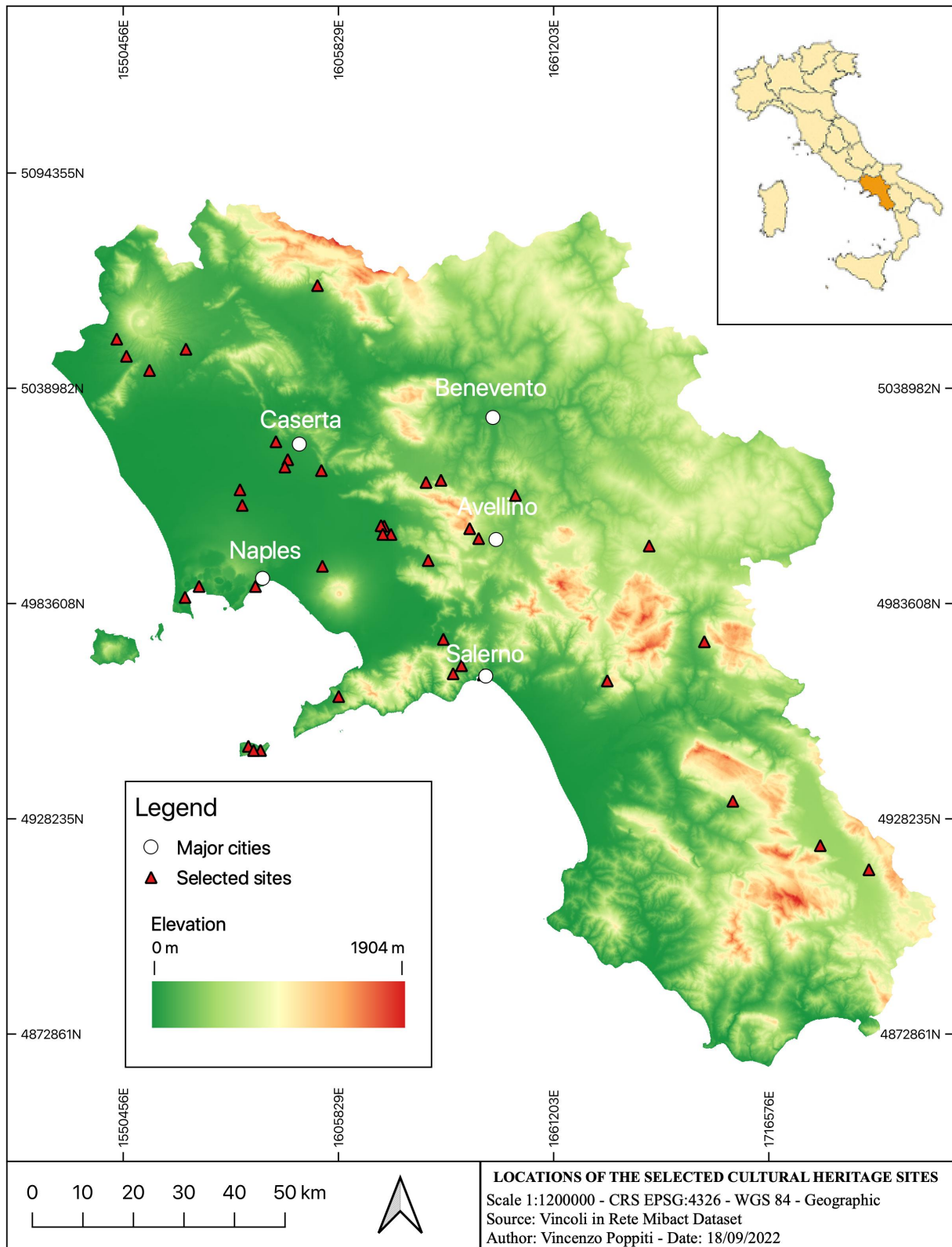


Fig. 15: Locations of the selected sites as results of the analyses

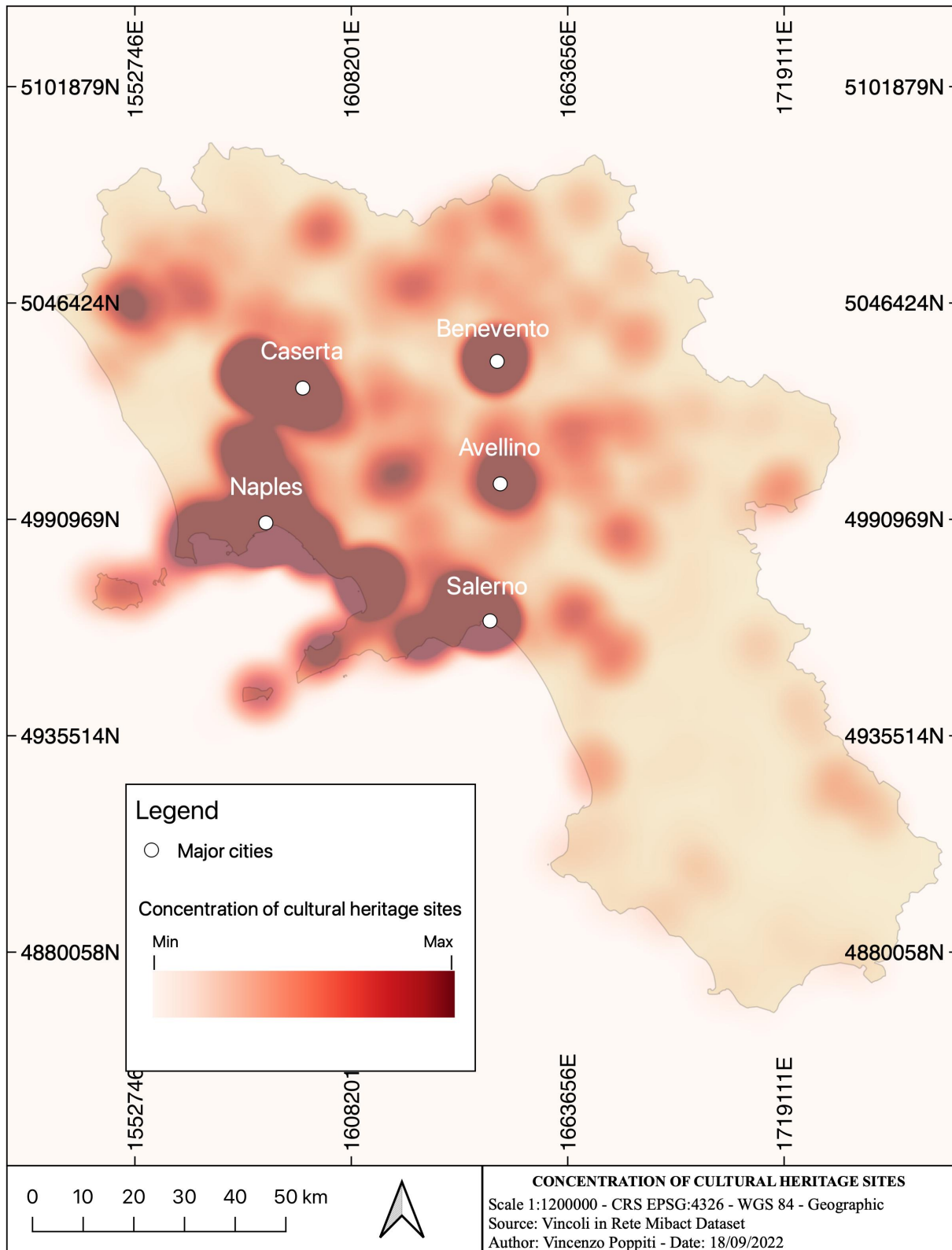


Fig. 16: Concentration of all cultural heritage sites

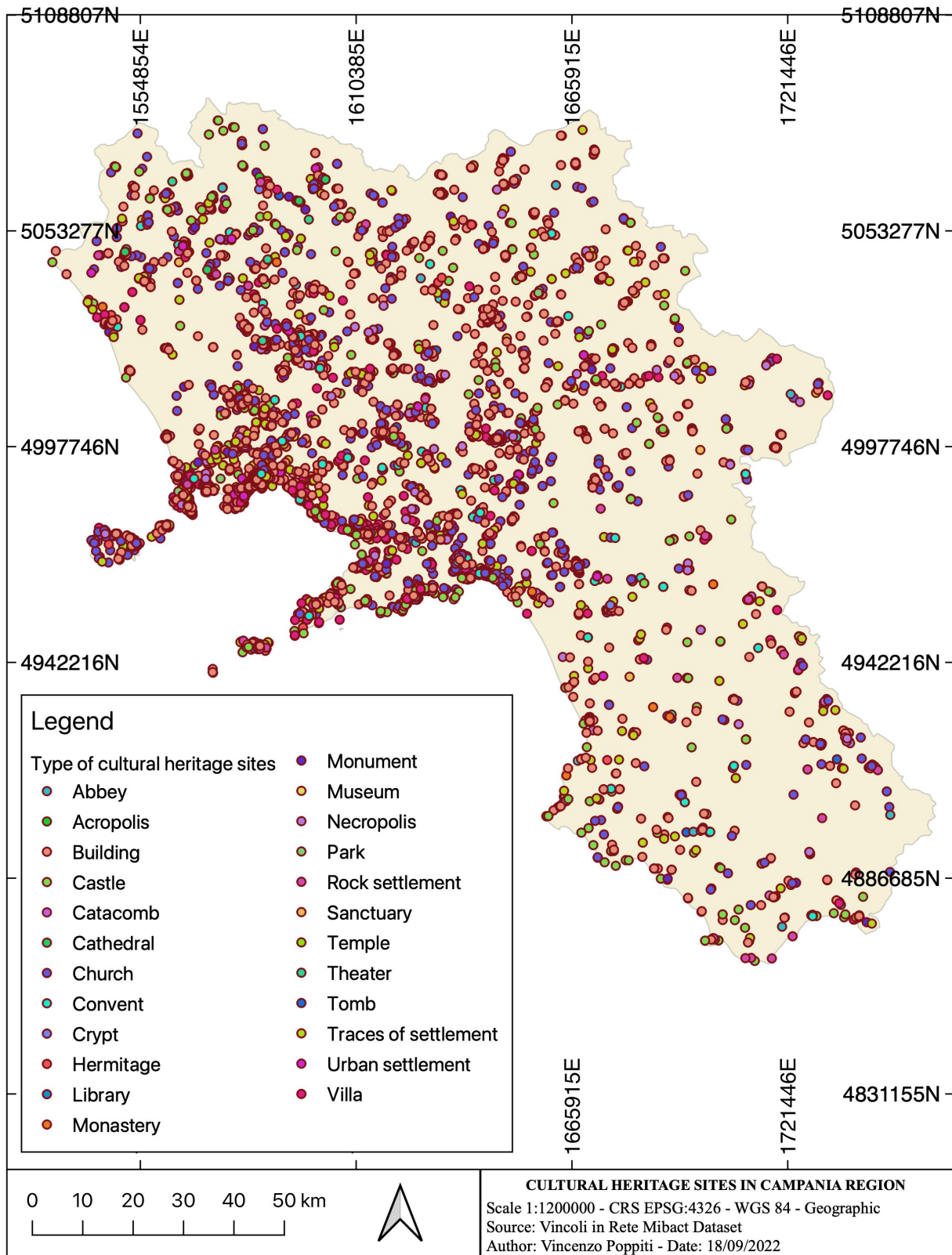


Fig. 17: Distribution type of all cultural heritage sites

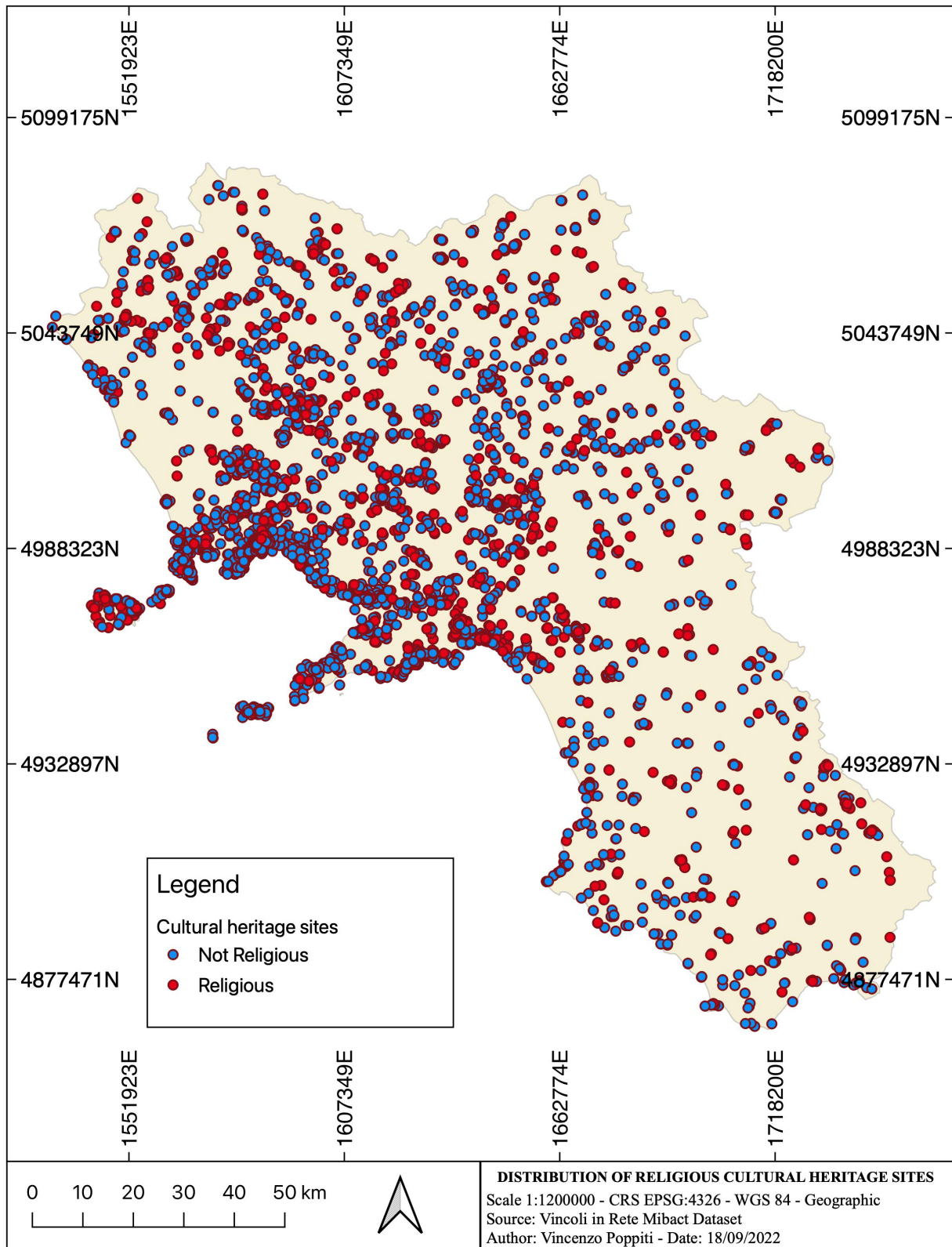


Fig. 18: Religious and not-religious sites distribution

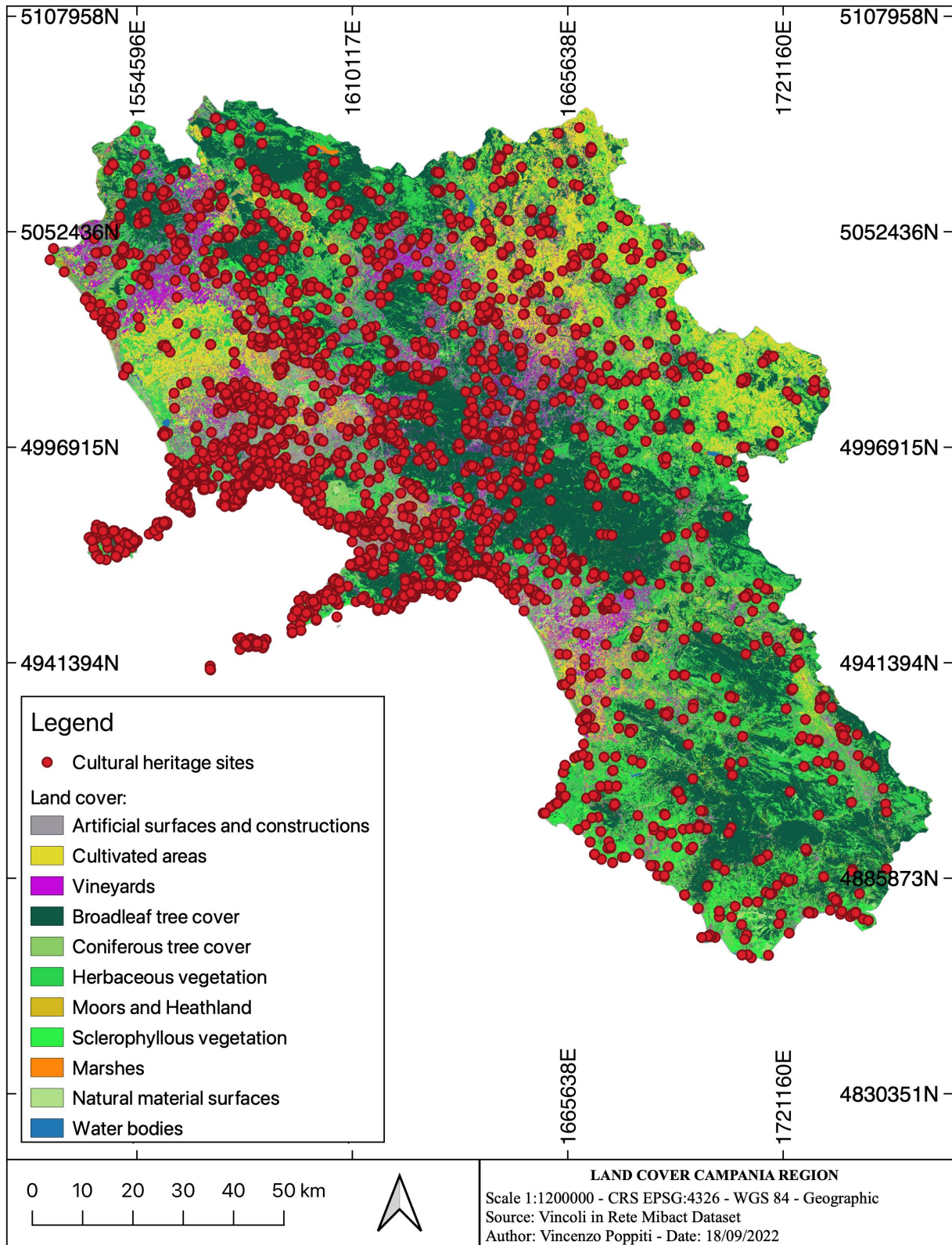


Fig. 19: Land cover distribution of cultural heritage sites

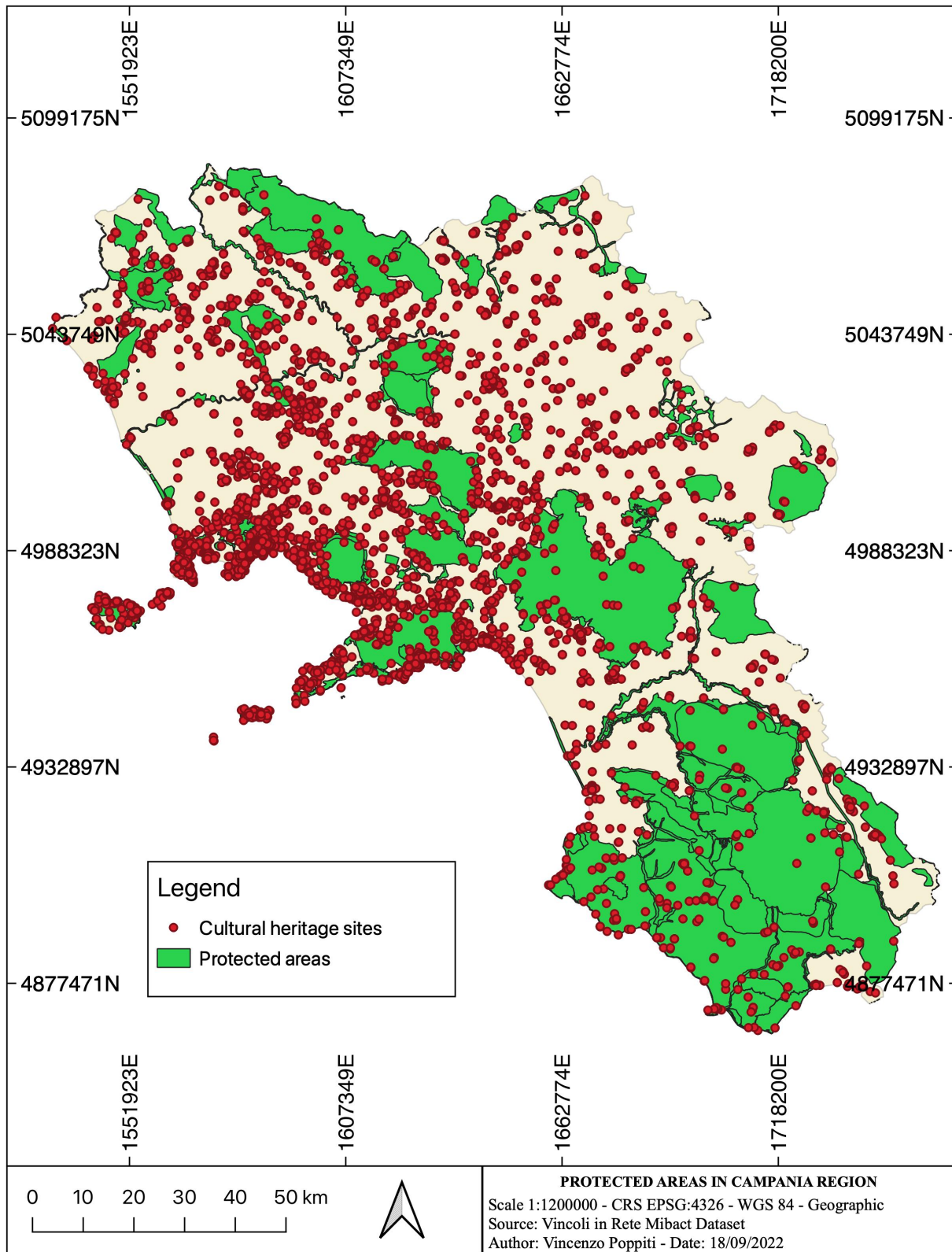


Fig. 20: Cultural heritage sites distribution over protected areas

4 Discussion

During the data comparisons of the results, a trend was noticed between two factors: the tourist presence of the sites and the distances of the sites from their closest city centres. It was observed that the more distant a site is from the city centre, the less the tourist presence subsists for a site (Fig. 21). It might not necessarily indicate a direct correlation, but it may be considered as a value designation for the distance as a key factor of the model run in the analyses. Perhaps, some further research could dig into this observation.

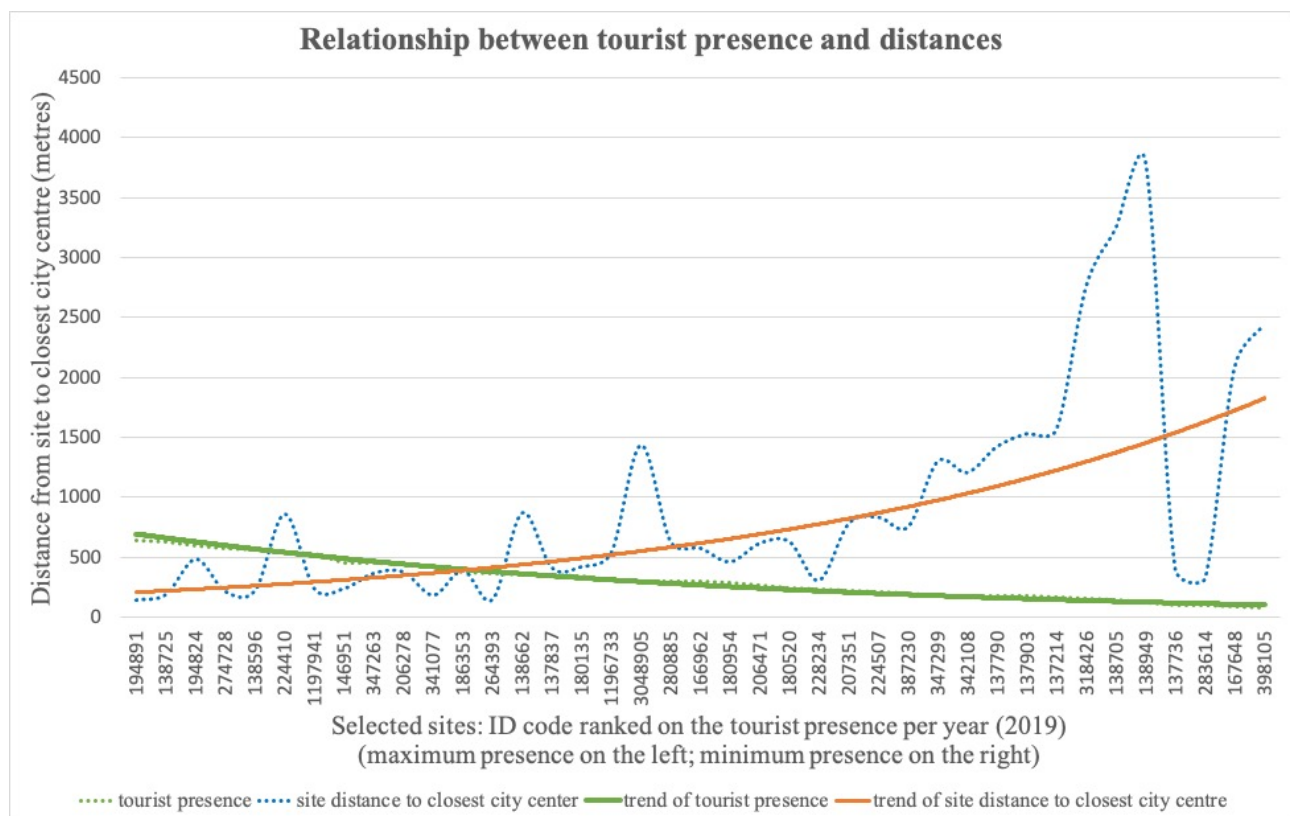


Fig. 21: Trends of tourist presence and distances from sites to their closest city centres

On the topic of value designation, the approach seems to have some weaknesses, especially in the very few previous studies that have explored the ranking of cultural heritage by type. In fact, for this research only the two papers of Vallone & Veglio (2014) and Donato & Badia (2008) were considered, as no other literature was found. This lack of information can be seen as a limitation to fully develop on the issue.

Other implications can be found in the selection of the factors for the analyses. There were other aspects that could have been taken into account such as the presence of infrastructures and facilities nearby the sites (hotels, transportations, restaurants, etc.), accessibility to the sites (ramps for

disabled people, customer services, etc.). These may have had a slightly different impact on the final results; unfortunately, it was not possible to consider these factors due to the amount of work required to go through all the data at this stage.

Despite these issues and limitations encountered during and after the research, an overall consideration on the results can be made: the selected sites have great potentialities for developing new touristic flows. In fact, despite the touristic presence is very low as shown in Fig. 22, all of them have a very high value in terms of historical and artistic importance.

In addition, all of them have the advantage to be very accessible by the tourists in terms of distances: 34 sites on 39 are less distant than 2 kilometres to their city centres (fig. 23); and the 98% of the selected sites is below 70 metres distant to their closest roads (fig. 24).

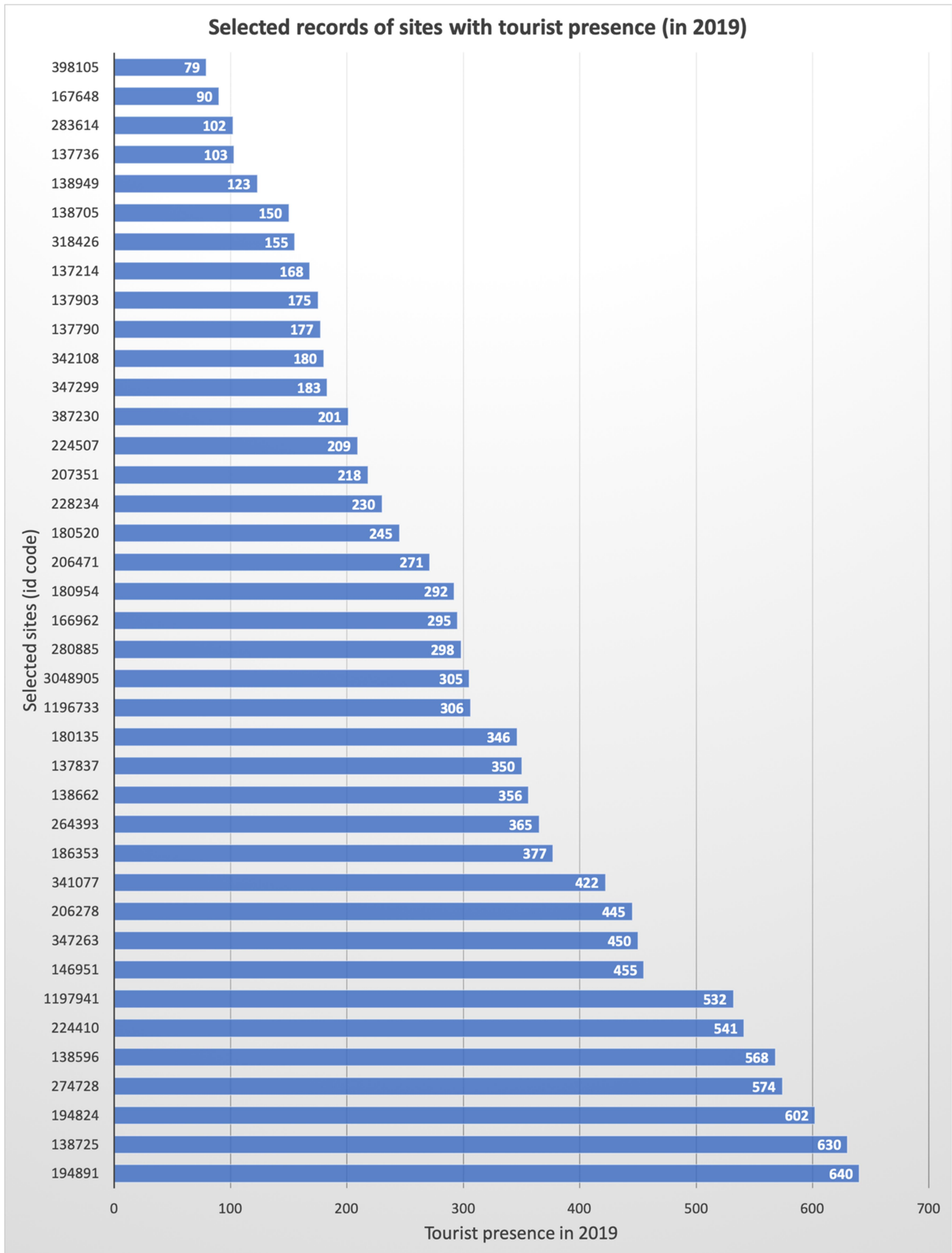


Fig. 22: Tourist presence in 2019 for the selected sites

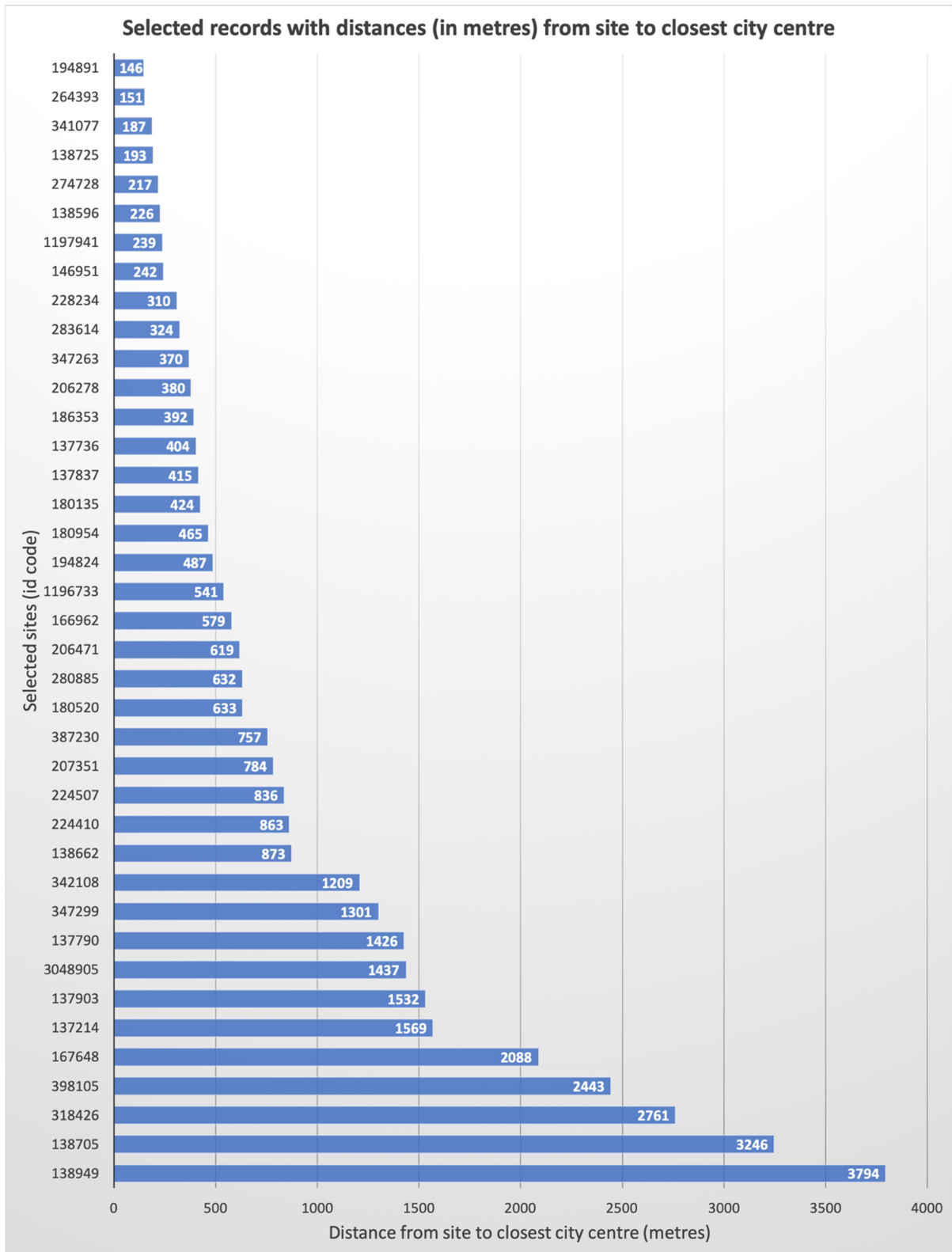


Fig. 23: Distances from sites to closest city centres

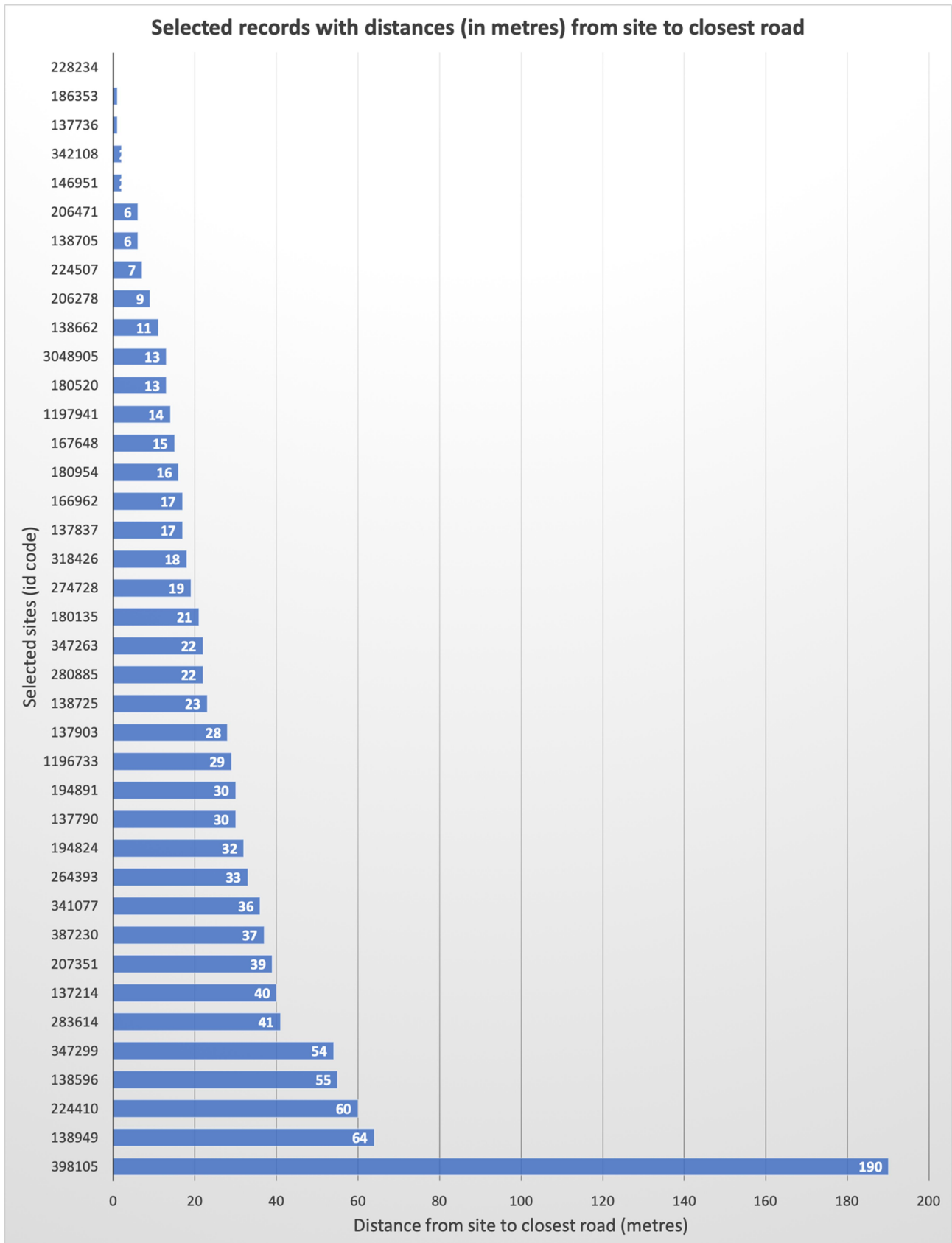


Fig. 24: Distances from sites to closest roads

Although it does not solve all the problems related to the weakening of the tourism sector, this research proposes, through Geographical Information Systems methodologies, a tool that can make a small contribution to the *re-launch* of a supply chain that is strongly in crisis. There are many aspects that still need to be improved and the methodology has a certain degree of weakness and surely needs to be perfected. However, the weighted analysis has actually identified those characteristics introduced by the research aims:

- The categories in which the selected sites are classified, represent the most valuable types of sites
- Every single record from the results have a high value in terms of artistic, cultural, historical and environmental importance.
- All of them have a very low tourism presence.
- They are not very far from the closest city centre, hence close to essential facilities (hotels, transports, restaurants, etc.).
- Distance advantage can also be seen in their proximity to their closest accessible roads, which makes them all very easy to reach.

The approach to the topic, the methodology applied and the model run during the study has selected 39 potential sites that actually match the prerequisites to possible develop new touristic flows.

So why are these sites so little popular and unknown to the mass tourism, even if they all have these qualities? The main answer may be found in the context they are located: Campania is a region with many worldwide famous sites such as Pompeii, Herculaneum, Paestum, the Royal Palace of Caserta, the Vesuvius, and so on. These “major” sites have cast a shadow on all other sites of the region, draining all the tourism to their places. However, this does not mean that some of the flows cannot be driven to these new destinations as proposed in this paper, especially in the light of the considerations explored during the research related to the Covid-19 pandemic

5 Conclusion

The tourism system is one of the pillars of the Italian country's economy, and a significant part of the national GDP revolves around it. Serious and unpredictable events, however sporadic, can deteriorate or even cancel the tourist attractiveness of famous locations. A terrorist attack, a pandemic, a violent hurricane, an earthquake or human error can suddenly obscure the image that a destination has achieved over decades or centuries (Angeloni 2012). Like this, the recent pandemic has dramatically changed the scenario for Italian tourism, temporarily changing the face, but perhaps also permanently the destiny, of places whose tourist success was considered timeless. Although rhetorical, it is undeniable that the crisis induced by Covid-19 can become an incredible opportunity for resilience and social cohesion, yet another opportunity to rethink and redesign the future of tourism in Italy. This renewal process will greatly depend on the ability of tourism companies and territories to safeguard and modernize the entire system of tourism offer. The sudden change of scenery, which Italy, like other countries, was completely unprepared for, once again teaches us that in tourism, first and foremost, you need to be prepared to change strategies in order to diversify the touristic offer, generate new interests in the touristic demand and exploit new resources that our territory has. This research goes in this direction.

For future studies, it is suggested to widen the selection of factors involved during the analyses, such as the facilities nearby the sites, accommodations, public transports and the preservation of the cultural heritages (the state of decay; presence of restauration in act; environmental risk). In addition, by expanding the area of study, the model run for the analyses might generate more accurate results as additional databases, catalogues and archives are taken into account.

Another consideration can be made on the subject of developing new touristic flows: what would be the impact that an increased presence would have on the local communities and the territory? If the exploitation of new sites can be seen as a great opportunity for the tourism market and the growth of the economy in general, there are some side effects that need to be considered as well: increase of pollution, risk of damage/degradation of the cultural heritage, intensification of traffic transportations, and so on. Towards this direction, a future study that evaluates these aspects and what can be done to minimize their impacts, would be an important addition.

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7 Appendix

7.1 List of chosen sites

Here is the list of the sites (with a brief description) that have been chosen as a result of the analyses.

Name: ANTICO CASTELLO GIÀ DEL DUCA DI BOVINO CON PARCO E GIARDINO					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
206278	Castle	380 m	9 m	445	3
<p>Description: From an avenue lined with rows of agapanthus and walls covered with roses intertwined with lemon branches, you enter the magical world of the dukes of Guevara di Bovino: an Italian garden decorated with painted terracotta pots that knows no monotony with its many corners full of surprises at every turn; an artificial pond populated with water lilies and papyrus; a baroque pavilion; a 75-meter-long avenue called “of the umbrellas”, one of the most successful examples of 18th-century topiary art, where a superb camphor stands out among the pruned boxwoods in the shape of benches shaded by vegetable umbrellas; the “grove of holm oaks” which houses a majestic sequoia, a centuries-old pedunculate oak whose trunk measures 7 meters in diameter, a set of stone “furniture”, a large elliptical fountain, “the umbrella fountain” which recalls the avenue eponymous, and another jet; finally, the “gallery” of climbing roses embellished with a very rare purple camellia and an orange grove. Created at the end of the 18th century by the Duchess Maria Suarda Guevara di Bovino, lady-in-waiting to Queen Maria Carolina (sister of Marie Antoinette), this garden of one and a half hectares could be irrigated thanks to a concession from the king, who in 1752 had built the Pharaonic Caroline aqueduct (listed as a Unesco World Heritage Site) to feed the waterfalls of the royal park (Magnotta 2016).</p>					

Name: BASILICA DI S. MARIA FORO CLAUDIO					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
318426	Cathedral	2761 m	18 m	155	3
<p>Description: A country lane leads to a small unexpected jewel, the church of Santa Maria in Foro Claudio. Among the frescoes that decorate it, carried out over the course of four centuries (from the 11th century, approximate date of construction, to the 16th century), those of the central apse with intense and bright colours, constitute the centre of interest of this Cassinian abbey (built on the remains of an early Christian basilica). Of the “Last Judgment” (16th century) depicted on the walls of the right aisle, some scenes remain that constitute a mere curiosity: in hell dishonest craftsmen and traders are represented in the exercise of their trade (Dovere 2000).</p>					

Name: BIBLIOTECA					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
228234	Library	310 m	0 m	230	3
<p>Description: Although the Certosa di Padula (Certosa di San Lorenzo in Padula), founded in 1306, has been on the UNESCO World Heritage List since 1998, this extraordinary monument is strangely little visited. The wonderful library that can be visited only accompanied and by appointment, and even unknown. It is a hidden wonder not to be missed. It is accessed by a spiral staircase, self-supporting, without handrails, which represents a true architectural feat of the fifteenth century. The 18th-century decoration of the library is breath-taking: the Vietri sul Mare ceramic floor, in which marine colours, blue and emerald green prevail, is a splendour. On the walls under the windows are to be admired the allegorical paintings representing the transience of the arts. Of the tens of thousands of manuscripts and rare illuminated books that were preserved here, only two thousand remain, all the others were stolen and dispersed by Napoleonic troops in the sacking of the Certosa. (Giudice 2002).</p>					

Name: CAPPELLA RUPESTRE DI S. MICHELE					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
398105	Rock settlement	2443 m	190 m	79	3
<p>Description: Located 650 meters high in an exceptional green landscape, the sanctuary of San Michele Arcangelo is one of the most fascinating early Christian rock complexes in Italy. You can get there along a long steep path that runs along the mountain in the past called Mons Aureus (Monte d’Oro), overlooking the Tusciano river. The sanctuary is made up of five chapels (VIII-</p>					

XI century) built in a cavity 900 meters deep, 50 wide and 40 high. At the foot of the cave, you go up a long staircase and immediately you have the feeling of having reached a place outside the world. You arrive right in front of the chapel of San Michele, admirably decorated with frescoes from the 10th century, representing episodes from the life of Christ and St. Peter, the Madonna between two angels and three pilgrim monks kneeling in front of San Michele. To the right, a path climbs up to the heart of the mountain where there are four other small buildings. The last chapel, very beautiful and decorated with stucco, was the real pilgrimage destination: completely enveloped in darkness, it has a window that served as a confessional (Zuccaro 1977).

Name: **CASTELLO LANCELLOTTI**

Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
1197941	Castle	239 m	14 m	532	3

Description: Burned by the French republican troops in 1799, Lancellotti castle was rebuilt only in 1870 by Prince Filippo Massimo Lancellotti, who enjoyed mixing the most disparate styles, reviving the old structures a bit, to which he added elements that had no connection with local architecture. It will therefore not be surprising to see medieval type crenellated towers, an Italian garden typical of the Florentine Renaissance, a chapel inspired by early Christian basilicas and an interior decoration mostly from the nineteenth century. Although the reactions of visitors are not unanimous, the castle never arouses indifference (Gleijeses 1977).

Name: CASTELLO PIGNATELLI DELLA LEONESSA					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
206471	Castle	619 m	6 m	271	3
<p>Description: Built in the 9th century in the Monte Partenio Natural Park, surrounded by luxuriant vegetation, the Pignatelli della Leonessa castle has always belonged to the same family. Duke Giovanni Pignatelli della Leonessa lives there all year round, and is happy to be a guide for passing visitors (by appointment). Rebuilt several times over the course of its history, the building was abandoned for several decades before being restored by the mother of the current owner. Today it is possible to visit several rooms, all magnificent, with period furnishings and frescoes from the seventeenth and eighteenth centuries, which represent episodes from the long history of the family. A story that began in the fourteenth century with the Duke of La Lagonière (who later became Lagonessa and finally Leonessa), who arrived in Naples following Carlo d'Angiò and who was the first member of this family to own the fortress. In addition to the reception halls, it is possible to visit the chapel, consecrated in 1706 by Pope Benedict XIII, the prison, with walls five meters thick, and a dining room in which decorative objects from all eras are exhibited. The wonderful hanging garden was, according to legend, a gift from the women of the village, very devoted to one of the duchesses of the Lioness. For many days, according to the chronicles of the time, a long line of women from the village could be seen carrying soil in large baskets that they balanced on their heads, climbing along the very steep road that leads to the castle (Glejjeses 1977).</p>					

Name: CATACOMBA					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
207351	Catacombs	784 m	39 m	218	3
<p>Description: Built in the 7th-8th centuries, the basilica of the Santissima Annunziata is considered one of the oldest and most representative of southern Lombard art in Campania. Due to numerous alterations over the course of its long history, only the apsidal part, carved into the rock, retains its original appearance which refers to the early Christian basilicas with the ambulatory from which one accessed the martyrium (seat of the relics of the martyrs). From the beautiful 12th-century fresco in the central arch, which represents the praying virgin flanked by two saints, the Byzantine influence on the Campania pictorial school shines through. The façade was rebuilt during the restoration works of the 1950s. To the right of the church, passing through a small garden, you enter a catacomb (II-III century), which is divided into two almost circular rooms:</p>					

the first is vast, while the second, smaller and located at the back, houses an altar and a marble sarcophagus. This space was to be used to preserve the relics and was probably used for cultural gatherings, at a time when Christians were still persecuted. The large room, dedicated only to burials, surrounded by ten tombs (semi-circular niches called *arcosolia*) of which no decoration remains (Gambardella and Jacazzi 2003).

Name: **CATTEDRALE DI S. MATTEO**

Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
1196733	Church	541 m	29 m	306	3

Description: The medieval liturgical furniture, although heavily cancelled by the modernization works of the following centuries, still presents valid evidence referable to that historical moment. Among these, there is the ambo and the candlestick for the paschal candle which are beautifully displayed on the right side of the central nave. The ambo was built in the first half of the 13th century in line with the style dictated by those of the Cathedral of Salerno (in particular the “Romualdo Guarna” ambo). Four column-bearing lions and two leopards form the basis of as many columns with leafy capitals inhabited by female and male figures. The plutei of the case are mosaics with glass pastes and mainly reproduce geometric elements with the exception of two phoenixes or peacocks. The eighteenth-century displacement probably caused an alteration of some of its parts (Capomaccio 2002).

Name: **CHIESA DELL’ABBAZIA**

Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
137837	Church	415 m	17 m	350	3

Description: The library of the Badia di Cava had to be built right from the beginning of the monastery (11th century) due to the need to provide books to the monks, as required by the Rule of St. Benedict. In addition to the Library as a place of conservation, in Cava there was also a Scriptorium, in which books were written necessary for the formation of the monks of Cava and the numerous dependent monasteries. The library has 65 parchment codices, about 100 paper manuscripts, 120 incunabula, over 5000 editions of the sec. XVI-XVIII. Overall, the printed works are about 80,000. Among the most famous codices are: the Visigothic Bible of the century. IX, the Codex legum Langobardorum of the century. XI, the Etymologiae of Isidoro of the century. VIII, the De Temporibus of Beda of the century. XI, the De septem Sigillis by Benedetto da Bari of the century XII. (De Pasquale 2017).

Name: CHIESA DI S. BIAGIO					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
138662	Church	873 m	11 m	356	3
<p>Description: Incorporated in the construction of later periods, the chapel of San Biagio (early 15th century) can pass completely under observation, despite its considerable interest from the pictorial and iconographic point of view. In addition to the main scenes taken from the life of San Biagio and from the childhood of Jesus, every small space is covered with an astonishingly rich decoration: depictions of evangelists, doctors of the Church, prophets and sibyls, floral motifs and medallions that frame allegories of virtue. The iconographic story surprises for its anachronistic order, as if the main concern of the painter (or the client) had been to strike the imagination of the faithful with scenes of coherent prodigies and tortures, such as the torture of San Biagio and the seven virgins, which were live skinned with iron combs. The episodes of Jesus' childhood, very faithful to the apocryphal gospels of the pseudo Thomas and the pseudo Matthew, instead insist on the external manifestations of divinity, describing the Messiah as a child who abuses his powers, putting the Christological message in the background (Marazzi 2015).</p>					

Name: CHIESA DI S. GIACOMO					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
146951	Church	242 m	2 m	455	3
<p>Description: The foundation of the complex dates back to the second half of the 14th century, as evidenced by the valuable fresco that surmounts the access portal to the church dating back to around 1371, by Jacopo Arcucci, count of Minervino and lord of Altamura, Secretary of State and Treasurer of Giovanna I of Anjou, queen of Naples. In 1373 Queen Giovanna I, former protector of the Carthusians of San Martino, sent the Fathers who should have lived in the Charterhouse to the island. Following the pirate raids, the Certosa suffered serious damage and from 1563 was the subject of significant restoration works. The Charterhouse today has a stratification of interventions but remains characterized by an unmistakable architectural style, the same that is found in a large part of the island and the Amalfi coast (Rossi 2000).</p>					

Name: CHIESA DI S. MARIA IN GROTTA					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
138705	Church	3246 m	6 m	150	3
<p>Description: Even if the facade is modern and of questionable taste, one cannot regret having gone to Rongolise to admire the very interesting frescoes (executed between the 11th and 13th centuries), which decorate the two caves dug into the tuff hill, of which it is established the rock church of Santa Maria in Grotta. The strong point of this pictorial decoration is undoubtedly the Dormition of Mary: taken from the apocryphal Gospel attributed to St. John, the theme of the Dormition is distinguished by its great affinity with the Hellenistic world, an affinity confirmed by the Greek inscription that appears under the painting (Dovere 2000).</p>					

Name: CHIESA DI S. PRISCO					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
138596	Church	226 m	55 m	568	3
<p>Description: The chapel of Santa Matrona. Located at the end of the right aisle of the Cathedral of Santa Croce and San Prisco, an eighteenth-century church, built on the remains of an early Christian basilica of the sixth century, the chapel of Santa Matrona is a small jewel that has fallen into oblivion, despite the ceiling being decorated with splendid Byzantine mosaics. Although some parts are missing due to the acts of vandalism perpetrated by the Saracen mercenary troops in 1841, the decoration of the chapel is remarkable from many points of view: for the beauty of the colours in which the lustre of the gold contrasts with the deep blue background and for the originality of the themes represented (Russo 2020).</p>					

Name: CHIESA DI S. FRANCESCO					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
137903	Church	1532 m	28 m	175	3
<p>Description: The censer of Cava dei Tirreni. Similar to that of San Giacomo di Compostela, the censer of the church of San Francesco and Sant'Antonio, put into operation in 2010, is the largest in the world: made of silver-plated copper, it is 1.60 m high, weighs 70 kg and it can contain 10 kg of coal in addition to 3 kg of incense. It is put into operation only for solemn liturgical celebrations, and on the 13th of each month, the day consecrated to St. Anthony (Dovere 2000).</p>					

Name: CHIESA DI S. MARIA MAGGIORE					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
180135	Church	424 m	21 m	346	3
<p>Description: The early Christian baptistery of Santa Maria Maggiore is one of the most monumental, best preserved and most beautiful baptisteries in Italy. With its 24 m in diameter, 15 m high and the 15 twin columns on which the largely original dome rests, the building dating back to the second half of the 6th century is certainly impressive not only for its size, but also for its state of conservation, which presents the miracle when one thinks of the numerous devastations suffered during its long history. It was built to celebrate the victory of the Byzantines over the Goths (555) at the behest of the Emperor Justinian, who intended with the grandeur of such a monument to affirm his power in Italy (Dovere 2000).</p>					

Name: CHIESA DI S. MICHELE					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
137214	Church	1569 m	40 m	168	3
<p>Description: Built in 1698 at the behest of Sister Serafina di Dio, who had vowed to build a church if Vienna was liberated by the Turks, the church of San Michele in Anacapri was transformed into a weapons depot by French and English troops from 1806 to 1808. Having regained the throne, Ferdinand I of Bourbon had it restored. The floor is the work of the great Neapolitan ceramist Leonardo Chiaiese, based on a design by the famous Neapolitan painter Francesco Solimena (Dovere 2000).</p>					

Name: CHIESA RUPESTRE DI S. MICHELE					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
137736	Church	404 m	1 m	103	3
<p>Description: The Grotta dell'Angelo is located less than 500 meters from the inhabited centre of the alburnine municipality of Sant'Angelo a Fasanella, in the province of Salerno. The place occupied by the cave has been inhabited since prehistoric times and was also an ancient place of pagan water worship. The entrance to the beautiful rock church, dedicated to the cult of the Archangel Michael, is easily reached after a short climb, in a very scenic area, along a path paved with stones. Inside the most important rock religious settlement of the Alburni, scholars and tourists can admire valuable sculptures, an ancient well, a gothic style shrine, a chapel, ancient tombs, 17th century Neapolitan ceramics, stalagmites, stalactites and frescoes from the '300. (Fonseca 1996).</p>					

Name: CHIESA SUPERIORE					
Code: 138949	Type: Church	Distance to closest city centre: 3794 m	Distance to closest road: 64 m	Tourist presence (in 2019): 123	Final score: 3
<p>Description: The triple enclosure of the Goletto abbey and the chapel of San Luca. Among the numerous rare and controversial symbols found in the Goletto Abbey, that of the triple wall is particularly fascinating. It is engraved on the last arch at the entrance to the ancient convent of the cloistered nuns, in a vertical position. Although some consider it simply a drawing to play “fillet”, others like André Guénon and Paul Le Cour point out that, in some places, such as Goletto, it is engraved on a vertical wall or in very small dimensions, and is therefore impossible to play with. For the aforementioned scholars, it would be a powerful esoteric symbol (Dovere 2000).</p>					

Name: COMPLESSO CONVENTUALE MADONNA DELL'ARCO					
Code: 3048905	Type: Convent	Distance to closest city centre: 1437 m	Distance to closest road: 13 m	Tourist presence (in 2019): 305	Final score: 3
<p>Description: Attached to the church of the Madonna dell'Arco di Sant'Anastasia, the ex-voto museum houses an exceptional collection of 8000 objects of unimaginable diversity, collected over five centuries. Among the many objects, it is the paintings that constitute the true originality of the museum. So, sometimes, they are made on paper by an improvised painter, they describe in detail the scene which, without the help of the virgin, would have been fatal for the donor. In addition to the iconographic richness, this collection has a great documentary value: it allows us to learn about the customs and traditions of the various social classes over the centuries and testifies to a profound faith in the Madonna dell'Arco (Dovere 2000).</p>					

Name: COMPLESSO DELLE BASILICHE					
Code: 194891	Type: Building	Distance to closest city centre: 146 m	Distance to closest road: 30 m	Tourist presence (in 2019): 640	Final score: 3
<p>Description: Founded by San Paolino da Nola, the early Christian complex of Cimitile is one of the oldest and most fascinating sites in Christianity and consists of seven basilicas which developed over nine centuries (from the 2nd to the 10th). Originally it included no less than 13 buildings built around a Christian cemetery, built in turn on the remains of Roman monuments. This veritable holy city welcomed crowds of pilgrims who came to gather on the tombs of numerous martyrs who were buried there (Dovere 2000).</p>					

Name: CONVENTO DI S. ANGELO					
Code: 224410	Type: Convent	Distance to closest city centre: 863 m	Distance to closest road: 60 m	Tourist presence (in 2019): 541	Final score: 3
<p>Description: Of late Gothic style, the beautiful refectory of the monastery of Sant'Angelo in Palco hosts a pictorial cycle from different eras that does not, however, affect the homogeneity: prophets, apostles and evangelists are depicted all around the great room whose main theme is the passion of Christ. Executed by an anonymous artist in 1503, the two frescoes representing the "Washing of the Feet" and "The Last Supper" are particularly admirable. St John stands out in this scene, lovingly resting his head on Jesus' shoulder, and having undeniable feminine features (Dovere 2000).</p>					

Name: CRIPTA					
Code: 180520	Type: Crypt	Distance to closest city centre: 633 m	Distance to closest road: 13 m	Tourist presence (in 2019): 245	Final score: 3
<p>Description: The mosaic floor and the ambo of the cathedral of SS. Peter and Paul. Founded by bishop Giacomo, a monk of the abbey of Montecassino, the cathedral of the most holy Peter and Paul of Sessa Aurunca did not suffer the sad fate of its Cassinian "matrix", razed to the ground by the Americans in 1944. The artistic heritage of this church it is unique for several reasons: the ambo is incomparable, and the amazing 12th-century mosaics, which cover its 142 m² floor, are the only testimony in the world (apart from the few fragments in Syrian churches) of art Alexandrian mosaic that the Cassinian Benedictines loved so much. This Byzantine masterpiece, destined to dazzle the profane and illuminate the spirit of the scholars, also contains the meaning of oriental carpets, which removed the faithful from the earth to elevate them to a transcendental dimension (Dovere 2000).</p>					

Name: CUPOLA DI S. FRANCESCO					
Code: 137790	Type: Church	Distance to closest city centre: 1426 m	Distance to closest road: 30 m	Tourist presence (in 2019): 177	Final score: 3
<p>Description: The ceiling of the church of San Francesco. In Teggiano, the church of San Francesco (early 14th century) boasts an astonishing painted ceiling whose almost perfect resemblance to a tapestry is striking. The tempera painting on wood, an uncommon technique that can only be admired in some cities of Campania, was performed in 1745 by two artists of the</p>					

area, Francesco De Martino and Anselmo Palmieri, when a false ceiling was added, to make the church. A master in the art of geometric and floral ornamentation, De Martino left religious subjects to Palmieri, and painted his favourite motifs that made his work look like sober and elegant embroidery (Dovere 2000).

Name: DUOMO

Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
274728	Cathedral	217 m	19 m	574	3

Description: The mysteries of the crypt of San Felice in the cathedral of Nola. Excavations conducted in 2013 in the chapel of the cathedral of Santa Maria Assunta unearthed the remains of a Roman house from the 1st century AD, just behind the alleged tombstone of San Felice, the first bishop of Nola. Thanks to a study still in progress, it has been established that this could be the oldest “domus ecclesiae” (house of Christian union) known so far. In these domus of the rich converts the first Christians gathered, around them places of worship were built, then transformed into churches. The hypothesis is supported by the hagiographies according to which Bishop Felice, beheaded in 95, was buried in a “domus” (Dovere 2000).

Name: DUOMO DI SAN PAOLO

Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
186353	Cathedral	392 m	1 m	377	3

Description: The Loreto temple of the cathedral of San Paolo. In the ancient cathedral of San Paolo di Aversa (1053), in 1630 an exact copy of the temple of Maria di Loreto was built in the left wing of the transept. Inside, you can admire three 17th-century canvases, an original brick from Nazareth, and numerous ex-votos, including a cannonball offered in 1510 by Pope Julius II, when he escaped a cannon shot fired by the besieged of Mirandola (Dovere 2000).

Name: EREMO CAMALDOLESI DI ASTAPIANA

Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
180954	Hermitage	465 m	16 m	292	3

Description: Agriturismo Villa Giusso: from a Camaldolese convent to a rural site. Located on a hill on the Sorrento coast, in Astapiana, a town overlooking Vico Equense and Meta di Sorrento, Villa Giusso has been listed as a historical monument. The building, which incorporates the structures of a 17th-century Camaldolese convent, was transformed into a “royal site” by Joachim Murat, king of Naples, when I confiscated the assets of the Church. In 1822 the residence was

bought by Luigi Giusso, Duke of Galdo, a very rich notable very close to Ferdinand II of Bourbon, king of Naples. Enchanted by its paradisiacal position, the duke restored it entirely and made it his summer residence (Dovere 2000).

Name: EX CONVENTO CHIESA DI S. FRANCESCO DI PAOLA

Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
194824	Church	487 m	32 m	602	3

Description: Unknown to most, Villa Lenzi (formerly the convent of San Francesco) in Cimitile stands out for its grandeur and the conventual forms still intact. A bright cloister, elegant furnishings, refined majolica floors transport the visitor into an atmosphere of other times: once you cross the threshold of the cloister, at Villa Lenzi everything seems to have remained as it was centuries ago. The construction of the convent-church complex (1587) was financed by Annibale Loffredi, who donated it to the Minimal Friars of San Francesco di Paola. Extensions and improvements were carried out in 1675 and 1685 (with frescoes by Antonio Vecchione). Unfortunately, the French troops caused damage in 1799 and in 1809 the suppression came. Passed to the state property, the property was purchased in 1870 by the honourable Michele Rossi, who assigned it to the processing of silkworms. He named the sons of his partner Gaspare Lenzi heirs. In more recent times, the Lenzi family has made it an elegant villa, respecting the architectural and decorative features of various conventual rooms, which revolve around the large arched cloister on 22 pillars (Dovere 2000).

Name: EX CONVENTO FRANCESCANI-CONVITTO NAZLE

Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
224507	Convent	836 m	7 m	209	3

Description: Giordano Bruno National Boarding School: the largest canvas in the world. Of the spectacular Convitto Giordano Bruno, which can be visited by reservation only, the vast hall whose ceiling of 72 m by 10.80 m, is embellished with an immense Baroque canvas (1756) which could be the largest canvas in the world. Giovanni Funaro, the author of this gigantic work, is inexplicably absent from the history of art books. He had no better luck than his son Giacomo, who was also one of the painters called to court to decorate the Royal Palace of Caserta. With the painting of the Giordano Bruno boarding school, which exalts the Christian faith and the Madonna, they really wanted to magnify the power of the Church (Dovere 2000).

Name: IMMOBILE CON STRUTTURE DI VILLA SUBURBANA DI ETÀ ROMANA					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
283614	Villa	324 m	41 m	102	3
<p>Description: Not far from the centre of Pozzuoli, the villa of Livia is a magnificent residence from the 1st century AD, which owes its name to a statue of the wife of Emperor Augustus, one of the sculptures that adorned the rooms. Found in the 19th century, the statue was sold, with others found on the spot, and is now part of the collections of the Ny Carlsberg Glittoteca in Copenhagen. If the name of the owner of the villa is known in Roman times, its imposing size suggests that it is an imperial palace. The layout of the reception rooms and other rooms, embellished with terraces and hanging gardens sloping down to the sea, follows the model of all the coastal vile, which allowed their very wealthy owners to enjoy the incomparable view of the gulf (Zefi 2010).</p>					

Name: MUSEO DELLE CARROZZE					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
167648	Museum	2088 m	15 m	90	3
<p>Description: Among the most secret places in Naples and its immediate surroundings, the private museum of the carriages of professor Leonardo Bianchi deserves a special mention: housed in the former stables of the castle where the kings of Naples often stopped when they went hunting, it houses 40 cars kept in an impeccable condition and all still in working order. Professor Bianchi, a distinguished neurologist and, as a young man, a promising horseman, over the years has collected unique carriages, from the smallest and most sporty to the largest and most sumptuous, produced between 1820 and 1920 in Italy and abroad and belonging to members of high society (Franchini and Grimaldi 2018).</p>					

Name: PALAZZO ABBAZIALE DI LORETO					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
387230	Building	757 m	37 m	201	3
<p>Description: Built in 1732 to replace an eighth century building that was razed to the ground by the earthquake, the abbey palace of Loreto, dependent on the monastery of Montevergine, is the work of the architects A. Vaccaro and M. Di Blasio, who were able to harmonize their respective tastes, to curved lines and straight lines, giving the building a style unmatched for the time. Damaged several times, the building has been restored respecting the original decoration. One is fascinated by the exquisite taste of the whole: the audience hall; the splendid pharmacy with its</p>					

walnut furniture that housed ceramic vases made by the famous Giustiniani atelier, which also produced the majolica on the various floors; the sumptuous chapter house with the walls covered with red damask and the three Flemish tapestries of the sixteenth century; the chapel enriched, among other treasures, by a choir whose walnut chairs are decorated with leather inlays; the splendid archives of the precious wood cabinets that house 7000 parchments and 100,000 ancient manuscript documents; the very rich library, to which 38 incunabula, 10 illuminated manuscripts and 24 codices (from the 13th to the 15th century) belong; 2000 sixteenth century and other 200,000 volumes dated between the seventeenth and twentieth centuries (Aceto et al. 1988).

Name: **PALAZZO ACCONCIA**

Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
341077	Building	187 m	36 m	422	3

Description: Of the beautiful Palazzo Mondo, built in the eighteenth century, you can visit the first floor by appointment, which houses some rooms of amazing richness: the reading room, the dining room, the “picturesque” living room, the room decorated with allegories of marriage union, the prayer room and the study with murals softened by motifs inspired by Etruscan art. Among all these splendours, the corner living room and the archetype of the Baroque itself: the paintings painted as wall frescoes surrounded by majolica, the ceiling covered with architectural motifs, are stunning. They were performed by the Magri brothers, specialists in this kind of scenography that “expand” the space to infinity. Domenico Mondo (1723-1806), who lived in this palace until 1789, painted eight allegorical female figures depicting the virtues, which add to the already very rich decoration of this room (Campanelli and Tartaglione 1997).

Name: **PALAZZO E LE PORTE ED I SOFFITTI IN LEGNO SCOLPITO**

Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
342108	Building	1209 m	2 m	180	3

Description: The esoteric symbolism of the castle of the Marquis Caracciolo del Balzo. Built in 1581, the enigmatic and splendid castle of the Caracciolo del Balzo family can be visited by appointment only: to admire in particular the dear walnut coffered ceilings and the decorations of the Hall of Justice, 22 meters long and 9 wide, in the hall of ark of Noah, and that of the “little birds”. Also, not to be missed is the chapel consecrated by Pope Benedict 13th in 1727. The castle has, however, another surprising peculiarity: both the facade and the interiors are studded with esoteric symbols that fascinate lovers of hermeticism and alchemy. In his book “the temple

of the Caracciolo”, Marco Di Donato traces a complete and precise picture of the numerous symbols of which the castle is scattered, also describing the mysterious personality of the Marquis Francesco Caracciolo (Di Donato 2015).

Name: PARCO MONUMENTALE DI BAIA

Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
166962	Park	579 m	17 m	295	3

Description: Baia is known a bit like the Roman Atlantis, thanks to the precious finds that are found underwater and the excellent state of conservation of the city. You can see the road layouts, the statues, the shops and the patrician villas that overlooked the renowned seaside and spa town. From the late Republican age and up to the Empire of Augustus, Baia was a thriving town renowned for the quality of the sulphurous waters, excellent for health problems. The intact domes and with pieces of frescoes of the submerged park were considered for a long time, at least in popular belief, the remains of temples. And they are still called that. Sacked by the Saracens in the eighth century, the city of Baia was abandoned and remained so until 1500 when, due to bradyseism (periodic lowering or raising of the ground) it sank to 5-8 meters below sea level. What remains in the sunlight of the ancient Bay is the hilly part of the city which today is at the same level of the sea (Maniscalco 2004).

Name: SANTUARIO DI MONTE VERGINE

Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
347299	Shrine	1301 m	54 m	183	3

Description: The episcopal throne of the Montevergine museum. Almost unknown, despite the crowds of pilgrims attracted to the sanctuary, the museum of Montevergine is undoubtedly exceptional for the richness and variety of its collections and is really worth a visit, if only for the extraordinary episcopal throne, completely unknown. Despite the numerous studies of eminent medievalists, the throne remains an enigma, since, if it is true that it was undoubtedly used by the abbot of the monastery when the emperor Henry VI appointed it feudal baron in 1195, too many profane elements, coming from art Muslim and Sassanid, they suggest the throne of a prince (perhaps Emperor Frederick II, a great admirer of Arab culture), probably offered as an ex-voto (Dovere 2000).

Name: SANTUARIO DI SANTA MARIA DI CASALUCE					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
138725	Church	193 m	23 m	630	3
<p>Description: Built in the 14th century by order of Raymond of Beaux, a powerful Provençal lord, the sanctuary of Casaluce houses many almost completely unknown treasures: an icon of the Black Madonna, two alabaster vessels that were used by Jesus to transform water into wine during the wedding banquet at Cana as well as rare frescoes made by the pupils of Giotto, a painter at the Angevin court in Naples. Brought from the Holy Land in 1276 by Ruggero di Sanseverino for Charles I of Anjou, king of Naples and Jerusalem, the Black Virgin and the vases were entrusted to Raymond of Beaux by Ludovico d'Angiò (nephew of Charles I, bishop of Toulouse who later became San Ludovico) with the promise to consecrate a sanctuary to them. Raymond commissioned the Celestine monks to build a church in honor of the Black Virgin. The icon managed to escape terrible looting and natural disasters, which instead caused major damage to the convent. In fact, only the ruins remain of the latter (which can be visited), as well as a dozen rooms adjacent to the church, which preserve the beautiful frescoes of Giotto's school (Dovere 2000).</p>					

Name: SANTURIO DI S. MARIA CETRELLA					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
347263	Shrine	370 m	22 m	450	3
<p>Description: Far from the crowds and the most beaten paths, the hermitage of Cetrella can be reached after a spectacular walk in the Capri woods overlooking the sea. Built on a precipice overlooking Marina Piccola, it dates back to the 15th century. The place was especially dear to Capri sailors who used to go up on a pilgrimage to the church of Cetrella before the dangerous expeditions to collect coral. It is a place that leads to peace and contemplation. On the ground floor there is the church with the refectory and the kitchen. The former cells of the friars are on the first floor. At the end of the corridor you come out on a natural terrace that seems to be suspended in space. From here it is possible to be enchanted by a breath-taking view of Marina Grande, Monte Tiberio, Marina Piccola and the faraglioni, the Sorrento coast and, on clear days, also the gulf of Salerno and the Amalfi coast, the internal mountains of Salerno and the coast. southwards to the Punta Licosa lighthouse (Dovere 2000).</p>					

Name: TEATRO ROMANO (RESTI)					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
280885	Theatre	632 m	22 m	298	3
<p>Description: The Roman theater of Teano, reopened after a long period of closure, is a spectacular hidden treasure: the entire surface of the cavea and, just beyond, half of the stage building are visible. It is the oldest theatre in Italy whose cavea was completely supported by a system of doors: it was part of an architectural complex built from a large artificial terrace on which there was also a temple probably dedicated to Apollo. An entire sector of the beautiful Archaeological Museum of Teanum Sidicinum is dedicated to the Teano Theater with reconstructive models, architectural remains and grandiose sculptures (Pensabene 2007).</p>					

Name: VILLA VALVA DEI MARCHESI D'AYALA					
Code:	Type:	Distance to closest city centre:	Distance to closest road:	Tourist presence (in 2019):	Final score:
264393	Villa	151 m	33 m	365	3
<p>Description: Located just outside the historic centre of Valva, the park of Villa d'Alaya extends over 17 hectares surrounded by a wall. It consists of a grove, two Italian gardens, and a spectacular "green theatre" formed by box trees in the shape of steps, dotted with sculpted heads of "spectators". The park is embellished with statues, fountains, ponds, small buildings, canals probably built in Roman times. More caves, one of which is called the "den of monsters" (it houses terrifying-looking sculptures), complete this extraordinary example of open-air architecture. Along the avenue leading to the castle, the statues representing Meleager and Hercules, the allegories of the arts (music, dance, song, painting and sculpture) and the three Graces (Roman goddesses who personify happiness, abundance and splendour). The park castle and the crenelated tower were probably built in the 11th century by the Norman lord of Valva, nicknamed Gozzolino (Franchini and Grimaldi 2018).</p>					

7.2 Query Codes

Follows the detailed query codes used during the analyses.

7.2.1 Getting the data ready for the analyses - Code

- Added the two files to the workspace in the GIS and converted the .kml file in a shape file format: processing toolbox > gdal > vector conversion > convert format > output file 'cultural_heritage_sites'. Joined the tables of the two files (.csv and .shp) on the column 'name' (for the .csv) and 'denomination' (for the .shp)
- Added the streetmap basemap to the project.
- Added the municipal boundaries of Italy layer and selected only those within Campania region: vector selection > extract by location.
- Added a layer with all the roads of Italy and extrapolated only those within Campania boundary: vector selection > extract by location. To be able to carry out analysis on the distance between the sites and the closest roads, I had to transform a column in this layer from string to integer: field calculator > to_int(osm_id).
- Added an osm layer with all the places of Italy (cities, towns, etc.) and extrapolated only those within Campania boundary: vector selection > extract by location

7.2.2 Calculating the distance from a site to the closest road - Code

In the cultural_layer_sites (a point layer) I added two columns, one for the distance (dist_road) and one for the id of the roads (id_roads). Follows the analysis: processing toolbox > grass > vector > v.distance. 'from' vector map select layer cultural_heritage_sites; 'to' vector map select layer 'roads_campania'; 'upload' select 'dist' and 'to_attr'; column name(s) where... select 'dist_road' and 'id_road'; column name of nearest... select 'roads_id'; file output 'Nearest' = 'sites_nearest_roads'; file output 'Distance' = 'sites_distance_roads'; RUN. The result is a shape file with all the distances in metres from each Cultural Heritage site to its closest road.

Setting ranges with output values from '1' to '9' for the distance from a site to the closest road:

CASE

```

WHEN "dist_road" <= 500 THEN 9
WHEN "dist_road" > 500 AND "dist_road" <= 1000 THEN 8
WHEN "dist_road" > 1000 AND "dist_road" <= 1500 THEN 7
WHEN "dist_road" > 1500 AND "dist_road" <= 2000 THEN 6
WHEN "dist_road" > 2000 AND "dist_road" <= 2500 THEN 5
WHEN "dist_road" > 2500 AND "dist_road" <= 3000 THEN 4
WHEN "dist_road" > 3000 AND "dist_road" <= 3500 THEN 3
WHEN "dist_road" > 3500 AND "dist_road" <= 4000 THEN 2
WHEN "dist_road" > 4000 THEN 1

```

END

7.2.3 Calculating the distance from a site to the closest city centre - Code

In the cultural_heritage_sites (a point layer) I added two columns, one for the distance (dist_place) and one for the id of the places (id_places). Follows the analysis: processing toolbox > grass > vector > v.distance. 'from' vector map select layer cultural_heritage_sites; 'to' vector map select layer 'city_town_campania'; 'upload' select 'dist' and 'to_attr'; column name(s) where... select 'dist_place' and 'id_place'; column name of nearest... select 'places_id'; file output 'Nearest' = 'sites_nearest_roads'; file output 'Distance' = 'sites_distance_roads'; RUN

Setting ranges with output values from '1' to '5' for the distance from a site to the closest city centre:

CASE

```
WHEN "dist_place" <= 5000 THEN 5
WHEN "dist_place" > 5000 AND "dist_place" <= 10000 THEN 4
WHEN "dist_place" > 10000 AND "dist_place" <= 15000 THEN 3
WHEN "dist_place" > 15000 AND "dist_place" <= 20000 THEN 2
WHEN "dist_place" > 20000 THEN 1
```

END

7.2.4 Assigning values for each type of Cultural Heritage - Code

For this analysis I needed to export the values from the 'cultural_heritage_sites' layer to a new one: 'cultural_heritage_sites_analyses'. In this new layer I had to assign a typology (Type) to each Cultural Heritage that has not been correctly catalogued or with missing data. It means that for some records the field 'Type' was not filled during the cataloguing and there was a 'NULL' output in that field. In some other cases, the records were wrongly catalogued (e.g. 'Abbey' recorded as 'Road', etc.). Consequently, within the field calculator and with a specific function, I updated the column 'Type' with 'NULL' values.

In order to assign values for each type of Cultural Heritage, I had to create a csv table (cultural_heritage_score_by_type) with scores for each type of cultural heritage: vector analysis > statistic by categories; then I added a column in the table with values for each feature (type of cultural heritage).

Assigning typology values to each Cultural Heritage not correctly catalogued or with missing data:

CASE

WHEN "Type" IS NOT NULL THEN "Type"

ELSE

CASE

WHEN "Name" ilike '%large farm%' THEN 'large farm'

WHEN "Name" ilike '% dwelling %' THEN ' dwelling '

WHEN "Name" ilike '%apartment%' THEN 'building'

WHEN "Name" ILIKE '%hamlet%' THEN 'urban settlement'

WHEN "Name" ILIKE '%area%' THEN 'scattered settlement'

WHEN "Name" ILIKE '%remains%' THEN 'scattered settlement'

WHEN "Name" ILIKE '%church%' THEN 'church'

WHEN "Name" ILIKE '%complex%' THEN 'building'

WHEN "Name" ILIKE '%abbey%' THEN 'abbey'

WHEN "Name" ILIKE '%edifice%' THEN 'building'

WHEN "Name" ILIKE '%plot%' THEN 'settlement tracks'

WHEN "Name" ILIKE '%real estate%' THEN 'real estate'

WHEN "Name" ILIKE '%institute%' THEN 'building'

WHEN "Name" ILIKE '%accommodation%' THEN 'building'

WHEN "Name" ILIKE '%ruins%' THEN 'settlement tracks'

WHEN "Name" ILIKE '%district%' THEN 'urban settlement'

WHEN "Name" ILIKE '%land%' THEN 'settlement tracks'

WHEN "Name" ILIKE '%estate%' THEN 'real estate'

WHEN "Name" ILIKE '%real estates%' THEN 'real estate'

ELSE "Type"

END

END

Assigning each record a score on the base of the type of feature:

CASE

WHEN "Type" IN

('aqueduct' , 'dock' , 'shop' , 'orphanage' , 'channel' , 'funnel' , 'jail' , 'farmhouse' , 'farmstead' , 'barracks' , 'small house' , 'little house' , 'quarry' , 'middle' , 'tank' , 'dovecote' , 'columbarium' , 'colony' , 'repository' , 'customs' , 'dryer' , 'pharmacy' , 'farm' , 'guesthouse' , 'furnace' , 'oven' , 'washroom' , 'warehouse' , 'large farm' , 'orphanage' , 'hospice' , 'pavilion' , 'gym' , 'bakery' , 'powder keg' , 'post office' , 'stable' , 'kindergarten' , 'primary school' , 'secondary school' , 'tank' , 'greenhouse' , 'silo' , 'substructure' , 'stable' , 'agricultural terracing' , 'cow farm' 'dwelling' , 'hotel' , 'farm' , 'house' , 'conservatory' , 'hospital' , 'apartment bloc' , 'seminar' 'arsenal' , 'shipyard' , 'circus' , 'collegiate' , 'college' , 'newsstand' , 'oratory' , 'building')

THEN '1'

WHEN "Type" IN

('cell' , 'cemetery' , 'factory' , 'crusher' , 'real estate' , 'lazaretto' , 'mill' , 'workshop' , 'vegetable garden' , 'sanatorium' , 'dry cleaner' , 'court' 'canonical' , 'coenobium' , 'curia' , 'rural service building' , 'sacristy' , 'university' 'antiquarium' , 'archive' , 'arc' , 'fortification wall' , 'city wall' , 'courtyard' , 'crypt' , 'cryptoporticus' , 'building' , 'episcopal' , 'beacon' , 'fountain' , 'hole' , 'garden' , 'scattered settlement' , 'lodge' , 'single wall' , 'observatory' , 'door' , 'gate' , 'porch' , 'dock' , 'refuge' , 'shrine' , 'cottage' 'cloister' , 'convent' , 'domus' , 'gallery' , 'brothel' , 'jetty' , 'town hall' , 'cliff' , 'tavern' , 'hot sprigs' , 'settlement tracks')

THEN '2' then

WHEN "Type" IN

('amphitheater' , 'library' , 'bell tower' , 'column' , 'convent complex' , 'house of worship' , 'hermitage' , 'strong' , 'blockhouse' , 'spa' , 'urban settlement' , 'well' , 'wall structure' , 'wall structures' , 'tower' , 'fortified tower' 'abbey' , 'baptistry' , 'house of worship and annexes' , 'fortress' , 'cave' , 'fortified settlement' , 'park' , 'church' , 'pile-dwelling settlement' , 'market' , 'bridge' , 'shrine' , 'stage' , 'station' , 'grave' , 'villa' , 'village' 'acropolis' , 'urban area' , 'city cathedral' , 'chapel' , 'castle' , 'catacomb' , 'catacombs' , 'cathedral' , 'charterhouse' , 'dome' , 'monumental fountain' , 'rock settlement' , 'mausoleum' , 'monastery' , 'monument' , 'funerary monument' , 'museum' , 'necropolis' , 'obelisk' , 'square' , 'rock burial ground' , 'street' , 'theater' , 'temple')

THEN '3'

END

Table 5: Assigning values for each single site of cultural heritage – Example list

NAME	CODE	SCORE
Il Carpine	1197627	2
Cas.Cappellini	429080	2
Cas.Enrico Toti	429076	2
Casa Moro	472900	2
Epitaffio	142210	2
Fondo Candelara	Null	2
Il Muro	1198380	2
Il Muro	1198380	2
Il Muro	1198380	2
Il Muro o Il Forno	1198424	2
La preta lo Piesche	1198342	3
La Rocca o Castello	1198416	2
La Rocca o Castello	1198416	2
SS.Rosario e S.Rocco	469462	3
Villa Tosti di Valminuta	2960331	2
[nome attribuito]	24805	2
Abbazia	132631	3
Abbazia Basiliana (ruderi)	213911	3
Abbazia della Ferrara	213946	3
Abbazia della Trinità di Cava	213901	3
Abbazia si S.Guglielmo al Goleto	213967	3
Abbazia di S.Maria della Libera	213966	3
Abbazia di S.Maria Maddalena in Armillis	213909	3
Abbazia si S.Pietro (avanzi)	213945	3
Abbazia di S.Vito	213984	3
Abbazia di San Pietro ad Montes	3132492	3
Abbeveratoio di S.Maria ad Peti	24963	2
Abellinum (resti)	288766	3
Abitato	319115	1

Table 6: Assigning values for touristic flow for each single site of Cultural Heritage: Example list

NAME	CODE	TOURISTIC FLOW
Il Carpine	1197627	8
Cas.Cappellini	429080	9
Cas.Enrico Toti	429076	9
Casa Moro	472900	9
Epitaffio	142210	8
Fondo Candelara	Null	5
Il Muro	1198380	9
Il Muro	1198380	9
Il Muro	1198380	9
Il Muro o Il Forno	1198424	9
La preta lo Piesche	1198342	3
La Rocca o Castello	1198416	9
La Rocca o Castello	1198416	9
SS.Rosario e S.Rocco	469462	2
Villa Tosti di Valminuta	2960331	2
[nome attribuito]	24805	5
Abbazia	132631	2
Abbazia Basiliana (ruderi)	213911	2
Abbazia della Ferrara	213946	2
Abbazia della Trinità di Cava	213901	2
Abbazia si S.Guglielmo al Goletto	213967	2
Abbazia di S.Maria della Libera	213966	2
Abbazia di S.Maria Maddalena in Armillis	213909	2
Abbazia si S.Pietro (avanzi)	213945	2
Abbazia di S.Vito	213984	2
Abbazia di San Pietro ad Montes	3132492	2
Abbeveratoio di S.Maria ad Peti	24963	5
Abellinum (resti)	288766	4
Abitato	319115	9

7.2.5 Aligning the scores output for the Weighting Analysis – Reclassify Query Code

Each factor had scores with a different range of output. This is how the range where set:

- Distance between the site and the closest road = from 1 to 9
- Distance between the site and the closest city centre = from 1 to 5
- Historical and artistic value of the type of Cultural Heritage = from 1 to 3
- Historical and artistic value of each single site = from 1 to 5
- Touristic affluence for each single site = from 1 to 10

In order to apply the Weighing Analysis to these factors, the outputs needed to be reclassified, so that the weights could be equally affect all the records. The factor ‘Historical and artistic value of the type of Cultural Heritage’ did not need to be reclassified as its scores had already a range from ‘1’ to ‘3’. This is the query code for the reclassification of the other four factors:

Reclassifying factor ‘Distance between the site and the closest road’

CASE

```
WHEN "dist_road" = 9 THEN 3
WHEN "dist_road" = 8 THEN 3
WHEN "dist_road" = 7 THEN 3
WHEN "dist_road" = 6 THEN 2
WHEN "dist_road" = 5 THEN 2
WHEN "dist_road" = 4 THEN 2
WHEN "dist_road" = 3 THEN 1
WHEN "dist_road" = 2 THEN 1
WHEN "dist_road" = 1 THEN 1
```

END

Reclassifying factor ‘Distance between the site and the closest city centre’

CASE

```
WHEN "dist_place" = 5 THEN 3
WHEN "dist_place" = 4 THEN 3
WHEN "dist_place" = 3 THEN 2
WHEN "dist_place" = 2 THEN 1
WHEN "dist_place" = 1 THEN 1
```


END

Reclassifying factor 'Historical and artistic value of each single site'

CASE

```
WHEN "Name_score" = 5 THEN 3  
WHEN " Name_score" = 4 THEN 3  
WHEN " Name_score" = 3 THEN 2  
WHEN " Name_score" = 2 THEN 1  
WHEN " Name_score" = 1 THEN 1
```

END

Reclassifying factor 'Touristic affluence for each single site'

CASE

```
WHEN "tour_flow" = 10 THEN 3  
WHEN "tour_flow" = 9 THEN 3  
WHEN " tour_flow" = 8 THEN 3  
WHEN " tour_flow" = 7 THEN 2  
WHEN " tour_flow" = 6 THEN 2  
WHEN " tour_flow" = 5 THEN 2  
WHEN " tour_flow" = 4 THEN 2  
WHEN " tour_flow" = 3 THEN 1  
WHEN " tour_flow" = 2 THEN 1  
WHEN " tour_flow" = 1 THEN 1
```

END

Department of Physical Geography and Ecosystem Science

Master Thesis in Geographical Information Science

1. *Anthony Lawther*: The application of GIS-based binary logistic regression for slope failure susceptibility mapping in the Western Grampian Mountains, Scotland (2008).
2. *Rickard Hansen*: Daily mobility in Grenoble Metropolitan Region, France. Applied GIS methods in time geographical research (2008).
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