LOST AND FOUND
Processes of abandonment of the architectural and urban heritage
in inner areas. Causes, effects, and narratives (Italy, Albania, Romania)

Edited by Annunziata Maria Oteri

Per una mappa digitale del patrimonio costruito in disuso: il caso di Ferruzzano. Metodologia e esiti della mappatura

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A seguito di alcune premesse riguardanti le potenzialità e i possibili utilizzi della cartografia digitale nei processi di conoscenza dei piccoli centri storici, il presente contributo propone un metodo speditivo per valutare le principali caratteristiche e lo stato di conservazione del patrimonio costruito di piccoli insediamenti siti in aree marginali. Verranno illustrati nello specifico l'approccio selezionato per la raccolta dei dati, la metodologia utilizzata per elaborarli e i risultati ottenuti. Questa parte della ricerca RIBA ha l'obiettivo di definire possibili modalità per comprendere le problematiche peculiari dei piccoli centri storici a rischio di abbandono, sperimentando questo approccio attraverso un caso studio, l'antico insediamento di Ferruzzano Superiore (Reggio Calabria), per testimoniarne la flessibilità e la possibilità di applicazione ad altri contesti simili. I dati raccolti attraverso rilievi speditivi sul campo, che hanno riguardato le caratteristiche urbane e architettoniche del patrimonio costruito e lo stato di conservazione delle strutture e dei materiali, sono stati raccolti in un database digitale e sintetizzati in mappe tematiche, evidenziando le criticità individuate. L'applicazione di questa metodologia mostra come tale approccio, seppur speditivo, possa fornire una base conoscitiva essenziale per supportare i processi decisionali che coinvolgono il riutilizzo e la valorizzazione del patrimonio architettonico dei piccoli centri storici.

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Digital Mapping for the Neglected Built Heritage: the Case of Ferruzzano Superiore. Methodology and Outcomes

Morena Scaglia, Caterina Valiante

The RIBA research *Lost and Found* included the framing of analytical approaches to the knowledge and preservation of abandoned small historical centres. In this regard, part of the investigation has been implemented at the architectural scale through the analysis of the old settlement of Ferruzzano (Reggio Calabria), a municipality classified as "peripheral" by the National Strategy for Inner Areas and included in the Grecanica pilot area[1].

Within the framework of a history-based approach[2], this study was developed along two different axes: the processes of knowledge of small historical settlements and the methodologies for transferring data into digital tools. The goal of this part of the research is to define and experiment with an expeditious method to comprehend the features of the town in terms of built heritage and broader context and to gather and disseminate the data and the obtained results through an agile tool for other scholars but also for supporting the decision-making processes at a local level.

This article is the result of the joint work of the both authors: however, from an editorial point of view, the introduction and *From filling to mapping* are to be attributed to C. Valiante, *Ferruzzano: the case study* and *Sheets for the census of the historical buildings and open spaces* to M. Scaglia.

1. For further details about the Grecanica area, see: https://www.agenziacoesione.gov.it/strategia-nazionale-aree-interne/regione-calabria-aree-interne/grecanica/ (accessed 15 July 2023).

2. For more information about the history-based approach proposed see Oteri in this volume, pp. 8-39.

Furthermore, the conducted analyses are aimed at investigating the morphology, the kinds of construction and functions of the built heritage, assessing the state of use and conservation, verifying the transformations that occurred, and finally archiving the – constantly updatable – data collected.

The studies about small historical centres in marginalised areas have been quite diffused lately[3], regarding the state of conservation of the built heritage, the strategies for its regeneration, the tools for assessing risks and threats, the abandonment processes, and implementing digital tools. As stated by various authors[4], the preservation of small historical centres still represents an open issue since their configuration and morphology are peculiar and different from the single monuments: they require a specific approach, as they are not a simple summation of cultural heritage but a complex system[5]. In this sense, digital tools can represent an effective device for facing these issues.

The opportunities given by digital mapping tools, mainly Geographic Information Systems, have been widely experienced at a territorial scale in the field of urban planning since the Eighties[6]. In the field of architectural preservation, these tools are generally implemented for the mapping and organisation of data regarding monuments or single buildings[7], however, they were also applied to historical centres thanks to experimentations on academic and institutional levels. Among the first studies about the implementation of GIS systems for historical centres there are some important surveys and filing proposals for differentiating the categories "cultural heritage" and "historical centre" within wider census initiatives[8]. Extensive research has been conducted mainly regarding the relationship between historical settlements and risk mitigation, in particular in seismic contexts[9]. The latest investigations in this field were developed in the framework of the Italian *Carta del Rischio*, the "Risk

3. Within the studies about the historical centres, the activities of the National Association Historical Centres (ANCSA) have been crucial, starting from the national conference for the protection and preservation of the historical centres held in Gubbio in 1960, see Ancsa 1961. More recently, many contributions published in this field, among them: Ancsa 2017; Barbanente, Maiellaro 1993; Bartolomucci, Cacace 2008; Bellini, Canevari, Marescotti 1995; Fiorani 2019; Giambruno 2007; Monti, Brumana 2004; Stabile, Zampilli, Cortesi 2009; Toppetti 2011.

4. Fiorani 2019; Giambruno 2007; Savarese, Valentino 1993.

5. Mancinelli, Negri 2019, in Fiorani 2019, pp. 55-64.

6. Fiorani 2019, p. 39; Gabrielli 1993, pp. 229-236.

7. Among others, Achille, Brumana 2004; Agapiou 2015; Bartolomucci 2003; Negri 2008; Panzero, Ferruggia 2009.

8. Reference is made to the census proposed by Bellini *et al.* 1995 and to the new filing proposed for the historical centres within the "Carta del Rischio" by Cacace, Fiorani 2015.

9. See the various contributions collected in Oteri, Scamardì 2020; Bartolomucci, Bonzagni 2012; Faccio, Zamboni 2020.

Charter for the Cultural Heritage", together with La Sapienza University, and proposed a first knowledge and inventory method precisely conceived for the historical centres, aiming not only to conduct an analysis of their state of conservation but also to provide technical support to future urban planning strategies. This methodology, in fact, took into consideration urban aggregates, not single buildings, assuming the settlements as systems interrelated with the context and proposing a specific cataloguing approach able to register the features of such a complex heritage[10]. Besides the "Risk Charter", from the institutional perspective, some attempts for the inventory and digital mapping of small historical centres were carried out both at the national and regional levels, often concerning natural hazard prevention strategies. Reference is made to the extensive work done by the Italian Central Institute for the Cataloguing and Documentation (ICCD) and the heterogeneous local initiatives that many regions realised, such as Lombardy, Veneto and Calabria itself[11], which although do not provide specific surveys of the historical centres and only in a few cases indicate their delimitations. At a national scale, the Civil Protection Department experimented with a strategy for the prevention of seismic hazards and the assessment of the vulnerability of historical centres in order to provide additional support during the emergency phase, realising an "Atlas of the historical centres exposed to seismic risk", a tool implemented on various Italian municipalities but not on the entire national territory[12].

In addition to these inventory and mapping initiatives on a large scale, it is necessary to quote some important in-depth studies conducted on single historical centres, mainly within the framework of post-earthquake reconstruction plans, which this research took as a reference too. Such initiatives, which will be explained in detail below, usually include extensive field survey campaigns and comprehensive cataloguing sheets that lead to thematic maps and reports intended as guidelines for public and private interventions on the built heritage.

Considering the studies mentioned above, this work aims to propose an intermediate approach between the national scale inventories and the built heritage in-depth analyses, an expeditious investigation that reaches the building scale but does not require extended field surveys, providing support to guide future settlement reuse strategies. In the Grecanica area, various initiatives for the regeneration of marginal areas and hamlets have been recently diffused, such as the National Strategy

10. See the case study applications reported in Fiorani, 2019, pp. 163-178 and 193-226.

11. In the case of Calabria, in 2011, the region defined a list of the historical centres and small settlements subject to protection and valorisation, among which Ferruzzano (Deliberazione 44, 10 febbraio 2011, LUR n. 19/02 art. 48 comma c).

12. See the Civil Protection Department website: https://rischi.protezionecivile.gov.it/it/sismico/attivita/censimento-dei-centri-storici-esposti-al-rischio-sismico/ (accessed 15 July 2023).

for Inner Areas, the so-called “Bando Borghi” promoted by the National Recovery and Resilience Plan (PNRR)[13] and other local experiences activated by the Grecanica Local Development Agency, such as the “Spiti ti musikì”, a “House for the music” founded in Gallicianò for the preservation and valorisation of local traditions. Similar strategies could represent useful occasions for the relaunch of the territory, although it appears essential to ensure appropriate interventions on the architectural heritage through expeditious methods addressed to the local authorities.

For this purpose, the paper deals with the step-by-step process carried out to assess the built heritage consistency and state of conservation of Ferruzzano Superiore, starting from the general territorial framework in which it lies, to proceed with the on-site survey campaign, data collection and processing through digital mapping tools with the aim of equipping institutions with intuitive tools at support of their decision-making processes in light of unfolding the hamlet reactivation potential[14].

Ferruzzano: the case study

State of the art, Services, Urban structure

Ferruzzano Superiore is one of the many little-known towns in Calabria that split in the last century in favour of safer and more accessible settlements, unaffected by hydrogeological instability and more favourable in terms of job opportunities[15]. Its newer "downstream" town lies along the coast and it’s called Ferruzzano, the seat of a peripheral municipality counting 736 inhabitants[16], while Ferruzzano Superiore, the historic hamlet, is positioned "upstream" on the homonymous hill, 475 meters above sea level[17].

In a barely urbanised territory where the natural component is predominant, Ferruzzano Superiore overlooks the Aspromonte National Park to the west, the Ionian Sea to the east and the Fiumara Laverde to the north, in an enviable geographical location where Ferruzzano Superiore dominates the arid Mediterranean landscape from above.

13. Ferruzzano is one of the sixteen municipality of Calabria funded by the Line B – “Proposals for the cultural and social regeneration of small historical hamlets” (total amount: € 1,5 million); https://www.beniculturali.it/comunicato/approvazione-graduatorie-aggiornate-decreto-sg-n-378-del-200423-pnrr-m1c321-attrattivita-dei-borghi (accessed 15 July 2023).

14. See Pistidda in this volume, pp. 228-259.

15. Teti 2020.

16. Up to 01/01/2024-ISTAT. See https://www.tuttitalia.it/calabria/92-ferruzzano/ (accessed 8 September 2023).

17. See Mareggi, Rombolà in this volume, pp. 126-149.

Located 65 km from the capital Reggio Calabria and 120 km from Catanzaro, Ferruzzano Superiore' residents for goods and services (education, health, mobility) lean on the coastal towns, from Bianco to Brancaleone, reachable at the most with 25 minutes by car, while the nearest hospital is in Locri, distant by the same means a little less than an hour (fig. 1).

As of today, the built fabric of this hamlet is largely empty, with around a decade of permanent residents, a result of a process of migration concentrated in recent times because of the 1908 royal decree of settlements for consolidation and/or transfer[18], the 1973 regional laws on the same topic[19] and, mostly, the last earthquake hitting Ferruzzano in 1978[20].

The advanced state of generalised decay in which the village currently lies is the result of this exodus process, whereby the absence of daily use has been combined with the neglect of the owners and their descendants in maintaining the inherited properties, only occasionally in good condition to betray a possible use as seasonal residences.

The abandonment that characterises the built-up area has not equally affected the farmlands along the slopes; although greatly reduced in number, orchards and vegetable gardens are still cared for by owners who go there specifically. Vines and olive trees are the predominant crops, while the cultivation of mulberry trees for silkworm breeding is also historically attested[21].

Ferruzzano Superiore occupies the entire hill ridge while at its foot there are two expansions, Saccuti (to the east) and Stinchi (to the west), built post-earthquake 1908[22].

The village is crossed by a driveway that reaches it from the "orecchione" of via Pioppo and continues to the locality of Stinchi after branching into via Giacomo Matteotti, and from there to the village's only square, via Umberto I, and its parallel, the wider and longer Via Regina Margherita (fig. 2).

The building system has a compact layout, visibly designed for slow travel, especially in the northernmost and southernmost parts, likely the oldest. As for the square overlooked by the Church of San Giuseppe, it is conceivable that before the 1908 earthquake, there was the same dense built-up area. Indeed, Michele Spinella reports: «Il terremoto […] non aveva distrutto tutto il paese ma quella parte soltanto che era a sud-est e comprendeva i rioni Piazza e Pioppo, ed era la parte più bella»[23].

18. National Law, 30th July 1908, n. 445, Titolo II, *Provvedimenti per le Calabrie.*

19. Regional Law, 31st August 1973, n. 16, *Trasferimento e consolidamento degli abitati colpiti da calamità naturali.*

20. E.L. 1978, p. 5.

21. Spinella 1996, p. 24 and p. 44.

22. Perrone 2007, p. 22.

23. Spinella 1996, p. 76.

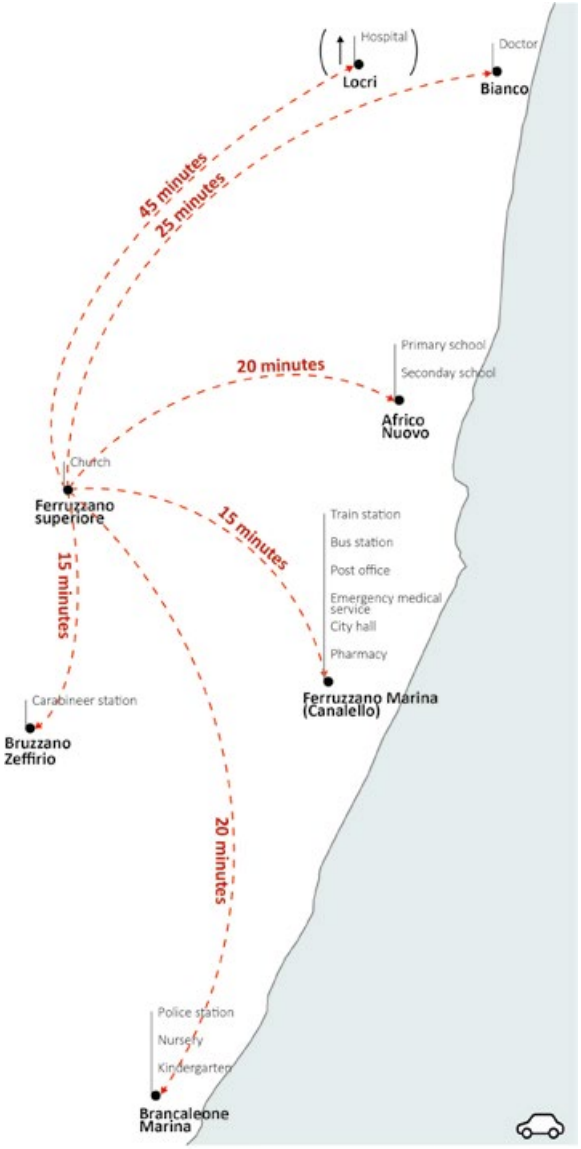

Figure 1. Distance of Ferruzzano Superiore from the main services (elaboration by the authors).

Figure 2. Accessibility to Ferruzzano Superiore and layout (elaboration by the authors).

Sample area

To determine possible strategies for the preservation and compatible reuse of individual assets and, on a larger scale, of the entire town of Ferruzzano Superiore, reporting the state of the art has been an obligatory step.

Having assessed the anteriority of the built-up area at the top of Ferruzzano hill with respect to the twentieth-century offshoots, the orographic margins of the relief have been taken as boundaries of the surveyed area.

Out of this perimeter, saturated with buildings or their traces, further portioning has been established for the analysis of the built-up component. Meanwhile, for the open spaces, the study has been extended to the entire core; indeed, for the built heritage, the shortage of time and the

impossibility of accessing some buildings led to the identification of two significant sample areas from which to generalise and extend the results to the entire built heritage of Ferruzzano.

To collect a significative picture of the centre to determine its reactivation potential[24], it has been chosen to prioritise the most historically consistent built comparts, leaving for later stages very transformed areas and very ruined ones. As a result, by joining the northernmost and southernmost parts of the built-up area through the survey of the urban wings overlooking Via Regina Margherita, the survey of 247 out of 356 cadastral parcels has been carried out, with an outcome of more than 2/3 of the properties checked.

To proceed in the mapping, the paper sheet 7 of the urban building cadastre of Ferruzzano Municipality has been taken as base where to identify the comparts to study (fig. 3). Having named them with a letter to support the subsequent identification of the cadastral parcels therein contained, the cataloguing of the information was conducted.

In the onsite campaign, a rich photographic collection and eidotypes of the urban fronts were collected for each parcel to support and implement the filed information, complementing the available material to share open source through QGIS a rich and homogeneous information set.

Sources

The study of the potential for reactivation of the built heritage and, consequently, of the open space, is set on the criterion of the expeditious survey, capable of describing the buildings and the outdoors in their essential characteristics, focusing on aspects related to their architectural and constructive nature and state of preservation.

A well-established practice for the approach to historic centres, also in the aftermath of natural disasters, consists in the analysis of the existing by means of thematic maps. Following this praxis, common among others to the Carta del Rischio[25] and to the preparatory studies for the reconstruction plans of the municipalities in the Abruzzo crater after 2009 earthquake (Fontecchio[26], Capitignano[27],

24. To deepen the theme of reactivation potential, see Pistidda in this volume, pp. 228-259. Concerning potential strategies for reactivating the small historical centres, a practical application on Craco medieval village is presented in De Cadillhac, Catella 2020.

25. Fiorani 2019.

26. *Piano di Ricostruzione di Fontecchio- Relazione generale*, a cura di Politecnico di Milano, 2012; http://www.comune.fontecchio.aq.it/piano-di-ricostruzione/ (accessed 2 September 2023).

27. *Piano di Ricostruzione comune di Capitignano- Relazione generale*, a cura di Università degli studi "G. D'Annunzio" Chieti-Pescara, 2012; https://www.dda.unich.it/ricerca/piani-di-ricostruzione/pdr-capitignano-consulenza (accessed 6

Castel di Ieri[28]), the assessment of Ferruzzano Superiore consistency of the built heritage and open spaces and the determination of their state of preservation has been approximated to parameters that allowed an urban-level reading of the general state of maintenance and of the main constructive characteristics of the hamlet.

To arrive at this targeted goal, a schedographic tool compliant to the purpose of the investigation in the tight timeframe available has been set up, starting from the reworking and simplification of the above-mentioned references and after a preliminary study of the site through cartography, bibliography and photographic documentation.

The survey forms, drafted considering both built and open spaces, present lists of options calibrated on the specific case study from which to choose, with the possibility to integrate the available linguistic and numerical terms with free textual additions to guarantee flexibility of compilation to the group of compliers.

Adjustments to the sheets have been made in the aftermath, on the basis of the onsite visit and in light of extending the methodology of the reactivation potential analysis to other centres, an operation that nevertheless could require the entries to be slightly improved on a case-by-case basis after a preliminary theoretical approach to the sites object of study.

Given that all the survey sheets are included in the appendix of this volume[29], a schema summarizing their main contents is provided (fig. 4) to enhance guidance for the reader through the upcoming sections of the paper, where they will be described in detail, reporting, for each macro-section, the related sets of alternatives from which to choose.

Sheets for the census of the historical buildings and open spaces

Introductory sheet

Determining whether the buildings were “Accessible-Partially accessible-Not accessible” helped in the first stage to calibrate the survey time. For buildings that were not accessible, most likely because they were still in use or otherwise maintained, the survey has been oriented on the analysis

September 2023).

28. *Piano di Ricostruzione comune di Castel di Ieri- Relazione generale*, a cura di Università degli studi "G. D'Annunzio" Chieti- Pescara, 2012; https://www.dda.unich.it/ricerca/piani-di-ricostruzione/pdr-castel-di-ieri-consulenza (accessed 7 September 2023).

29. See Scaglia, Valiante in this volume, pp. 324-351.

Figure 3. Cadastral map with surveyed comparts and sample area (elaboration by the authors).

of the general state of preservation and the state of conservation and consistency of the fronts and roofs only, while for those that were accessible, it was possible to take the survey to a higher level, also considering horizontal partitions and interior spaces.

Fundamental in determining the potential for reactivation is to understand what function and with what type of buildings we interface, in order to subsequently imagine compatible uses with the historic ones to reflect on a possible future of the village. To do so, the state of use "Used, Unused but maintained, Abandoned, Undetectable" was added to the general sheet to allow a clear recognition of active uses and historical use categories, for which a list of functions has been prepared based on those typical of a village that historically has an agricultural spirit[30] ("Residential, Commercial, Religious, Warehouse, Rural, Mixed (specify which uses), Undetectable").

By assessing the general state of preservation, the intent is to provide a preliminary judgment of the building: "Intact, Partially preserved, Presence of extensive collapse, Missing roof, Building in ruins" are the labels within which to evaluate buildings.

Intact is defined as a building that is usable and in excellent condition; partially preserved is defined as a building that is usable but affected by superficial forms of deterioration; extensive collapse refers to cases with missing or failing floors and elevation structures; missing roof refers to a precarious state of preservation in which deterioration may quickly affect internal structures and masonries, given the collapse of the roof; ruined buildings are the fragments of collapsed buildings still recognisable in the urban fabric. They are voids identifiable from the traces found on the ground as full in an earlier era.

For each property, it was deemed of interest to report whether or not in possession of a pertaining open space to be positively evaluated in the eventual perspective of reuse.

Elevations

In order to understand how the built fabric is organised, the number of floors corresponding to each parcel as well as their number of built boundaries were recorded to allow an assessment of whether the built-up area is compact or diffuse and to delineate the configuration of the urban skyline (homogeneous, homogeneous with punctual volumetric emergences, heterogeneous).

For each property, it was deemed of interest to report whether or not in possession of a pertaining open space to be positively evaluated in the eventual perspective of reuse.

30. Perrone 2007.

CONSERVATION AND REUSE OF THE BUILT HERITAGE

INTRODUCTORY SHEET

1. Building location and inspection
2. State of use and intended use
3. General state of conservation
4. Presence of pertaining open spaces
5. Photographic collection
6. Meaningful sketches

SURVEY SHEET OF THE CONSISTENCY AND STATE OF CONSERVATION OF THE BUILDING

ELEVATIONS

1. Geometry and morphology
2. Masonry
3. Balconies, loggias and galleries
4. External staircases
5. Windows
6. Characteristic elements
7. Provisional works
8. Roofing finishes

HORIZONTAL PARTITIONS AND INTERNAL STRUCTURE

1. Roof structure
2. Floors structure
3. Characteristic structural elements

INTERIORS

1. Dimensional characteristics of the interiors
2. Plant equipment
3. Internal connections
4. Characteristic elements
5. Interior finishings (walls & pavings)

CONSERVATION AND REUSE OF THE NON-BUILT HERITAGE

SURVEY SHEET OF THE CONSISTENCY AND STATE OF CONSERVATION OF THE OPEN SPACES

1. Localization and intended use
2. Morphology
3. Paving
4. State of conservation
5. Furniture
6. Potentialities
7. Photographic collection
8. Meaningful sketches

Figure 4. Summary by macro categories of the survey assessment sheets (elaboration by the authors).

Relatively to the geometry and morphology of the built-up area, moreover, the review of the available bibliography has pointed out the presence of buildings that pander to the terrain's course in Oligocene soft sandstone rock on multiple levels[31]. The case-by-case recognition of situations where there were buildings with entrances at different elevations, leaning against slopes or near flat terrain, was considered noteworthy, especially with a view to future rethinking the accessibility to and in the village.

Quantifying the degree of transformation by reporting the addition of toilets, balconies, loggias and terraces, or any superelevation was considered of interest in order to reconstruct the plant equipment present in the buildings and to understand if and how the added elements weakened the historic building's stability.

With a view to skimming the information collected during the data processing phase, information was gathered about the type of hollow volumes present on the fronts of each parcel ("Exterior loggias, Covered balconies"), the projecting volumes present ("Balconies, Exterior staircases, *Profferli*, Service volumes") and their materials and state of preservation.

Exterior masonry finishes were classified according to material ("Recently made plaster, Mixed masonry, Plastered masonry, Brick masonry"), surface deterioration ("With no visible decay phenomena, Superficial decay phenomena, Diffused decay phenomena") and specificity (whether post-earthquake reconstructions are present or absent) while the filing of window and door frames was done according to material and state of preservation.

Wood, Iron, Aluminum, and PVC from an initial online exploration seemed to be the predominant materials and therefore included as possible items on the list while regarding the degree of preservation, inability to respond to their required function ("loss of functionality") or good state of conservation were noted.

The listing of the characteristic elements of the fronts took into account the level of degradation afflicting them as well. "With no visible decay phenomena, with superficial and with widespread decay phenomena" are the three possible evaluation criteria to be included for any stone ashlar cornices and portals, pilasters and angles, string courses, *profferli*, arches, paintings and frescoes, relief decorations (stucco, plaster, etc.), under eaves cornices, corbels, lintels (wooden material, stone, CA, masonry, etc.) and railings/railings present (fig. 5).

The presence of provisional works such as "ribs, underpinning, hoops and ties rods" is a significant parameter to be read in relation to the state of deterioration and collapse of the factories to verify the effectiveness of these principals in the preservation of the buildings, so it was included in the filing.

31. Spinella 1996, p. 71.

Figure 5. Abandoned buildings along Via Regina Margherita (photo M. Scaglia, 2023).

In view of what was found during the study of the few bibliographic sources available on the case study, namely that generally «il tetto veniva realizzato con tegole di creta chiamate "*ciaramidi*"»[32], it was deemed of interest to verify whether this characteristic feature survives today. The roof covering was classified, where present, according to the constituent material and according to the extent of degradation, possibly pointing out whether it was replaced in a period subsequent to construction with a flat roofing, asbestos cladding or similar and their state of preservation, where possible to ascertain.

Internal storeys and structures

Given the possibility of access to only a few units, two additional forms were structured for the survey of storeys and interior structures and for the inside spaces, with a view to achieving a greater degree of specificity and completeness of assessment.

About the roofs, in addition to their absence or presence, it was wanted to understand how often the single, double or flat roof type recurred, in what materials they were built and in what percentage they have been preserved to the present day.

In order to assess the reactivation potential of Ferruzzano Superiore, the assessment of the state of preservation of the building passes as well through that of the preservation of the floors, which, in historic buildings of assumed heights varying between one and three stories, was considered significant for all levels.

The type of structure, whether "Flat, Flat with exposed beams or Vaulted", the materials, whether "Wood, Bricks, CA, Steel, Laterocement or Mixed masonry", and the finishing, whether "False ceiling, Plaster or Exposed (no finishing)" are parameters that the schedographic tool has looked at to determine what percentage of the built-up area may or may not be preserved given the superficial or diffuse phenomena from which it is affected.

Considering also the local building tradition of interrupting the large spans of the beams with pillars placed in the centre of the rooms to reduce their flexural deformation, and given the peculiar location of Ferruzzano Superiore, placed on a «*cono roccioso*»[33], it was considered of interest to verify whether and to what percentage the buildings lean against or are carved out of a rock wall and present the peculiar case of the "pillar-breaker" (fig. 6).

32. Perrone 2007, p. 13.

33. Spinella 1996, p. 14.

Figure 6. Characteristic presence of a central pillar in an abandoned building in via Pisacane (photo N. Sulfaro, 2023).

Interior spaces

At the level of the individual parcel, if accessible, in view of possible compatible reuse, the focus went on the filing of the number of rooms, the possibility of connection with neighbouring parcels, the presence of plant equipment and characterizing elements to be maintained, both at the level of fine finishes of masonry and floors and for characteristic features such as ovens and fireplaces, niches, lintels and cornices, seats and shelves in masonry.

As connection possibilities, we refer to the possibility of independent dwellings being connected from the inside to other units in the individual subdivisions or if connected by courtyards or other devices.

Open spaces

Seen as an opportunity to qualify abandoned or severely degraded building passages, the open spaces were mapped in their totality, thanks to the information collected in the onsite visit, the orthophoto[34], to the photographic survey and through the digital tools (Google maps) that allowed to reconstruct information left out in the campaign phase.

The unarticulated topography of Ferruzzano Superiore reflects the steep and irregular terrain on which it stands. To determine its characters, open spaces were analysed by intended use ("Pedestrian, Driveway, Parking areas or Public garden"), morphology ("Flat, Slight or Steep sloping"), types of pavement ("Asphalt, Vegetation, Concrete paving, Stone slabs, Live rock"), state of preservation (whether "Perfectly preserved, or with Minor and Severe pathologies") and presence of street furniture ("Public lighting system, Benches, Manholes, Rainwater collection system").

A particular focus was devoted to the potential of open spaces ("Privileged views, Proximity of publicly owned buildings, Places of consolidated aggregation") to identify urban landscape elements such as viewpoints and monuments significant to the history of the village with a view to its promotion (fig. 7).

From filing to mapping

34. Realized by Luigi Barazzetti on the 27th May 2022. On the usefulness of drone technology for surveying small centers, see Barazzetti in this volume, pp. 262-279.

Figure 7. Calvary overlooking Stinchi hamlet (photo C. Valiante, 2023).

The results of the onsite surveys, conducted through an extensive filing of part of the built heritage, have been translated into thematic maps in order to summarise and synthesise the main issues that need to be highlighted in the perspective of future reuses. Visualising the important features of such small settlements through interoperable urban scale maps, which can be updated and shared online, allows a much easier comprehension of opportunities and vulnerabilities of future programmes for regeneration. Nevertheless, this research concerns the organisation of knowledge regarding the peculiarities of the architectural heritage and its state of conservation, but it does not include guidance in terms of design and direct intervention in the buildings. The method proposed is intended as a preliminary and preparatory investigation for possible future planning phases, an essential knowledge process to understand the local heritage and context. Such introductory stages represent a fundamental step for reuse strategies, but they often represent a quite expensive procedure to the small municipalities involved, so, as mentioned above, this study is proposed as useful material that can be made available to the local actors[35]. In fact, the aim of this mapping phase is to provide elements that constitute not only a report and an interpretation of the current state of conservation of Ferruzzano, but also a starting point for the evaluation of possible reuse strategies.

Methodological aspects

From a methodological perspective, this research wants to suggest an expeditious procedure that can be easily applied to other similar historical settlements if properly adapted to the specificities of the case study. The transformation of the synthetic filing conducted onsite into GIS database and maps allows to keep together and cross-reference multiple data that can help in interpreting the existing context, highlighting the most important features of the buildings, and reading the transformations that occurred. This is extremely useful to define an order of priorities both regarding the preservation of the site and the relaunch strategies. Moreover, the GIS allows to gather and disseminate a significant amount of data in an agile manner, thanks to the possibility of share online the contents of the maps, using the WebGIS, a method quite diffused also within the Italian public offices[36].

The thematic maps were elaborated starting from an extended database, which collected the entire amount of information gathered through the filing. These data were georeferenced according

35. In this field, successful partnership between universities and public institutions has been experimented many times during the last decades, such as the case of the “Carta del Rischio” (Risk Map), see Fiorani 2019.

36. Reference is made to tools like "geoportale", an informatic platform accessible online that is currently used by several public actors such as local municipalities, provinces, and regions.

to the building cadastral map of the settlement in order to link the information to each real estate urban unit, which was identified as principal reference in this investigation[37]. (fig. 8) Given the extensive data collected, a selection was made based on the most important elements observed throughout the onsite visits and the study of the bibliographic material. The mapping phase focused on three main aspects that define the old settlement of Ferruzzano: the morphology of the buildings and the urban fabrics, the current state of use and conservation, and the transformations that occurred in the last decades, looking both at the interiors and the external features of the built heritage. These elements helped in identifying not only the degree of abandonment and degradation of the site but also the opportunities and potentialities that can support possible strategies of reuse or preservation, concerning, for instance, peculiar aspects of what remains or elements which can foster new uses.

Morphology of the settlement

The town of Ferruzzano Superiore, that according to some authors, was founded in the early 16thcentury[38], appears now as a homogeneous settlement, composed of limited-size buildings which are arranged into bigger aggregates and characterised mainly by two-storey constructions (fig. 9). Part of the built heritage was reconstructed after the catastrophic events that hit the village in the last century[39], as the inscriptions over some buildings report (dated 1927). Despite the simplicity of the structures, made of mixed masonry and wooden flooring and roofing, some very peculiar elements emerge. Most of the settlement lies on a rock outcrop, which was often carved for realising the ground floor or the basement, where these sandstone surfaces are still visible. From the structural point of view, the long-lasting frequency of seismic events led to interesting expedients that are quite diffused within the studied area, such as the mixed masonry provided with regular brick courses, or the wooden pillar placed at the midpoint of the main beam on the ground floor. Other peculiar elements concern the construction materials used for horizontal and interior vertical structures, among which the circular clay elements called "*carusi*" or "*caroselli*"[40], diffused in very delimited areas, used to build vaults of the most important and rich buildings of the town, and the lathwork

37. The cartographic map base was elaborated starting from the building and land cadastre map, retrieved thanks to the online geographic information system of the Calabria Region, through WebGIS application, see http://pr5sit.regione.calabria.it/navigatore-sirv/index.html (accessed 4 July 2023).

38. Spinella 1996, p. 5.

39. The earthquakes in 1907 and 1978, and the floodings in 1951, 1953 and 1973. See Perrone 2007; Spinella 1996.

40. This technique is specifically diffused in Calabria area, see Gattuso *et al.* 2000; Rutignano 1996.

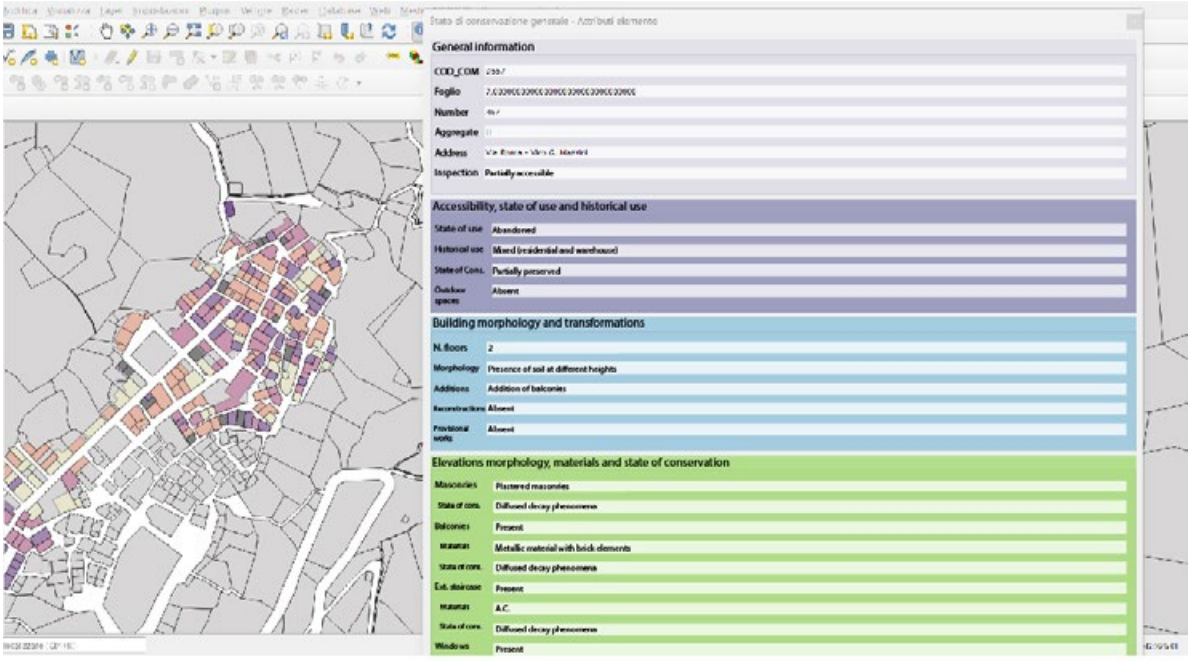

Figure 8. Example of the visualisation of a cadastral unit on the GIS model (elaboration by the authors).

Figure 9. Ferruzzano Superiore, buildings in vico Cavour (photo C. Valiante, 2023).

used in the internal partitions. (figs. 10-11) The external elevations are usually finished with lime-based plaster and framed by simple decorations, such as string courses, cornices, and architraves. As will be discussed below, many of these features are now threatened or partially lost due to the poor state of conservation and the transformations that occurred.

Accessibility and state of use

Among the investigated themes there are the actual conditions of the accessibility and the state of use of the site, which appears not completely abandoned. Very few are the permanent or long-term residents[41], but a small number of buildings are well maintained and occasionally used as a vacation or second house[42]. In these cases, small but constant interventions of maintenance or little transformation were conducted, and the general conditions of the external structures and surfaces were good, even though the interiors were not verified because not accessible (fig. 12) The maintained-in-use and inhabited buildings are mainly distributed along the main street, via Regina Margherita, that is the most accessible and suitable road for vehicles, entirely reached by underground utilities, where the few public buildings are located (the former school and a church). While some other partially used buildings are concentrated in the area overlooking the panoramic view towards the coast (in the southeast), more accessible through the panoramic street from the main square (fig. 13). These buildings are mainly used as storage places, garages, or cellars at the ground floor, while fewer are the residential spaces at the first floor, following the most common arrangement historically rooted in the village[43]. Thanks to the direct observation of the current status of the building, it was possible to assess the diffusion of such arrangement since the majority of the built environment is constituted by two stored houses with mixed functions, except for the single stored structures that were mainly devoted to artisanal or farming activities, as the presence of abandoned machinery and other equipment can confirm[44]. It is worth noticing that the partially

41. The permanent residents in the village are around ten people, even though it was not possible to assess the precise number of the real inhabitants since many are temporary users. Looking at the data referred to the entire municipality of Ferruzzano, the buildings inhabited by not permanent residents are 40% of the total. See Istat, *Mappa dei rischi dei comuni italiani*, https://gisportal.istat.it/mapparischi/index.html?extent= (accessed 4 July 2023).

42. Precisely, 16% of the buildings surveyed are in a good state of conservation and temporarily used.

43. The ground floor was used as storage, stable or place for artisanal activities, while the first floor as residential space. Perrone 2007.

44. Inside, some abandoned buildings are still present, for instance, wood-burning stoves, farming equipment, blacksmith tools, etc.

Figure 10. Ferruzzano Superiore. Traces of a vault made of *carusi* (photo C. Valiante, 2023).

Figure 11. Ferruzzano Superiore. Remains of the lathwork in the internal partitions (photo C. Valiante, 2023).

Figure 12. Ferruzzano Superiore. Partially preserved building in largo Colombo (photo C. Valiante, 2023).

On the next page, figure 13. Ferruzzano Superiore. Panoramic view overlooking the settlement of Saccuti and the sea (photo C. Valiante, 2023).

used buildings kept the same arrangement of the floors and distribution of the categories of function.

General state of conservation and occurred transformations

Due to the long-lasting abandonment processes, the old town of Ferruzzano Superiore shows a few completely ruined buildings (around 6% of the investigated area) and various structures that miss the entire roof or are affected by severe and diffused collapses (45% of the investigated area), concentrated in the less accessible northeast and southeast parts of the area. Nevertheless, a great part of the built heritage studied presents an acceptable state of conservation, being in some cases completely undamaged (around 15%) or partially preserved (32%). The overall conditions of the buildings – considering mainly the exteriors and the supporting structures – confirm that a relevant extension of the settlement is partially still used and maintained by the owners. The most ancient parts of the traditional masonries, present in vertical and horizontal structures, are the best preserved, except for the external superficial decay patterns diffused in the entire area. The mixed stone masonry, the most diffused typology, is usually finished with lime-based plasters, often affected by diffused erosion. The wooden horizontal structures and the parts transformed in recent times, such as perforated brick masonries or armed concrete elements, present the most severe degradations, as will displayed in detail later. Considering the overall state of conservation, the conditions of the external elevations and the horizontal structures, the decay phenomena are widely diffused but concentrated in the north and southeast areas. This situation shows some criticalities in the preservation of the most fragile sides of the built heritage in abandoned or disused villages, i.e. the external surfaces and the wooden structures. However, it highlights also how the traditional masonry is quite preserved, despite the abandonment (figs. 14-16).

Together with the current general state of preservation, the transformations that occurred over time were studied in order to understand how the settlement changed during the past century, especially considering the several earthquakes and related reconstruction, and how these modifications impacted the built heritage and its conditions. A significant part of the buildings inside the studied area were modified through the addition of single elements, such as balconies or terraces, or small volumes, mainly used as external restrooms[45]. Such modifications are relatable to the change of needs, uses and way of living of the former inhabitants during the last century, in fact, they were made in recent times. The added protruding balconies that in many cases, were probably meant to

45. Among the studied buildings, 16% show balconies or terraces added, 15% external restrooms, just 4% shows added floors and 2% external staircases, while 60% of the total presents no addition.

replace the previous existing stone "French balconies"[46], are usually built of armed concrete or a combination of steel beams and bricks, and they often show severe degradation due to the corrosion of the reinforcements. The added external volumes are often made of perforated bricks without finishings or armed concrete, so they have a wide impact on the external elevations. Furthermore, they are now affected by various decay phenomena due to abandonment and exposure to weather. In general, even though the morphology of the ancient settlement is still recognisable, the many punctual transformations – such as the above-described additions, the replacing of windows and external finishings[47] – that took place especially in recent times, showing no attention to the relationship with the existing heritage, partially changed the overall perception of the historical village. A more ancient, different kind of transformation was identified through the onsite investigations, which consisted of post-seismic reconstructions. These interesting interventions, in many cases, attest to a not-complete destruction of the existing structure since part of the stone or brick masonry was added to complete the damaged walls and often are characterised by a peculiar arrangement provided with regular brick courses in order to improve the resistance to earthquakes. The location of such interventions does not highlight any specific areas where the reconstructions were concentrated, and it is not possible to define part of the settlement that suffered more damages[48] (fig. 17).

Reuse potentials of interiors and outdoor spaces

In the perspective of assessing possible future reuse strategies for this historical centre, investigations were conducted to understand the features and the state of conservation of the interiors and of the outdoor public spaces. The investigated interiors, that correspond to the abandoned buildings that were accessible[49], are mainly characterised by one or two rooms per floor and usually are affected by various degradation concerning structures and surfaces (fig. 18). As mentioned above, partial or total collapses of the wooden horizontal structures are attested[50], while the decay patterns related to the presence of water infiltrations or humidity are quite diffused. Moreover,

46. Few "French balconies", made of natural stone with iron railings, are still in place in some abandoned buildings.

47. A great number of buildings (26% of the cases within the studied area) have aluminium or metal material windows, and in some cases, the lime-based plaster was replaced by cement-based mortar.

48. According to the bibliography, the most severely struck area of Ferruzzano Superiore was the southern side, where are now concentrated several ruined buildings, however, the analysis did not show any concentration of interventions in that area.

49. The partially used buildings could not be accessed during the onsite surveys.

50. 77% of the detectable horizontal structures are affected by severe degradation phenomena.

Figure 14. Elevations' morphology, materials and state of conservation (elaboration by the authors).

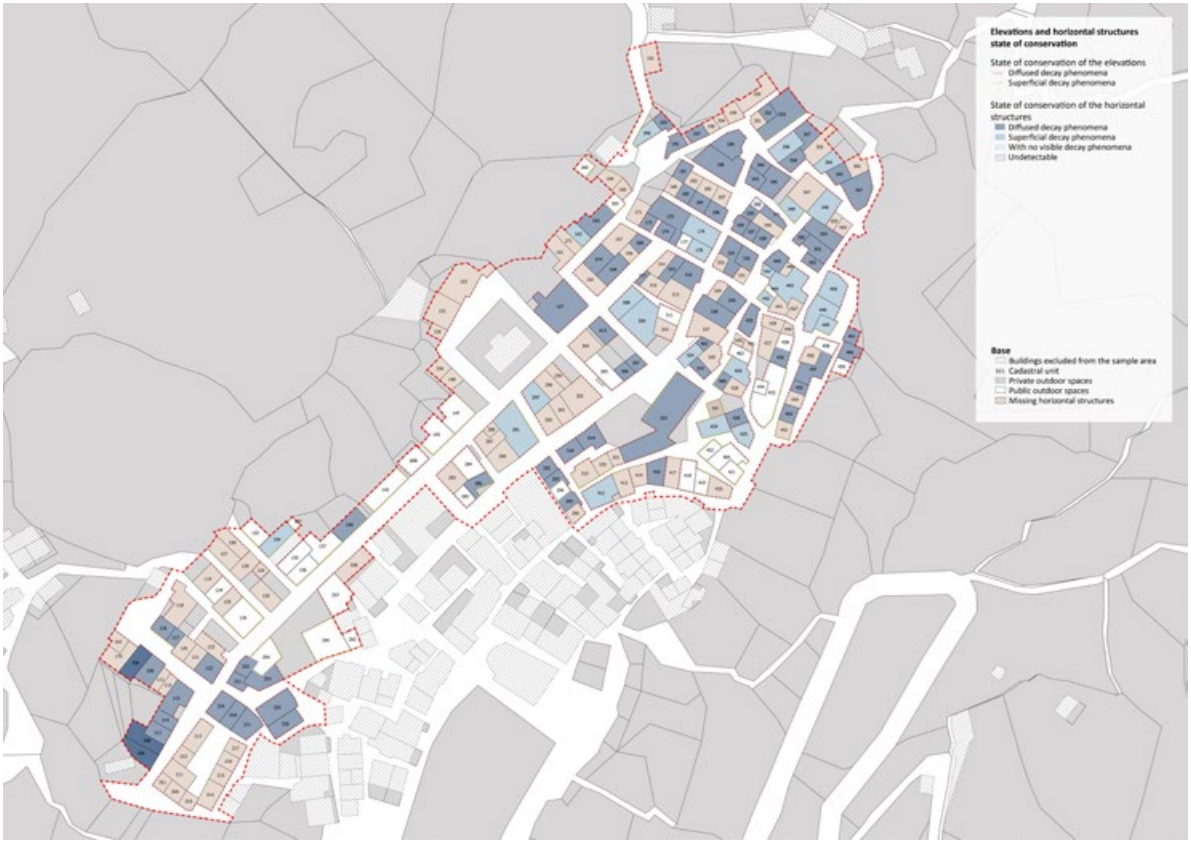

Figure 15. Elevations and horizontal structures' state of conservation (elaboration by the authors).

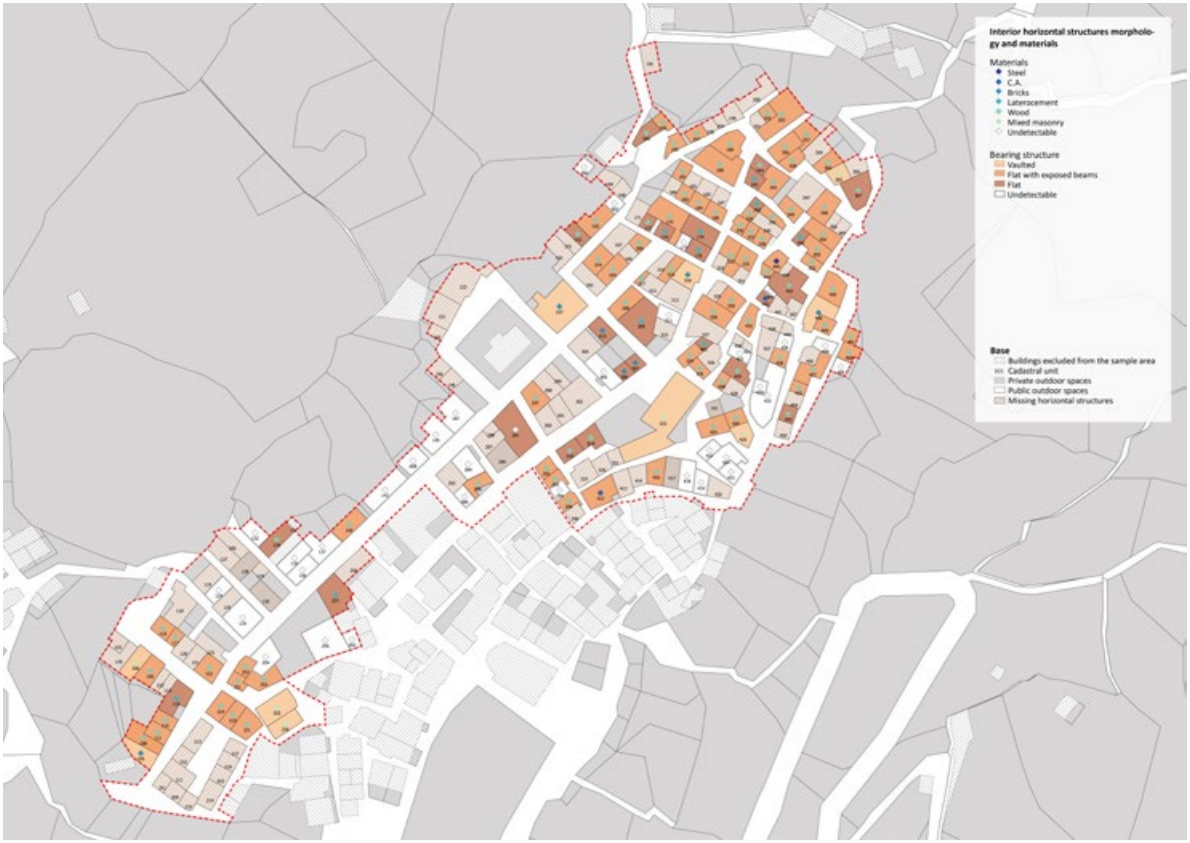

Figure 16. Interior horizontal structures' morphology and materials (elaboration by the authors).

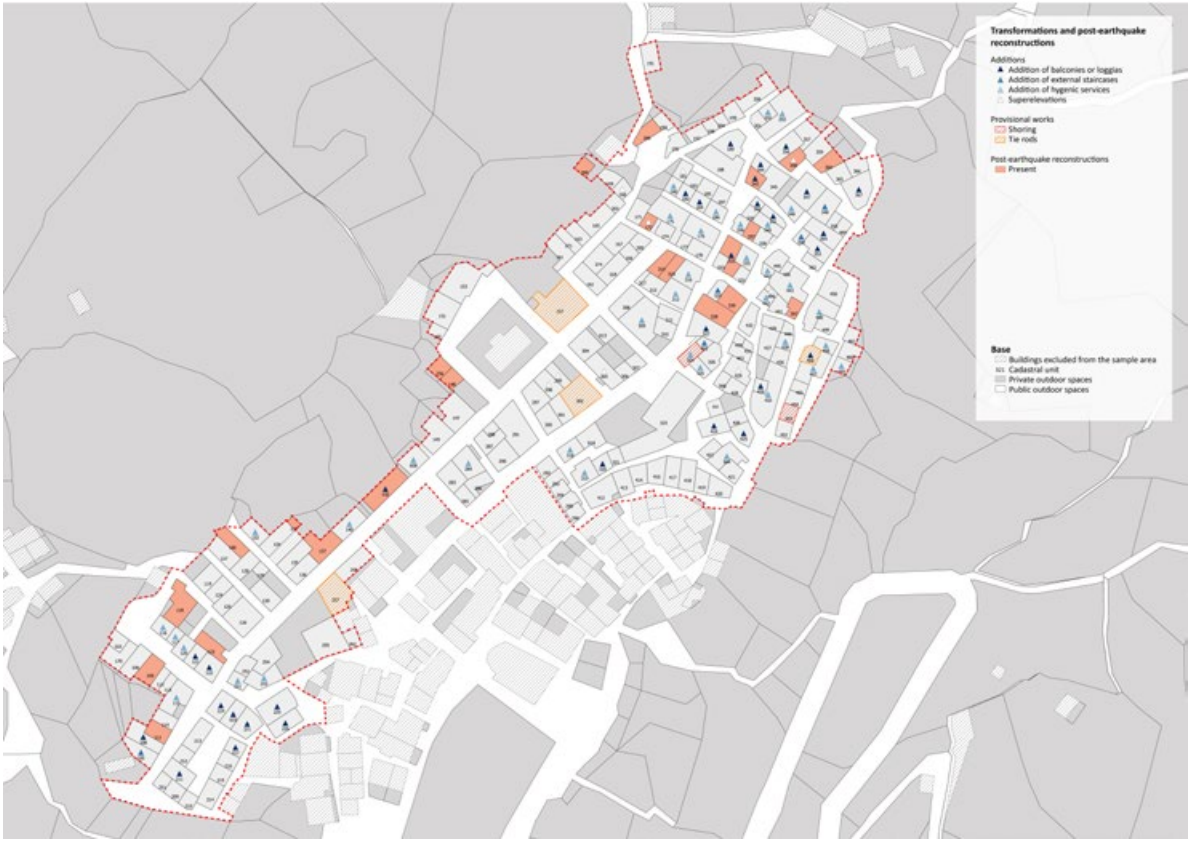

Figure 17. Transformations and post-earthquakes interventions (elaboration by the authors).

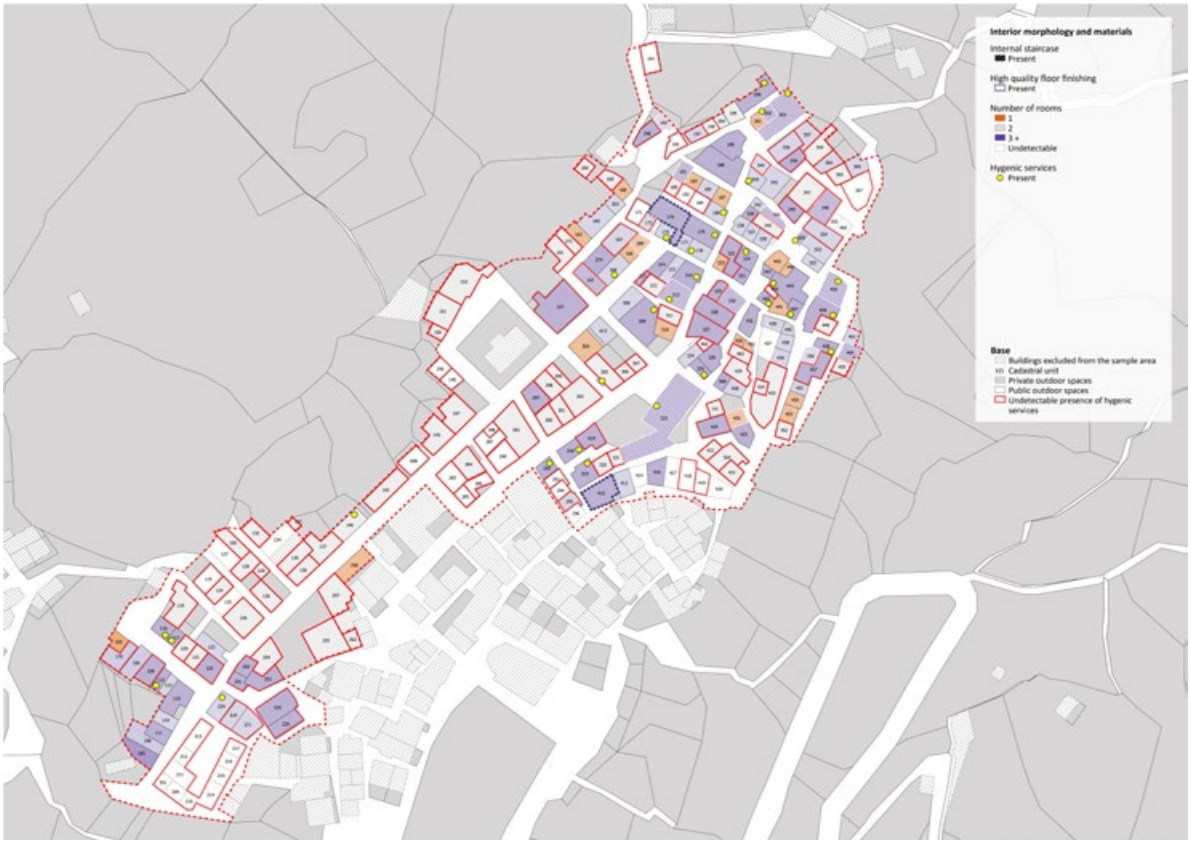

Figure 18. Interiors' morphology and materials (elaboration by the authors).

some wood-beamed ceilings were recently replaced with steel and brick structures. Very few are decorative or valuable internal finishings[51], however, despite the general state of conservation, it is still possible to observe very distinctive elements of this settlement, such as the rock outcrop present in many ground floors, carved to obtain floors, walls, niches[52] and small stairs, stone masonry arches and vaults, wood ceilings and pillars, masonry fireplaces and ovens. With a view to future reuses, a criticality linked to accessibility and internal connections was identified. Since the above-mentioned traditional arrangement of functions did not include a direct connection between the ground and first floor[53], a small amount of the buildings (18%) is provided with internal staircases, which often are simple wooden ladders. Some issues have arisen also concerning the morphology and state of conservation of the outdoor public areas. The streets of the settlement are not entirely suitable for vehicles and are mainly characterised by a significant slope. The principal, wider paths are asphalted and less affected by degradations, but the smaller ones, characterised by pebbles and stones, show various decay phenomena, such as instabilities and infesting vegetation that hinder the passage. Moreover, the urban furniture and the services, such as the lighting and hydraulic systems, are quite limited (figs. 19-20). Nevertheless, some of these spaces, especially the ones overlooking the valleys, benefit from interesting gathering points, such as small squares and very peculiar and outstanding panoramas (fig. 21).

Mapping outcomes

Through the analysis of the thematic maps, it becomes clear that a major part of the settlement is abandoned, and in some cases, the structures already appear in a state of ruin, while only a few buildings are still used for permanent and temporary uses. Moreover, the analysis highlighted many recent interventions that deeply transformed a great part of the settlement, both in the interior spaces and the external surfaces. Nevertheless, various peculiar elements still remain visible regarding the construction history of the settlement, such as the interesting historical anti-seismic protections, the post-earthquake reconstructions, and the technical expedients related to the foundation on the rock outcrop. Other distinctive aspects of the settlement are also linked to the

51. Valuable floor finishings are present in 2% of the surveyed buildings, and decorative or high-quality wall finishings in 4%.

52. The niches, called "*stipi*", are very diffused in the village and they represent a traditional kind of furniture. Perrone 2007.

53. The ground floors were devoted to farm or artisanal activities, so often they were not directly connected to the first residential floors, which was accessed through an external staircase.

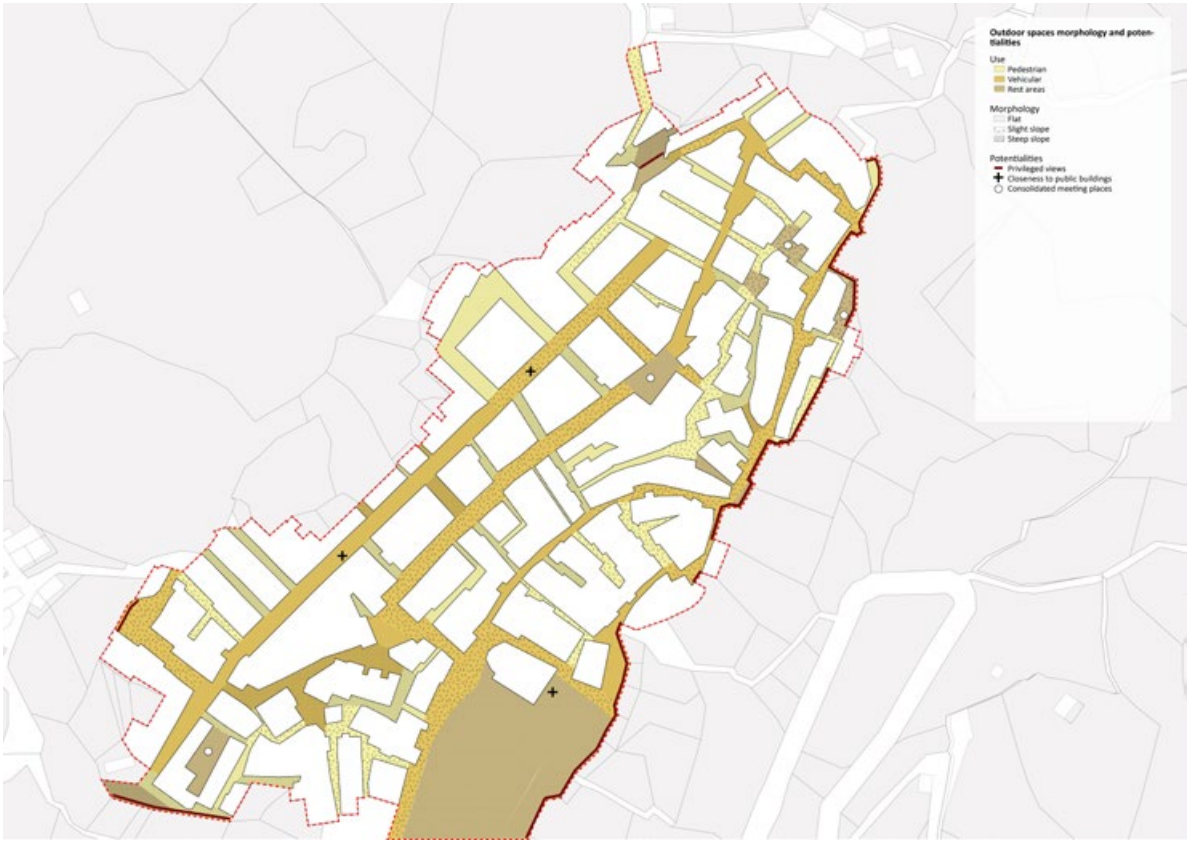

Figure 19. Outdoor spaces' morphology and potentials (Authors' elaboration).

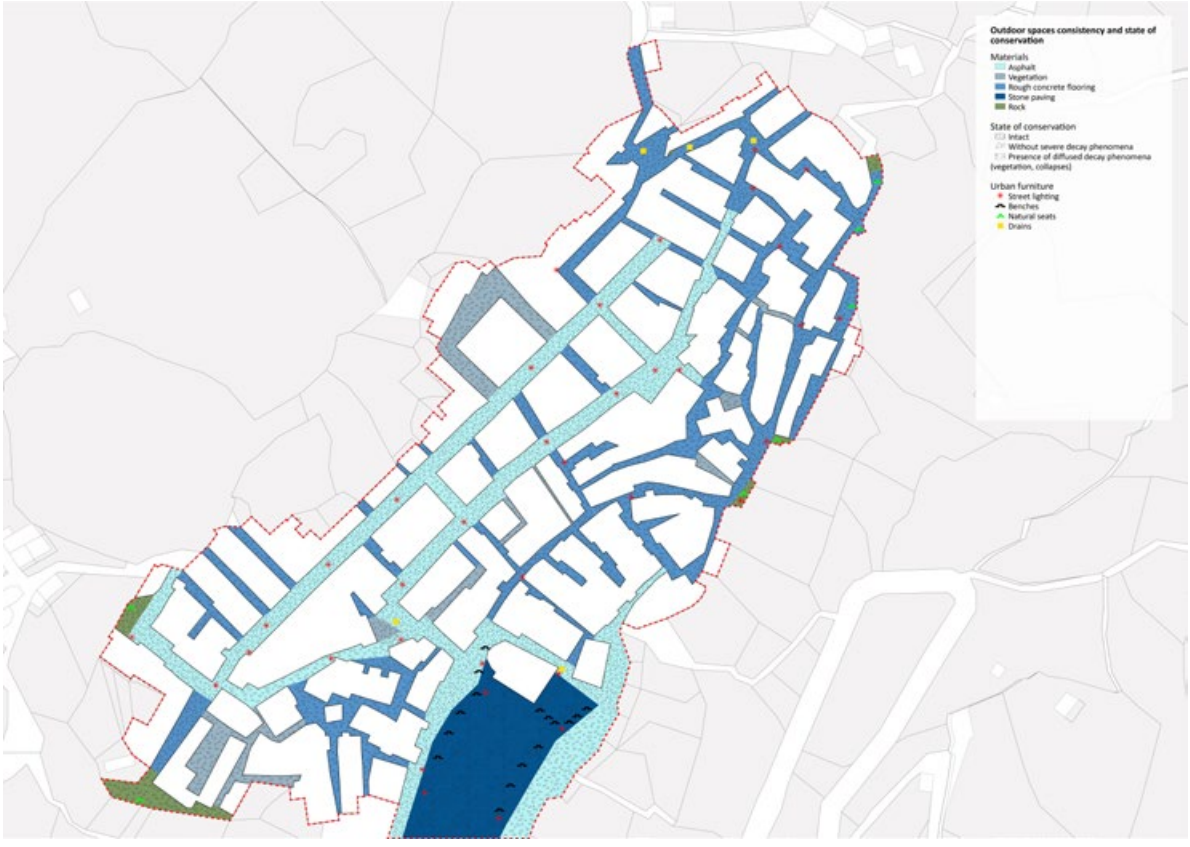

Figure 20. Outdoor spaces' consistency and state of conservation (Authors' elaboration).

Figure 21. Ferruzzano Superiore. Building in via Mazzini (photo C. Valiante, 2023).

landscape and natural environment conditions, which lead to interesting paths and pleasant views. If such features could possibly foster new uses, various criticalities persist, primarily concerning the state of conservation of the built heritage and the overall accessibility of the single buildings and the entire settlement (fig. 22).

Despite the conciseness of the gathered data, the research allowed us to identify some peculiar features of the current state of conservation and the main degradation phenomena, as well as some challenges and potentials in case of future reuse initiatives. As will be explained further on[54], the application of this expeditious method aimed at the identification of useful elements for defining reactivation potentials of the historical settlement of Ferruzzano Superiore, introducing evidence that serves as a starting point for reflections on possible strategies. In order to evaluate future directions for this heritage, especially considering such stratified contexts in a state of marginality and abandonment, the preliminary knowledge processes are crucial for orienting the recovery activities. This kind of investigation, supported by synthetic survey sheets, allows to quicky collect and compare a significant amount of information, offers high flexibility, and becomes widely effective in case of replicability. Moreover, considering the possibility of customising the filing structure according to the characteristics of the site and the objectives of the investigation, this method could reach an adequate level of knowledge of the built heritage. The aim of this part of the research is, in fact, to propose an approach that could be easily applied to other similar small historical centres, requiring a limited amount of fieldwork. In addition, the digitalisation of the collected data and their transformation into thematic maps foster the sharing of the results among scholars and stakeholders and facilitate the progressive update. Through the GIS model, in fact, the analyses conducted at the building scale could be effectively implemented and linked to data related to the urban and territorial level.

At the same time, the developed database can be connected with other existing platforms based on the GIS system, such as the Italian SIGECweb (General Information System of the Catalog), even though there is no direct correlation between the cataloguing methods tested and the scheduling models developed by the Central Institute for Cataloguing and Documentation (ICCD), entity of the Italian Ministry of Culture. As this research is oriented towards the conservation of non-listed heritage, understood not as isolated artifacts but as integrated historical built fabric, and therefore considered at the urban scale too, reference has not been made to the ICCD forms, although some terminologies have been adopted. The cataloguing model proposed here aims to delve into the

54. See Scaglia, Valiante in this volume, pp. 324-351.

Figure 22. Ferruzzano Superiore. Buildings in via Manin (photo C. Valiante, 2023).

details of building characteristics, considering them as part of a whole, which in turn connects to other levels of depth (local, supra-local, regional), that the developed platform attempts to synthesize[55].

Even though this approach shows some limits, mainly regarding the data accuracy due to the synthetic structure of the survey and the requirement of basic knowledge of the future stakeholders for using the platform, the approach appeared to be consistent and helpful in understanding complex systems like the small historical centres at risk of abandonment.

55. Other cataloguing strategies for the conservation of small historical centres have been proposed by La Sapienza research groups, in coordination with the ICCD system. See Fiorani 2019; Fiorani *et al.* 2022.

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