Preliminary results on post-medieval landscapes in the 'Underlandscape Project': towards an analysis protocol for mountain areas and rock structures

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Abstract

The PRIN 'Underlandscape Project' is a multidisciplinary and diachronic study on rock structures in North-Western Tuscany, conducted from 2022 to 2025 by the CNR and the University of Pisa. It aims at the fine-tuning of an analysis protocol for the study of hypogean structures, based on non-invasive scientific techniques and operating mainly in situ. Through some case studies, we will present the first results on the use of rock structures in modern and contemporary times, highlighting the possible connection between the road system, transhumance and the exploitation of natural resources.

Keywords

Rock structures, mountain landscape, non-invasive techniques, environment studies, postmedieval archaeology

Introduction: the PRIN Underlandscape Project

This work took place within the broader framework of the PRIN 'Underlandscape Project'[1]: a multidisciplinary and diachronic study on Tuscan mountain landscapes conducted by the CNR and the University of Pisa starting in 2022. The project aims to define an analysis protocol for

[1] For further information on the activities of the research group and the results achieved within the project, see https://sites.google.com/view/prin-underlandscape (accessed on 04/03/2025).



Figure 1. Map of the study areas of the PRIN 'Underlandscape Project' (elaboration L. Chiti).

the study, conservation and valorisation of rock structures, from Prehistoric to Contemporary times, based on non-invasive scientific techniques, operating mainly in situ.

The project is developed in Lunigiana, Garfagnana and Mediavalle del Serchio, three contiguous areas located in the Apuan Alps and the Tuscan Apennines. These areas are characterised by surface and deep karst phenomena that have generated numerous examples of caves and rock shelters located in different landscapes and historical contexts, some of which have been frequented since the Palaeolithic period (Fig. 1). Our current knowledge of these sites is based on outdated investigations, poorly documented and lacking a study of the surrounding environment and historical landscapes. Moreover, for many sites, the use or occupation in Late Antiquity and the Post-classical Period remained unclear. Sample sites were selected to carry out more in-depth studies with the aim of acquiring a more accurate knowledge of these structures, new data on their frequentation and the environment in which they were and are currently located.

The methodology applied falls within the tradition of 'global archaeology' introduced by Tiziano Mannoni and the ISCUM group in the Ligurian region from the 1970s onwards. It consists of archaeological research based on a 'global approach' that takes into account the entirety of the heritage present within the territory – on the surface, standing structures and underground – and without chronological preconceptions (Ferrando Cabona, Crusi 1979, 183-208; Cambi 2009, 349-358; Brogiolo, Giannichedda 2014, 1-141). From this perspective, the integrated use of available sources is essential for interpreting the historical landscape, particularly in mountainous contexts, where research is inevitably constrained by topographical and visibility conditions (e.g. Angelucci *et al.* 2023, 153-159). Our aim, therefore, is to test an effective methodology for the study of rock structures through a multidisciplinary approach that combines technical-scientific and historical-archaeological methods, for example through the application of non-destructive diagnostic methods and digital and multimedia technologies for archaeological, geohistorical and palaeobotanical research, including 3D modelling and aerial photography using drones (Florindi *et al.* 2020; Triolo *et al.* 2021, 219-226; Mattiello *et al.* 2024).

On this occasion, we intend to present, through some case studies, the first results of the study about the use of these hypogean structures and their landscapes, particularly in Modern and early Contemporary Ages. For these chronological ranges, written and cartographic sources combined with archaeological and botanical surveys and 3D models have provided some interesting insights into the possible connection between the use of the caves and road system and transhumance, as well as with specific productive uses of the forest that changed over time, between the 16th and 20th centuries.

Methodology and Research Strategy

The study of rocky or underground structures is one of the main challenges of current archaeological research. Given the logistical difficulties, the low visibility of archaeological evidence, the complexity of the environmental contexts and, at times, the scarcity of scientific information gathered in recent times, we decided to operate according to a scalar, multi-stage strategy, based on the following methodology.

After consulting the previous bibliography and current cartography, sixteen sites were initially selected to have a fairly significant and representative starting sample, including caves of different width and depth, and shelters. In addition, sites were included where anthropogenic uses had been documented in different periods, from the Palaeolithic to the Modern Age.

Subsequently, both the location and the current accessibility were verified through the study of maps, footpaths and the collection of oral sources (local archaeologists, hikers, Italian Alpine Club volunteers, others). In fact, not all caves could be easily located using the old directions. Furthermore, wood abandonment in many areas has obliterated the trails and made some areas, where the sites are presumably located, unreachable. On the basis of these elements, the sample sites on which to conduct subsequent research were reduced to eight: Grotta di Ponte Nero, Antro dell'Ugola, Buca della Piella (Mediavalle Serchio); Tecchia di Tenerano, Tecchia della Gabellaccia, Madonna Vecchia di Vinca (Lunigiana); Buca di Castelvenere, Buca delle Fate di Coreglia (Garfagnana).

Therefore, a series of in-depth activities were carried out at these eight sample sites:

- archaeological surveys in different seasons of the year (May-July, September, February);
- 3D photogrammetric surveys using different instruments and methods;
- in some of them we took photographs with filters for multispectral sampling then re-processed with *DStretch* software;
- in some of them, we performed LIBS analysis with a portable instrument or sampled materials for XRF analysis in the laboratory;
- in some of them we carried out manual coring to verify the characteristics and the archaeological potential of the superficial stratification.

Then, for the most interesting or promising among these rock settlements (Antro dell'Ugola; Buca della Piella; Tecchia di Tenerano; Tecchia della Gabellaccia; Madonna Vecchia di Vinca; Buca di Castelvenere) we did:

- research and study of published and in some cases unpublished written sources;
- research and analysis of historical cadastres and cartography with their registers to understand the land use in the Italian pre-unitary period: in particular, we consulted the Estense Cadastre of Massa and Carrara (1820-1824) and the General Cadastre of Tuscany (1826) (Nobili 1980, 57-78);
- botanical surveys for acquiring current field data also with aerial photography from drones;
- search for finds from the old excavations at museums and the local warehouses for further study and possible analysis;
- shovel tests or small trenches to check the old acquisition and acquire new stratigraphic data.

Despite the poor archaeological visibility caused by the surrounding environment, which is often unkempt woodland, field surveys often attested post-medieval frequentation: in most cases, pottery sherds have been found near the cave entrance, suggesting a chronology of use of the site ranging from the 16th to the mid-20th century. In order to better understand the dynamics of this frequentation, we have combined data acquired from written documentation and recent bibliography, archaeological and botanical surveys with GIS processing of data from historical cadastres and related registers, in particular for two case studies: Tecchia della Gabellaccia and Tecchia di Tenerano, both in the Apuan Alps, in the province of Massa Carrara.

Preliminary Results on Post-medieval Landscapes

The selected case studies are located in the Apuan Alps, between the maritime side of Carrara and the internal slope towards Fivizzano and Lunigiana area. Since the Middle Ages, this mountain range has always represented a natural and administrative border area, the scene of disputes and judgments between neighbouring communities attested up to the middle of the 20th century (ASM, Questioni di Confine, 229-230; Michelucci 2000, 88-107; Nobili 2006, 409-421). The current municipal border roughly follows that which in the 18th century divided the Duchy of Massa and Carrara (under the Este family), the Grand Duchy of Tuscany and the Marquisate of Fosdinovo. Moreover, it is a pass area with several routes that have been used since antiquity, connecting the sea to the Po Valley area and the valleys in between, such as

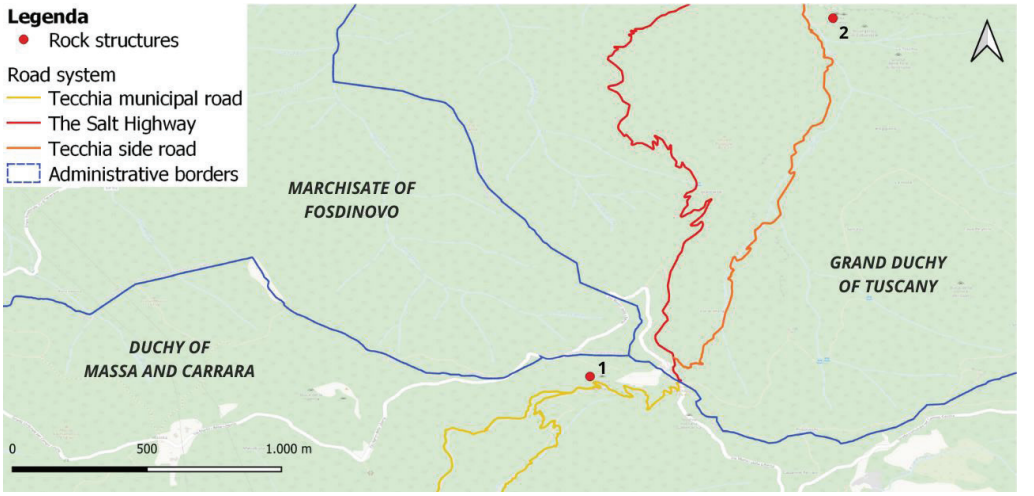


Figure 2. Location map of case studies (elaboration L. Chiti).

the route called "*Via Maestra del Sale*", also known as "*Via Lombarda*", which is now traced by hiking trails (Fig. 2).

Case 1: Tecchia della Gabellaccia

The first case study concerns Tecchia della Gabellaccia, situated on the northern border of the municipality of Carrara. It's a system of rock shelters and caves facing south, located along an imposing rocky slope, immediately west of the Gabellaccia Pass, a pass point at 895 meters above sea level that takes its name from the presence of a customs house between the Estense state and the Grand Duchy of Tuscany (Gabellaccia is the pejorative form of *gabella*, the customs duty) (Fig. 3).

The most articulated cave has three communicating rooms, investigated in 1959 with a series of trenches, which have yielded ceramic material belonging to the Eneolithic and Bronze Age, lithic industry, faunal remains and some fragments of Roman pottery (Fabiani 2006, 132-133; Radi 1976, 81-102). The site was frequented as a seasonal refuge during summer travel to the mountainous areas, but from our field surveys it is possible to extend this kind of use to the period between the 16th century and the first half of the 20th century, as highlighted by the various pottery fragments found on site: Marbled and White Slip pottery of North Tuscan production, Polychrome Majolica from Montelupo Fiorentino and Black Glazed Earthenware from Western Liguria (Fig. 4). In particular, this last evidence can be attributed to the presence of an important pass route towards the hinterland and to the exploitation of the surrounding area for grazing, attested both by the registers of the Estense Cadastre (1821-1822) and by botanical analysis.

Unlike the current landscape, the map produced for land use in the 19th century in this area clearly shows the extent of the pastureland, mostly characterised by rock outcrops and registered as the ownership of the municipality of Carrara, hence for the community use (Fig. 5-6). This situation 'photographed' by the Estense Cadastre is still confirmed by an aerial



Figure 3. Remains of the Este customs house, known as the 'Gabellaccia'.



Figure 4. Tecchia della Gabellaccia and some of the ceramic fragments found during the archaeological survey.

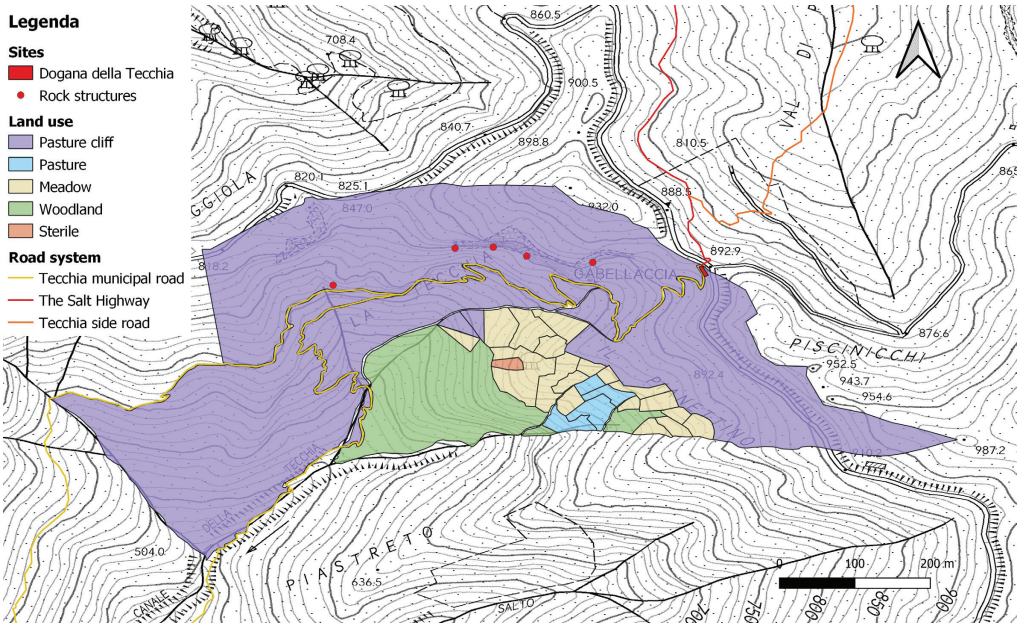


Figure 5. Map of land use around the Tecchia della Gabellaccia site in the 19th century based on the Estense Cadastre (elaboration L. Chiti).

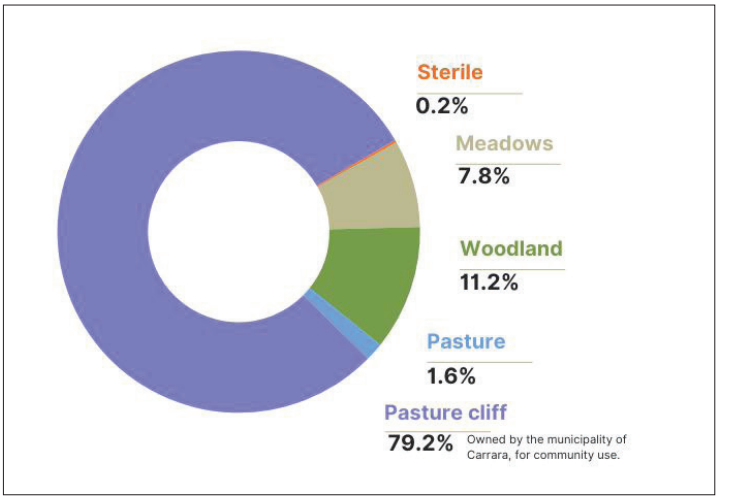


Figure 6. Graph of land use in the area of Tecchia della Gabellaccia in the 19th century.

photo of 1954, where the lack of forest cover in the area around the site can be seen, while in the valley to the south there are young and intensively cut woods (Fig. 7).

In the current landscape, we can distinguish two situations: the 'general vegetation context' in which the site is located and the 'proper' vegetation of the rock structures. In this case, the surrounding forest cover is predominantly hornbeam woodland with sporadic pine groves and exotic species recently planted for reforestation (since the 1960s), while in the limited



Figure 7. Photogram of the Passo della Gabellaccia area of the 1954 GAI flight (from photo library Geoscopio: https://www502.regione.toscana.it/geoscopio/ortofoto.html) compared with the current aerial image from Google Earth.

area of the rock face, the typical Mediterranean sclerophyll woodland can be found, with greater frequency of holm oak and manna ash. This difference in vegetation in the area bordering the rock face is essentially related to the carbonate nature of the substrate rock, the absence or scarcity of soil, the presence of fissures and cavities where water percolates and the favourable exposure to the southern quadrants.

Case 2: Tecchia di Tenerano

The second case study is focused on Tecchia di Tenerano, located in the valley of the Bardinello stream, immediately across the border, in the municipality of Fivizzano. Precisely, this site is situated on the western slope of the relief called Rocca di Tenerano and it's a natural cave characterised by a high entrance vault that leads to a large hall, where there is a seasonal pool of water. At the entrance is a series of drystone walls that act as small enclosures probably used in recent times for temporary stabling (Fig. 8).

The cave is already mentioned in the 18th century, but the first investigations date back to 1865, from which emerged human bones, faunal remains and fragments of Eneolithic and Bronze Age pottery. We do not have specific documentation about this excavation and further investigations, again non-systematic, conducted during the 20th century did not shed any new light or clarity on settlement dynamics (Ambrosi 1953, 61-63; Rellini 1924, 1-34). On the other hand, our field survey attested a post-medieval use of the site, even if probably in a seasonal form: in fact, the ceramic fragments found in the area of the cave entrance show a broad chronology, ranging from the 16th to the mid-19th century. The most frequent ceramic class is Glazed Cooking pottery, followed by Monochrome and Polychrome Majolica from Liguria and Montelupo Fiorentino, White Slip pottery of probable Ligurian manufacture, 'à Taches Noires' Glazed Ware, Black and Brown Glazed Earthenware from Western Liguria (Fig. 9).

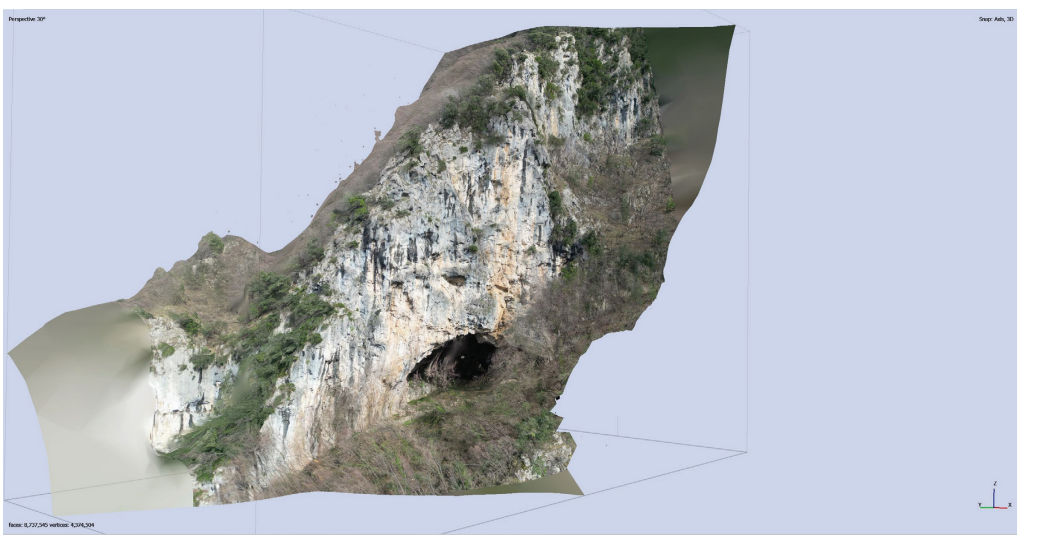


Figure 8. Drone shot of Tecchia di Tenerano (elaboration A. Bertacchi).



Figure 9. Tecchia di Tenerano and ceramic materials found during the archaeological survey.

The same chronologies of frequentation were confirmed by one of the shovel tests carried out in July 2024 at the cave entrance, in the centre of the northern chamber, leaning against its northern side, largely coinciding with a (presumably unauthorised) excavation carried out earlier, of which the occasional sections visible on the sides of the breakthrough were first cleaned and brought to light. The excavation was later further extended on the southern and eastern sides in order to recover more information on the stratigraphy of the cave in that area. The remains of a fireplace were found from which fragments of Glazed 'pignatti' dating back to the 18th-19th centuries were recovered.

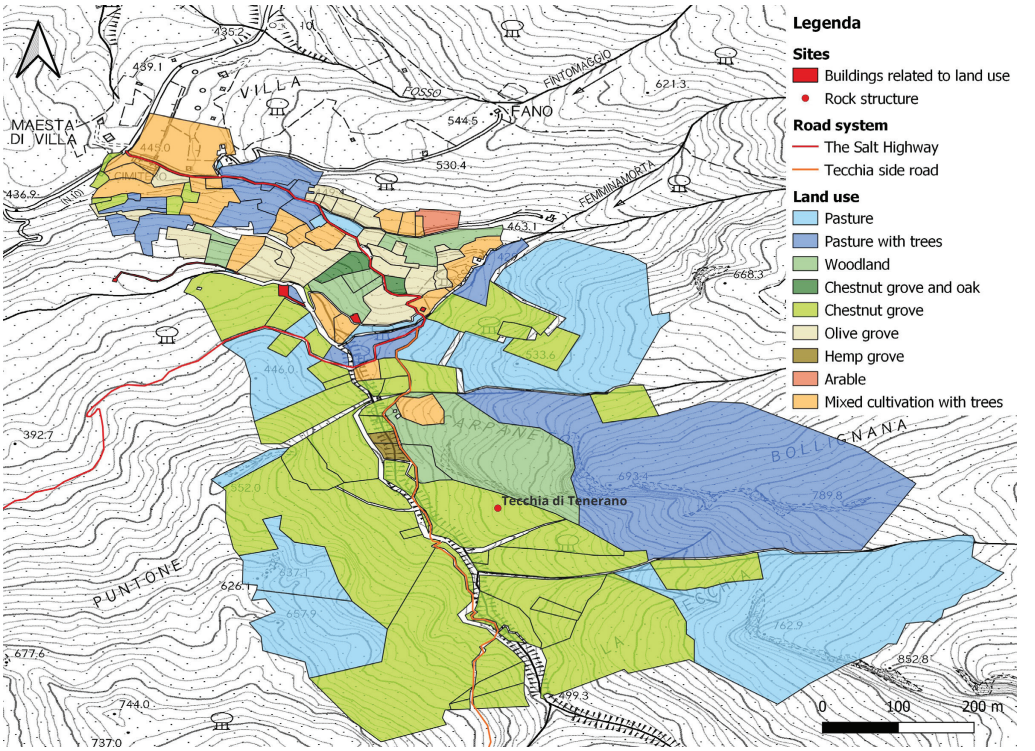


Figure 10. Map of the land use in the area of Tecchia di Tenerano in the 19th century based on the General Cadastre of Tuscany (elaboration L. Chiti).

This type of occasional use in post-medieval ages can be related to the employment of the natural resources of the surrounding area from the point of view of grazing and for the exploitation of the chestnut groves for the chestnut flour production. As we can see in the produced map of the land use, both are predominant according to the records of the General Cadastre of Tuscany (1826) (Fig. 10-11). In the case of the pastureland, concentrated in areas with higher elevation, it is mainly owned by the Community of Tenerano, Cecina e Viano as common property. By contrast, cultivated areas, mostly in intercropping form with tree species, are concentrated on gentler and better exposed slopes north of the Bardinello valley.

Another important aspect that we have to consider is the passage of a trade route connecting the sea and the Po area, passing through the Gabellaccia Pass, called 'Via Maestra del Sale', along with its variant that runs near the cave. This secondary road is no longer completely passable today; only the short section to the cave has been restored, while the ancient salt road corresponds to an officially marked hiking trail.

On the botanical side, the existing surrounding forest vegetation is characterized by almost monophytic hornbeam forests, within which, however, it is possible to recognize some ancient examples of chestnut trees, clear traces of previous exploitation along with the remains of

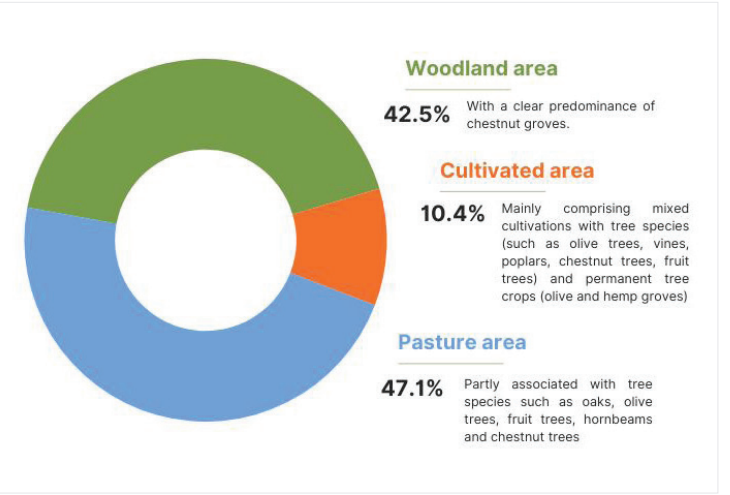


Figure 11. Graph of land use in the area of Tecchia di Tenerano in the 19th century.



Figure 12. Remains of a chestnut dryer along the path to Tecchia di Tenerano.

chestnut dryers still visible on the trail, as well as mills with water catchment, attested in the historical cadastre (Fig. 12). Also, in this case, the rocky buttress of the cave shows an important colonization of holm oak and manna ash on the portion facing south and south-west, along with the other typical species of sclerophyll forest.

Studying the Institution of the 'Compascuo'

The case studies analysed show that grazing and the community administration of the land set aside for this purpose have played a significant socio-economic role in these areas in modern times. Within this framework, the caves appear fully integrated into pastoral practice as places of shelter and rest.

It is interesting to note how this phenomenon has evolved over time through an analysis of disputes concerning grazing rights and the use of woodland reserved for the communities of the neighbouring areas of Vinca, Forno and Minucciano, which certainly provide exceptional documentation. These disputes date back as far as the 12th century and seem to draw for this territory an extremely stable socio-economic condition over time: the persistence of a 'long Middle Ages' that essentially ended with the crisis of transhumance practices and the use of common pastures with its abolition, which can be attributed to needs of fiscal origin of the Pre-unitary states (ASM, Questioni di Confine, 229-230; Michelucci 2000, 88-107; Rombai, Guarducci and Rossi 2021; Tocchini 1961). It would thus be the relict of a historical situation typical of an earlier age: as such it refers to a form of land use and a regime of ownership of village communities and the undivided ownership of these communities. A reality that, however, if it has remained stable over time as "use," has had in places different outcomes and times as a social reason or ownership regime.

Certainly rooted in the Middle Ages and established in Modern Era, the problem is to what extent this medieval trace can still be backdated to earlier periods, looking back to Roman times or even Prehistory. The theory of *compascuo* as a trace of Ligurian *conciliabula* was strong in local historiography in the late 19th and early 20th centuries and is mainly based on the works of Ubaldo Formentini (Formentini 1927 and 1952; Sereni 1954) in whose studies this theory is one of the pillars.

However, one must be aware that there are no clear documentary or even material traces of the existence of this social and economic structure and, above all, the areas around the sites we have studied do not have any stable settlements from the Ligurian or Roman periods at present.

Even backdating to the early Middle Ages, which certainly may be plausible, requires caution because it is not yet clear when the settlement developed, especially for these inland areas. In the case of Vinca, Minucciano and Forno, the correlation between written, cartographic and cadastral records—by examining the toponyms and areas described in great detail in the disputes—reveals a picture that is not that of a hypothetical remnant of a pre-protohistoric common land system, but rather the image of a very long medieval phase that lasted at least from the 11th to the 12th century.

The problem (and the related documentation) probably arose in the Middle Ages because of the population and livestock pressures being exerted on this common area. Basically, it is the dispute itself that tells us that an economic pressure is being created at that time, and this would more logically fit into a 12th century idea of the upper Lunigiana, where the population pressure and grazing activity were such that it was beginning to create problems in areas that had been used before perhaps without any particular boundary. Those boundary problems

would continue until at least 1841, so much so that the same cadastres of the Duchy of Massa and Carrara and the Grand Duchy of Tuscany show large areas of overlap, just along the ridge of Mount Sagro in the areas under dispute[2].

Final Considerations and Future Perspectives

The methodology applied yielded promising results, despite the objective difficulties of working in mountainous and rocky environments. These include, above all, the limited accessibility of the sites, which is often neither complete nor straightforward due to poorly maintained or overgrown paths. In addition, the final approach to the caves is frequently steep and unsafe.

Another factor to bear in mind is the problem of poor visibility of archaeological features in general, due both to the vegetation surrounding and, in some cases, within the caves, and to depositional and post-depositional processes, the latter including landslides and cave-ins that may have buried, even under large volumes of debris, the layers of human activity from the past. For this reason, surface surveys at some sites have also revealed a sort of 'hypervisibility' of the post-medieval period compared with chronologically earlier features (Colecchia 2006; Baldassarri 2012; Brogiolo 2012; Angelucci 2013).

The sub-optimal condition of the caves must also be taken into consideration, in which, in these areas, a great deal of encrustation is present on the rock surfaces, while in the more accessible caves there is a lot of writing with synthetic paint and climbing irons, which often makes the application of non-invasive techniques difficult. Finally, the actual 'portability' of the instrumentation poses limitations, including the need for instrumentation that can operate for long periods of time with a portable battery, but with acceptable size and weight to face the route to the site. Added to this are the limitations of the power of portable lighting and the actual possibility of using drones, due to the intricate vegetation outside the rock structures and the internal morphology of the caves, especially the high and irregular vaults in the larger cavities.

This preliminary study revealed that caves and rock shelters in mountain environments have been frequented for many years, although probably on a seasonal or sporadic basis, and associated with needs that have changed somewhat over time. It also showed the inextricable relationship with the road system and those natural pass routes that have always been used by humans, even in Modern and Contemporary times. The diachronic and multidisciplinary approach has made it possible to highlight different aspects of the relationship between humans and the mountain landscape, such as the relation with resources and the impact of human presence in ancient times on the current landscape, opening up further research perspectives and questions on the Roman and Medieval periods, for which clear data is currently lacking in these sites.

The landscape portrayed by the 19th-century historical cadastres seems to have continued almost unchanged until the middle of the 20th century, as shown by the analysis of historical

[2] These considerations on how to approach the study of the compascuo institution arose from our examination of the modern and contemporary landscape in which the rock structures under study are situated. For further details on the research carried out in Vinca, Forno and Minucciano, we refer to Salvatori, Alberti and Chiti forthcoming.

orthophotos, particularly with regard to the extent of pastureland and the adjoining practice of short- and long-distance transhumance, also testified to by written sources. This research topic relates to the institution of *compascuo*, which warrants further investigation, particularly with regard to its dynamics of alleged continuity from Prehistory to the Contemporary Age, requiring detailed archival research. Indeed, the documentation on Vinca, Forno and Minucciano has proved to be of great interest, but the scope must also be extended to other neighbouring areas in order to obtain a more complete picture of the dynamics of use and ownership.

In the end, the present landscape is the consequence of the abandonment of a whole series of agro-sylvo-pastoral practices, which characterized these mountainous areas until the mid-20th century. Today, we find the degeneration of a significantly changed woodland, no longer cultivated and with a rapid progression into areas previously kept as pasture or arable land. In part, the definitive end of this socio-economic practice was accentuated by the opening of the Mount Sagro quarries in the early 1980s, which provided employment for most of the area's population, who, according to collected oral sources, worked during the week in the quarries and on weekends took the few remaining flocks out to pasture, for example on Mount Pizzo d'Uccello.

On a botanical level, we can consider the proper vegetation of the rock structures to be a singularity because it has evolved naturally and practically unaltered by human activity, unlike the surrounding area that has been exploited for centuries for grazing, cultivation and cutting of forest. Moreover, the sclerophyll forest found here, which is typical of littoral areas, must have risen in altitude in warmer climatic phases up to more inland areas, to remain there later in colder phases, in relict form, but only in these south-facing contexts and on calcareous substrates.

All this makes this type of site of great interest not only from a historical-archaeological point of view, since this climatic condition may have facilitated the human settlement, but also in a naturalistic perspective.

The PRIN Underlandscape project is in its last phase, currently under completion, which involves, from the archaeological point of view, the study and analysis (including with XRF, LIBS or RAMAN) of the painted plasters and artefacts from the old excavations, as well as recent investigations; the analysis of any pollen and charcoal remains in the samples taken from the cores and recent excavations; and, finally, the reprocessing and comparison of all the historical, archaeological, palaeoenvironmental and analytical data collected for the elaboration of updated summaries and the fine-tuning of the analysis 'protocol'.

Based on the work carried out so far within the project, we can outline here some general aspects of a possible protocol for investigating underground landscapes—applicable to caves, rock shelters, and natural cavities with evidence of human occupation—which will be further refined and finalised as one of the outcomes of the PRIN project (Baldassarri *et al.*, forthcoming).

The basic principles on which the protocol is founded are: interdisciplinarity, whereby each site must be studied as part of a wider territorial system, using an integrated and

diachronic approach; graduality, namely the application of a 'scalar' strategy; replicability, understood as the standardisation of procedures, accompanied by metadata; sustainability in data preservation, which must be collected, structured, archived and published in open and durable formats; finally, valorisation, not as a separate and subsequent phase, but as an outcome envisaged from the very outset of the investigation.

Minimum documentation standards are therefore defined for each site included in the protocol, which must have: a unique identifier and geographical coordinates; an accessibility and safety report; basic photographic documentation; a general archaeological and geomorphological description; an assessment of the historical and territorial context; a record of the research techniques applied and the limitations encountered; the site's status regarding conservation and potential enhancement.

The general structure of the protocol involves a series of progressive actions and procedures, starting with the definition of the sample and pre-screening, followed by a preliminary survey and accessibility assessment, accompanied by the acquisition of spatial and geometric data. This is followed by in-depth analysis from a historical-documentary and cartographic perspective to contextualise the site, in situ archaeometric analysis, and environmental and geobotanical surveys. Where necessary, stratigraphic verification and/or targeted sampling of soils and rocks is carried out. Finally, we arrive at the interpretative integration phase, which involves managing, standardising and publishing data on the one hand, and promoting the area and making the results public on the other.

With regard to this last point, we are working for the creation of touristic geo-itineraries, with a high geological and historical value, in order to promote the identity and cultural aspects of rock structures and to redevelop the inland areas where they are located, which are currently undergoing depopulation and socio-economic decline. In the end, we want to amplify the synergy created with the local community and municipal administrations by the dissemination of the project results making it available for future application with local spin-offs (Deri, Chiti and Ciuffoletti 2023).

References

PRIN Underlandscape project. Last accessed March 4, 2025. https://sites.google.com/view/prin-underlandscape.

Ambrosi, Augusto C. 1953. "Il Castellaro di Puntone e la Tecchia di Tenerano". *Memorie dell'Accademia Capellini* 24.2: 61-63.

Angelucci, Diego E., Lara Casagrande, Annalisa Colecchia, and Mauro Rottoli (eds.). 2013. *APSAT 2. Paesaggi d'altura del Trentino. Evoluzione naturale e aspetti culturali.* SAP Società Archeologica.

Angelucci, Diego E., Enrico Croce, Mara Migliavacca, and Fabio Saggioro. 2023. "Per un'archeologia di montagna: alcune riflessioni". In *Montagne e archeologie*, edited by Diego E. Angelucci, Enrico Croce, Mara Migliavacca, and Fabio Saggioro. All'Insegna del Giglio.

Archivio di Stato di Massa. Archivio Cybo Malaspina. *Questioni di Confine*, b. 229-230.

Baldassarri, Monica. 2012. "Per una archeologia dei paesaggi in Val di Vara: documenti e materiali tra potenzialità e rischio di perdita cognitiva". In *Storia e territorio della Val di Vara*, edited by Enrica Salvatori. Felici Editore.

Baldassarri, Monica *et al*. forthcoming. "Proposta di protocollo 'UNDERLANDSCAPE'". In *Underlandscape e le ombre nella caverna*, edited by Vincenzo Palleschi, and Enrica Salvatori. *Archeologia Postmedievale* 30/1.

Brogiolo, Gian Pietro, Annalisa Colecchia, Diego E. Angelucci, Fabio Remondino (eds). 2012. *APSAT 1. Teoria e metodi della ricerca sui paesaggi d'altura*. SAP Società Archeologica.

Brogiolo, Gian Pietro, and Enrico Giannichedda (eds). 2014. *Archeologia globale. Archeologia Medievale XXI*.

Cambi, Franco. 2009. "Archeologia (globale) dei paesaggi (antichi)". In *Geografie del popolamento: casi di studio, metodi e teorie. Atti della Giornata di Studi (Grosseto, 24-26 settembre 2008)*, edited by Giancarlo Macchi Janica. Edizioni dell'Università degli Studi di Siena.

Colecchia, Annalisa. 2006. "Problemi nell'indagine dei paesaggi d'altura". In *Medioevo, paesaggi e metodi: problemi e prospettive della ricerca archeologica, Atti del Convegno (Padova, 8 aprile 2004 – Ravenna, 3 maggio 2004)*, edited by Nicola Mancassola, and Fabio Saggioro. SAP Società Archeologica.

Deri, Maria Grazia, Letizia Chiti, and Augusto Ciuffoletti. 2023. "A Sustainable Approach to Tourist Signage on Heritage Trails". *Sustainability*, 15, 16251: 10.3390/su152316251.

Fabiani, Fabio. 2006. *«… Stratam antiquam que est per paludes et boscos...». Viabilità romana tra Pisa e Luni.* Pisa University Press.

Ferrando Cabona, Isabella, and Elisabetta Crusi. 1979. "Archeologia del territorio: proposta metodologica sull'esempio dello Zignago (Zignago 2)". *Archeologia Medievale* VI: 183-208.

Florindi, Silvia, Anna Revedin, Biancamaria Aranguren, and Vincenzo Palleschi. 2020. "Application of Reflectance Transformation Imaging to Experimental Archaeology Studies". *Heritage* 3.4: 1279-1286.

Formentini, Ubaldo. 1927. *Conciliaboli, pievi e corti nella Liguria di Levante. Saggio sulle istituzioni liguri nell'antichità e nell'alto Medioevo.* Memorie dell'Accademia Lunigianense di Scienze Giovanni Cappellini.

Formentini, Ubaldo. 1952. "Monte Sagro. Saggio sulle istituzioni demo territoriali degli Apuani". In *Atti del 1°Congresso Internazionale di Studi Liguri, Bordighera 1950*. Istituto Internazionale di Studi Liguri: 207-217.

Mattiello, Sara, Olga De Pascale, Vincenzo Palleschi, Girolamo Fiorentino, and Giorgio Senesi. 2024. "Application of Handheld/Portable Spectroscopic Tools to the Identification, Inner Stratigraphy and Mapping of Archaeological Metal Artefacts". *Journal of Physics: Photonics* 6.3, 035005: 10.1088/2515-7647/AD46A7.

Michelucci, Massimo. 2000. "L'istituto del compascuo e la sentenza del 1189 tra Vinca e Antona". *Le Apuane: rivista di cultura, storia, etnologia* 20.40: 88-107.

Nobili, Mario. 1980. "Le mappe catastali come fonte per la storia dei beni comuni in età medioevale e moderna: un esempio lunigianese". In *Medioevo rurale. Sulle tracce della civiltà contadina*, edited by Vito Fumagalli, and Gabriella Rossetti. Il Mulino.

Nobili, Mario. 2006. "Transumanza verticale ed organizzazione degli spazi: esempi lunigianesi (secoli XIII-XVIII)". In *Gli Obertenghi ed altri saggi*, edited by Mario Nobili. Fondazione CISAM.

Radi, Giovanna. 1976. "La Tecchia della Gabellaccia (Carrara). Note paletnologiche". *Atti della Società Toscana di Scienze Naturali. Memorie, A* 83: 81-102.

Rellini, Ugo. 1924. "Appunti sul paleolitico italiano". *Bullettino di Paletnologia Italiana* 44: 1-34.

Rombai, Leonardo, Anna Guarducci, and Luisa Rossi. 2021. *Beni comuni e usi civici nella Toscana di Pietro Leopoldo di Lorena.* Consiglio regionale della Toscana.

Salvatori, Enrica, Antonio Alberti, and Letizia Chiti. Forthcoming. "Fonti scritte, materiali e cartografiche per la ricostruzione di un lungo medioevo rurale: il caso di Vinca". In

Underlandscape e le ombre nella caverna, edited by Vincenzo Palleschi, and Enrica Salvatori. *Archeologia Postmedievale* 30/1.

Sereni, Emilio. 1954. "La comunità rurale e i suoi confini nella Liguria antica". *Rivista di Studi Liguri* 20: 15-42.

Tocchini, Lorenzo. 1961. "Usi civici e beni comunali nelle riforme leopoldine". *Studi Storici* II: 223-266.

Triolo, Paolo, Luciano Marras, Gloria Adinolfi, Rodolfo Carmagnola, Stefano Legnaioli, Simona Raneri, and Vincenzo Palleschi. 2021. "Imaging as a First Step for Cultural Heritage and Archaeology Analyses". *Archeologia e Calcolatori* 32.2: 219–226.