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# VERNACULAR AND EARTHEN ARCHITECTURE TOWARDS LOCAL DEVELOPMENT

# 乡土未来

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# Identification and Interpretation of a Cultural Route: Developing Integrated Solutions for Enhancing the Vernacular Historic Settlemet

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**Abstract** Southern Italy and Central China plateaus are both located between latitude 34°～40° north. These two areas are characterized by the intensive historical use of underground space for the management of several urban and rural functions. The comparative analysis between Italy and China is at the base of the acknowledgement of the existence of a vernacular architecture related to climatic zones at a global level and whose successful enhancement must be collocated in the indications given within the ICOMOS 2019 International Conference in Rural Landscape and the celebrations of the troglodyte city of Matera (Italy) as 2019 European Capital of Culture.

Besides the most famous historical locations — as Matera or Fujian Tulou (China) UNESCO sites —in both countries there are several less known sites characterized by vernacular architectures as well. Particularly, in China a peculiar typology of rural troglodyte villages, the yaodong, are scattered on the rough landscape of the Loess plateau, having been realized exploiting the ocher-colored silty soil.

Although the great historical and identity value, many of those villages have been abandoned, having experienced economic, social and environmental problems.

The paper introduces a comparative analysis between Italian and Chinese vernacular rural settlements based on a new methodology introduced by the authors, and consisting of the use of two charts: the first dedicated to the functional classification of elements in the new class of Underground Built Heritage (UBH); the second addressed to the RE-USE actions planned for UBH. On the basis of this theoretical approach, the paper suggests the hypothesis of creating a cultural route as a solution to enhance those villages, setting up more and less known sites to optimize the use, so as to minimize the effects of overcrowding on the most popular one and maximizing social and economic rise in less developed ones, preserving livability and authenticity.

**Keywords** rural villages, earthenware architecture, underground settlements; enhancement; re-use, cultural routes

## 1 Introduction

Southern Italy and Central China feature historic rural settlements characterized by underground constructions, expression of a worldwide so — called "troglodyte lifestyle" which was developed during prehistoric times and is still in use today. This long— lasting building approach is one of the most typical building techniques in plateaus located between latitude 34° and 40° North, and the one resulting from the successful and sustainable balancing attempts between maximization of environmental opportunities and minimization of natural conflicts and social interactions in karst habitat. As a consequence, in this particular climatic zone of worldwide, surprisingly, underground sections of historical excavated settlements are very similar to each other both in the architectural and functional aspects, having much more in common than their corresponding above-ground buildings. Based on this hypothesis, a comparative analysis has been done regarding the vernacular villages in Loessian region in China (36°52′59. 99″ N, 10°42′59. 99″ E) and in Southern Italy (40°40′11. 39″ N, 16° 35′50. 03″ E), evaluating possible common actions aimed towards the enhancement

(Genovese et al, 2019).

This paper is based on some researches by the authors on a national and international scale. More specifically, on one hand, it is a National Research Council of Italy (CNR) interdepartmental project that began in 2015 coordinated by the CNR -Institute Studies on Mediterranean Societies (ISSM) that concerns the analysis of underground settlements in Southern Italy, aiming to define good practices for their recovery, refunctionalization and enhancement (Lapenna et al, 2017). On the other hand, two bilateral projects, that began in 2016, between the CNR -Institute for the Conservation and the Valorization of Cultural Heritage (ICVBC) and the Chinese Academy of Cultural Heritage (CACH). The first one is related to the sharing of good practices between Italy and China for the conservation of earthen surfaces. The second, concerns the mutual exchange of best practices in order to enhance less known cultural sites (Joint Research Projects CNR/CACH).

## 2 Southern Italy and Loess Plateau Rural Villages: Similarities and Differences

### 2.1 Southern Italy Underground Settlements

In the Southern Italy — particularly in Basilicata and Puglia regions in which our case studies are concentrated — due to geomorphological, climatic and cultural characteristics, the subsoil has historically been an integral part of urban planning, giving rise to the creation of underground spaces with residential and service functions.

The town of Matera, in Basilicata region, is a relevant example of an architectural and landscape ensemble resulting from a process of urban growth in symbiosis with nature (Fig. 1).

The old town — so called Sassi -was developed entirely on the western side of the homonymous canyon, locally referred to as gravina (gorge), deeply erodes the Murgia, the carbonate platform that constitutes part

Fig. 1 Matera in Basilicata region, Italy © R. V.

Puglia region. Its location was determined precisely in view of the different lithological characteristics of the two sides of the valley and determined the dug of caves in oblique. Thus, in winter the more oblique sun's rays could penetrate from the top to the bottom of the walls enlightening and heating cavities, while in summer the almost perpendicular sun's rays could reach only the entrance, leaving dwellings fresh and humid.

The Sassi are the result of a collective architecture that has developed over the centuries, starting with the cave houses and progressively evolving with the addition of external rooms utilizing the same excavated material and, finally, with the diffusion of entirely built houses (Laureano, 1993) (Fig. 2). The rupestrian settlement typology has been handed down to the present day, albeit through morphological and functional transformations. The basis of all these negative settlement experiences is the maximization of environmental potential in terms of allocative resources.

And Matera is not the only case: the wrinkled landscape of Southern Italy is dotted with rupestrian villages, as Castellaneta (Gravina di Coriglione and that of Santo Stefano), Palagianiello, Massafra (Madonna della Scala), Ginosa (Fig. 3) and Laterza in Puglia region, that are still waiting to be re-qualified and valued (De Minicis, 2009; Varriale, 2017).

Despite the fascinating aspect, Matera and other settlements in the area undergone to the risk of abandonment since the last

Fig. 2 Matera, a cave house © R. V.

Fig. 3 Ginosa village, Puglia region, Italy © R. V.

half of the last century, when demographic rise and the modernization of the society turned the underground built settlements into a symbol of socio-cultural degradation and poverty, causing their abandonment and rejection.

In Basilicata region, thanks to the application of regional development policies, in last decades, the underground cultural heritage preservation and enhancement had a strategic role. The candidacy for a UNESCO site in Matera, in 1993, represented a fundamental step in the acknowledgement process of the historical value of the troglodyte culture (Varriale, 2017). This process, recently, culminated with the further international recognition of Matera as the European Capital of Culture 2019, as a successful effect of combined actions by institutional and private stakeholders. Matera can be considered as a role model in the field of converting a neglected urban character into a cultural and natural resource. Nonetheless, these results must be strengthened and their durability must be guaranteed in order to achieve long lasting effects in terms of socio-economic behaviour and development. The protection and promotion of troglodyte culture typicality is today entrusted also to the Terra delle Gravine Regional Natural Park (2005) and to the Murgia Materana Park (1978) which are committed to safeguarding this enormous cultural heritage in a dynamic perspective.

### 2.2 Yaodong Villages in Loessian Region

According to archaeological findings, the dwelling caves represent a very traditional way of living in China for a long time, particularly in those provinces sited in the Loess Plateau. That is an area of almost 640,000 km , with slopes, ridges and valleys, characterized by very fine and loamy terrain that is highly fertile and easy to dig (Kapp, 2015). Following the irregularity of the topography, settlements can be excavated into flanks of elongated ravines, especially in the Guanzhou, in northern portion of Shaanxi and in central and southern Shanxi provinces (Fig. 5).

The so-called *yaodong* is a type of underground space with varied functions, constituting the minimal unit of innumerable rural villages. Depending on the subsoil

geo-morphology and the geo-climatic conditions, *yaodongs* have a variety of plans, sections and details, representing the very expression of the technical skills and traditional culture of the loessian region (Golany, 1992).

Typically, a *yaodong* has a long vaulted room with a semicircular entrance closed by walls, made of earthen bricks, stones of wood, and covered with a wooden door or a quilt. This arch-shaped structure also allows the sun to further penetrate inside the cave in winter, therefore making full use of solar radiation. A thick layer of earth on top (about 3 to 5 meters deep) acts as an effective insulation coverage and humidity modulator. Above a *yaodong*, there are often little chimneys and a tunnel constructed in the earth, representing the breathing system of a *yaodong*. In those area where bedrock exposed on top of the hill makes excavation somewhat difficult there are also houses partially or wholly above-ground, but inspired to the *yaodong* shape (Fig. 4).

Fig. 4 Laoniuwan village in Shanxi Province, China © F. F. 2017

In semi-terrain houses walls are realized by earthen bricks and or stone flakes, while roofs are made of stone flakes covered with earth, to ensure the thermal insulation of the interiors. Usually, multiple dwellings are built adjacent to or on top of one another and connected together to form a multitiered village, often for a single clan or an extended family. Sometimes terrain and semi terrain elements are combined with a

Fig. 5 Lijiashan Village, in Shanxi Province, China © F. F. 2017

structure built above ground in order to form an integrated complex connected by path (Knapp, 2000). Nonetheless, dwellings are hidden in the environment, being perfectly integrated into nature with minimum impact. However they are very fragile: earthen architecture is subject to a rapid decay processe, particularly suffering the humidity, thus needing a daily maintenance (Luvidi et al., 2019).

According to some studies, the number of inhabited caves in China is very consistent and many of these would be very ancient. Although in antiquity many of these villages have known prosperity, thanks to the fertility of the land, centuries of deforestation and over-grazing, exacerbated by China's population increase, have resulted in degenerated ecosystems, desertification, and poor local economies with the consequence of the abandonment of many villages. Exactly as happened in Southern Italy, since the middle of the last century, most of these vernacular settlements were abandoned because considered unhealthy and outdated if compared to the living standards of a 'modern' city dweller. It has been estimated that 90 thousand villages disappear annually, many of which collapse each year owing to exposure to floods and mudslides. Recently, very few cases have been faced the challenge of not losing their vitality by attracting tourism, and converting some traditional houses into affordable

accommodation for travellers. Nevertheless, many problems still restrict the sustainable development of those sites and could possibly compromise the conservation of their tangible and intangible values.

## 3 The New Theoretical Approach: From Historic Functions to RE-USE for Italian and Chinese Cases

### 3.1 UBH Functional Classification

The comparative analysis has shown that the Southern Italy underground settlements and Loessian *yaodong* system seem to have much in common, being examples of living heritage standing at the core of local identity. To this heritage has been applied the newborn functional classification on the Underground Built Heritage (UBH), referred to historical artefacts excavated in underground areas that become significant expressions of local cultural heritage (Varriale, 2019). To be included in UBH one site must be the result of technological adaptation to geological, climatic, geographical and political situation in application of selected local skills and professional abilities born or developed by local communities. Based on its significance, UBH can be at the core of enhancement processes aiming to generate widespread social and economic benefits thanks to communicative power of the corresponding artefact.

Being the inclusion or not in the UBH strictly connected to the communication of the historical functions of the spaces under evaluation and to the nature of the technological approach applied, the UBH definition made the introduction of a new classification chart necessary. This classification is fundamental, not only to allow the static representation of the corresponding UBH element but, also, to go back to all the transformations (shapes, uses, etc.) eventually occurred during its history and that can be significant in the potential enhancement actions. UBH considers eleven functions, each of which generates the creation of correspondent caved artefacts. Four of them are connected to the management of environmental conflicts and communicate information about the correspondent functions: Sanitary, Water, Environmental Alert and Living Space. Five are connected to the management of social interactions: Religion, Knowledge, Safety, Communication and Economy. Two (Food and Transport) are connected to both Environmental and Social issues. The analysis of the chart reveals that both in Southern Italy and in Loess Plateau, the most significant elements classified under UBH are represented by the classes "water management" and "living space" with reference to the management of environmental conflicts, and by "religion", "knowledge", "defence", "communication" and "economy" with reference to the management of comparable social conflicts. Spaces to manage "food" have been excavated as an answer to environmental and social problems in both countries. Historical tuff caves, stables, farming facilities, warehouses for local products, oil and vine transformation factories in Italy and historical steel, iron and coal mines in China, reflect the stages of the relative economies throughout history. Thus, both in China and Italy, the subsoil is the place where it is possible to read the stratification of human history. The testing of the UBH classification to both historical systems showed the presence of many similarities on the basis of which to build their improvement. Nonetheless, the analysis of the processes put in place in Italy and China for the enhancement of such areas revealed substantial differences between the two countries.

### 3.2 RE-USE Actions for UBH

This result was confirmed by the application of the newborn scale of RE-USE actions for UBH to both the Italian and Chinese cases. This classification was created to compare different approaches of management, sustainable conservation, regeneration and touristic use. It includes four different levels of actions carried out to address the UBH enhancement. The first three refer to innovative approaches to the various uses of historical spaces; the fourth

level refers to the building of new spaces using historical skills: Re-inventing, Re-introduction, Re-building and Re-interpretation.

Re-inventing is the level dedicated to rare and unique sites. This type of UBH requires monitoring, preservation and control processes, which are the preliminary goals, followed by RE-USE actions. When Re-inventing is applicable, emphasis is also placed on the communication of historical functions, even with the use of technological instruments to promote underground culture and allow virtual reconstructions of underground life. In this case, Re-use is virtual and happens to be a significant and qualifying element of the fruition of historical sites.

Re-introduction is the level dedicated to very widespread and common historical artefacts, representative of local social and economic history. In these cases, restored spaces can re-host the same functions as in the past with respect to both the remains of UBH and the introduction of new standards such as those related to contemporary hygienic and security parameters.

Re-interpretation is not a conservative approach with reference to the historical functions, however it refers to the location of new ones. In these cases, sites are restored and new functions are located while the communication of historical uses is preserved, also with the support of contemporary design which often includes historical equipment being used in interior planning.

The Re-building approach includes both the replication of the historical sites, in cases of extreme danger or vulnerability of the original ones, and the use of historical negative building methods -even implemented with the adoption of new technologies and materials -within environmentally friendly urban planning.

As the RE-USE classification revealed, there are substantial differences between Italian and Chinese case studies. This is due to two main factors. First, while Italian villages have been completely evacuated as an effect of the Laws n. 619 in 1952 and n. 126 in 1967 (Risanamento dei "Sassi"), *yaodongs* are characterized by the coexistence of villages with continuity in use, voluntary abandonment and non-systemic evacuation. Thus three different scenarios are possible in China: (a) currently populated villages, some of which present facilities and materials that have altered the natural equilibrium of excavated settlements; (b) abandoned and degraded *yaodong* and settlements already destroyed and (c) settlements destined to destruction to pave the way for the construction of new above ground urban settlements.

The second factor depends on the different levels of social acceptance of underground style living in Italy and China and to the involvement of local populations in the enhancement of troglodyte settlements as cultural sites. In Italy, despite the underground sites are still perceived as poor locations, those villages are considered as an economic resource in the cultural and tourism sector, thus almost all actions aim at their enhancement, considering UBH as facilities for tourists and local communities. This attitude was also strongly influenced by the Sassi of Matera UNESCO nomination that turned the area into one of the most significant open air museums in the world.

In China, on the contrary, the widespread social housing policy has motivated academic research towards the evaluation of climatic conditions of underground settlements. Consequently, new-built *yaodong* villages are now believed to be at the forefront of sustainable rural development (Li & Sun, 2013; Wang, 2014) and local communities actively participate in such projects. By way of contrast, there is little or no consideration of future touristic and cultural development of *yaodong* villages. That said, very recently, focus has shifted, even in China, to the conservation and enhancement of *yaodong* villages as a "cultural asset". However, those actions are mainly seen in function of the economic development of the sites, aiming at supporting and

increasing the "lost" national cultural identity (Zan et al., 2018).

As an effect of this approach, the application of cultural policies to *yaodong* villages, rather than being addressed towards the conservation of the correspondent UBH, focuses on their reconstruction (after the demolition carried out during the Mao period) as an instrument for the promotion of Chinese cultural identity.

The comparative approach showed substantial differences in the processes adopted for the improvement of two very similar systems, stimulating new research questions. Considering both differences and common characteristics of the two systems analyzed, is it possible to define mutual adjustments as a result of the present paper? More specifically, is it possible to identify a common methodology for the enhancement and the optimization in the use of UBH in selected areas?

## 4 From the Theoretical Approach to the Cultural Route

On the basis of the above mentioned analysis, the enhancement of Italian underground settlements can be improved with the re-introduction of functional "living space" in dismissed settlements and with the adoption of underground lifestyle concepts reaching a new frontier for sustainable house design. Perhaps not in Matera, where the current situation appears to be solidified, however in the abandoned villages of Gravina, Ginosa (Fig. 3), Laterza, etc., actions in this direction to support local urban and social development could be successfully planned and implemented. Furthermore, the analysis suggested the need to understand what can be learnt from the few successful cases and how it can be applied adequately in other sites. On the other side, it is urgent to create a network on the underground building culture in order to enlighten this important aspect of the local identity and support joint positive actions in conservation and sustainable enhancement.

In this network, the most famous sites must act as drivers for the promotion of lesser-known sites, also becoming models of restoration and revitalization (Genovese, 2018). From this perspective, enhancement actions have been planned and tested within the CNR project on the southern subsoil. In collaboration with local administrations, the evaluation of a multi-level strategy has been elaborated, as follow:

(1) The punctual sites conservation and development — consisting of the identification and selection of those sites not yet enhanced but accessible, on the basis of the UBH classification. This working step aims at the improvement of the underground context, to return it to sociality and opening to tourist market.

(2) The site integration into a network — the UBH method offers hints for an alternative reading of the heritage in relation to urban history, allowing to proceed with the sites systematization and the creation of a thematic cultural route. This process also includes the integration of lesser-known sites with more famous ones, composing a multitasking offer as a solution to minimize the effects of overcrowding on the most popular sites and maximizing social and economic rise in less developed ones, preserving liveability and authenticity.

The intervention plan included also the creation of multimedia products in order to complete the offer by giving an overview of the whole possible cultural offers, also promoting events, and allowing the tourist to compose the visit himself by choosing for short, medium and long-term stays. The creation of an interconnected network aimed to optimize the programming of cultural events so as to have a range of offers that cover the most varied needs with the maximum possible temporal coherence.

As the research highlighted, in spite of the differences, there will be positive potential to test this model of intervention even in Chinese villages. After all, in China some success stories in the field of UBH enhancement have yet become a pillar of tourist economy, having captured the attention of

the world.

## 5 Conclusion

The study based on the use of the innovative charts dedicated to the functional classification of elements of the new class of UBH, and the RE-USE actions carried on for UBH, provided new insight by testing the theories related to the connections between cultural identity and climatic zone, highlighting similarities and differences between Western and Eastern vernacular villages. On this basis the paper proposes a possible future action towards their enhancement, through the creation of a thematic cultural route. The model already tested in the Italian case, and some success stories in the field of UBH enhancement having yet become a pillar of the Chinese tourism economy, highlighted positive potential results in this direction.

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