Conservation of traditional earthen architecture in the Abruzzi region: The construction site for first aid rehabilitation work of Casa d’Arcangelo at Casalincontrada (Chieti, Italy)

Mauro Bertagnin
Gaia Bollini
Gianfranco Conti
Clelia Mungiguerra

Beginning in the seventies Italy has seen an increasing interest in the conservation of traditional earthen architecture heritage. The first Italian forum to promote conservation was the exhibition «Le case di terra: memoria e realtà» (Pescara, 1985). Different events followed that encouraged the study, research, conservation and restoration of traditional earthen architecture heritage, as well as the practice of earthen building techniques, mainly in the field of sustainable building. To support these goals institutions were also established to promulgate earthen architecture heritage. The LATERIS laboratory was set up at the University of Udine in 1983. In 1993, the Centro di Documentazione Permanente sulle case di terra of Casalincontrada (Chieti, Italy) was founded. At the Architecture Department of Cagliari University the Centro Studi e Ricerche sull’Architettura Regionale in Terra Cruda has been working since 1997. These centres mainly cooperate with the Rete dei Comuni della Terra Cruda. This network, officially born in 2000, links those towns characterised by an earthen architecture heritage.

THE CONSERVATION STRATEGIES: TOWARD THE FIRST AID CONSTRUCTION SITE

Conservation strategies in Italy are basically related to the restoration of public buildings. The basic aim of these strategies is to improve the awareness of local public administrations as well as the community and local population on the knowledge and conservation of the local earthen architecture legacy.

For what concern the private buildings, urban as well as rural architectures, mainly houses or farms, only few cases of spontaneous restoration were carried out in the Italian regions where the earthen architecture heritage is relevant. In the Abruzzi and Piemonte, some public authorities have just ordered a census of the local rural and urban earthen architectures.

Apart from these sporadic conservation actions carried out by the owners, a large amount of existing earthen rural architecture is generally in an increasing state of decay.

Key reasons for this deterioration include:

— a lack of awareness of the importance of maintaining traditional earthen architecture as a part of the cultural architectonic heritage;
— the general idea, of structural poorness or blighted appearance related to the earthen building, especially private houses, that foments the owners lack of interest in restoration or conservation;
— the frequent belief that earthen architecture restoration costs are onerous and that no artisans or construction firms have the necessary know-how and competence for restoration needs;
— the erroneous idea that earthen rural architecture is insalubrious.

As a result, the owners often ignore the ongoing decay process so that once totally run-down a «new» house can be built. This «new» house is related to the owner’s perception of social and economic progress, obtained through the use of «modern» materials such as concrete blocks, steel, etc., which are regarded as an affluent society status symbol.

To oppose this perspective, in the framework of alternative restoration policies, promoted by the local ONG Terrae Onlus, an experiment of first aid conservation field was carried out in the case study of Casa D’Arcangelo in Casalincontrada (CH), an old rural earthen house.

To avoid the complete decay of this house a team, directed by Mauro Bertagnin (Department of Civil Engineering-Udine University and CRATerre member), «invented» and promoted a first aid conservation construction site.

The basic goals of the field were:

— to promote a multidisciplinary research project on the local building technique, the massone;
— to obtain the survival of the building for the duration of the conservation project;
— to improve local awareness of conservation strategies;
— to provide different educational steps to local manpower (such as masons, artisans and designers) to promote the conservation and restoration process of local earthen legacy.

THE FIRST AID CONSTRUCTION SITE AS BASIC CONSERVATION TOOL

The conservation field steps were:

Theoretical training

Theoretical training provided basic notions of technology and typology of earthen architecture heritage in Italy and on the massone architecture in the Abruzzi. Furthermore an important part of this section focused on the importance of earth as raw material. Subsequently Mauro Bertagnin and his staff explained and showed the basic earth tests to analyse and recognise the fit earth for the different earthen techniques. Figures 1, 2 and 3.
Facts about correct static restoration as well as on earthen building maintenance and conservation practice codes were also provided.

An analysis and a survey of external and internal housing deterioration conditions completed the theoretical approach. Figure 4.

Organisation of the construction site and massone manufacture.

The first part of this section was devoted to the explanation of the preparation of a correct and safe construction site. The second and most conspicuous part centred around the practical manufacture of the massone. The various massone production phases were set in different areas of the field:

- earth sieving and its subsequent crushing by the muller, Figure 5;
- straw cutting into short threads, Figure 6;
- sand preparation for the plaster;
- raw materials mixing (earth, straw and water), Figure 7;
- massone manufacture, Figures 8a and 8b;
- massone storage in the straw.

Practical work section

According to the problems pointed out during the survey, the preliminary restoration actions, essential to avoid the definitive building decay, were carried out.
The team worked basically towards masonry reinforcement, having the building displayed vertical cracks. Those were appropriately stopped using natural elements\textsuperscript{17} to re-establish the structural continuity.
The corners too were maintained employing some vegetal elements that contributed to mould and to support the pieces of massone gradually added. Figures 9 and 10.

The base flowing water effect was avoided recreating new «good boots» trough covering the base with a fired bricks «skin». Figure 11, once cleaned up its surface and reintegrated the eroded portion. Figure 12.

Figure 9
Corner reconstruction. Corner cleaning. (Photo Mauro Bertagnin)

Figure 11
New fired brick basement. (Photo Mauro Bertagnin)

Figure 10
Corner reconstruction. New massone insertion. (Photo Mauro Bertagnin)
Before executing all these operations the wall surfaces were dampened, Figure 13, so that the added earthen parts could stick well on the old wall.

Finally some possible finishing solutions were tested on the restored walls. Once identified and defined some testing surfaces on earth-based plasters\textsuperscript{18} were used. The sand percentage and its granulometry were varied, and some natural additives added (casein, etc.). Different plaster colours were also tested by adding natural oxides.

To make possible a comparison it was employed an industrial pre-mixed earth-based plaster too.

To satisfy the second basic rule of a good earthen construction («a good heat»), a general overview and check of the tiled roof protection was carried out.

This new tool, according to the evaluation made some months later enabled minimal survival of the building, avoiding its sure collapse and helping the subsequent setting up of the restoration project in a longer time. At the same time it has looked as an important theoretical as well as practical educational moment.

Once ended, the first aid conservation construction site activities made it possible to think to a more meditated restoration project. This final project will be in fact set up according to the typological technological, philological and historical investigations concerning the earthen building. To provide a correct conservation strategy the integration in the local environment will be considered too.

A NEW TOOL FOR EARTHEEN RURAL ARCHITECTURE CONSERVATION

This experience has revealed that the first aid construction site is an important operating tool in earthen architecture conservation. It allows the contemporary achievement of providing maintenance that can’t be postponed, and preparing an appropriate base for further conservation and restoration actions.

NOTES

2. LATERIS laboratory is involved in activities and researches on earthen architecture, sustainable building, recycling in construction practice, alternative and renewable sources of energy, as well as on the rediscovery and revaluation of the traditional building techniques and know-how.
3. In the ‘80–’90 decade some others laboratories have been brought in operation in different Italian universities. For an exact survey see Bollini (2002).
4. It’s a national network that aims to coordinate the municipal administrations actions on the matter of earthen architecture.
5. Sardinia, Piemonte, Marche and Abruzzi are rich of earthen rural and urban architecture examples.
6. All the related expenses have been adopted in the framework of Regional Found and the census results were often published. For an example see Conti (1999).
7. Terrae Onlus is an association of earthen architecture connoisseurs, which locally promotes events focused on the earthen architecture heritage. It mainly operates in the Abruzzi region. Terrae Onlus often works in collaboration with Udine, Cagliari and Pescara universities.
8. This unique experimental construction site for first aid rehabilitation work was carried out with the collaboration of Maria Cristina Forlani (Faculty of Architecture-DiTAC-Chieti University), the ONG association Terrae Onlus (Chieti, Italy), the Scuola Edile di Chieti and thanks to Mr. D’Arcangelo, the owner of the earthen house. About twelve persons, besides the organisational staff, have participated; it was a very heterogeneous group, consisting of several local architects, an historian, a geologist, some masons, some final year students of different disciplines and people interesting to the oneself-building traditional and local techniques.
9. The international name of the massone technique is cob. To have further information on cob you can see Houben and Guillaud (1994): 178–179. For the massone technique and its diffusion in Italy see Bertagnin (1999): 183–219.
10. The conservation project is obviously related to the financing process that can be carried out by the owner following an affordable timetable.
11. All the explained tests were carried out following the CRA Terre Standard for the earth tests. See Houben and Guillaud (1994): 131–144.
12. This final section was carried out under the guide of the architects Stefania Giardinelli e Cinzia D’Arcangelo (members of the Terrae Onlus staff).
13. The whole logistical framework of the construction site was set up by the architect Gianfranco Conti, president of the ONG Terrae Onlus, and his staff.
15. This operation was carried out in a hole where the earth, the straw and the water were mixed by feet. Traditionally also cows and draught animals provided mixing «power».
16. It consists in shaping by hand a cake of earth and straw. The participants divided into groups supervised and coordinated by the architects Stefania Giardinelli, Cinzia D’Arcangelo (Terrae Onlus), Raffaella Petruzzelli (Chieti University-DiTAC) and Gaia Bollini (Udine University-Department of Civil Engineering) experienced in turn all the different stages of the massone production.
17. The natural elements were sticks of bamboo or straw and small wet massoni. In this phase these natural elements were used as seam and connection elements between crack borders.
18. These plasters have been manufactured in the construction site.

**REFERENCE LIST**


