

Notes

- (1) Stein stayed for three days in Bam, from 20 to 23 April 1932, but did not manage to see any of the archaeological sites that he intended to visit.
(2) Wells connected with underground tunnels, a popular method of irrigation in arid areas of the Middle East.
(3) A stage for traditional religious theater.

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DOCUMENTING EARTHEN-ARCHAEOLOGICAL SITES – THE ISCEAH GLOSSARY OF DETERIORATION PATTERNS

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Theme 3: Documentation, Conservation and Management of Archaeological Sites
Keywords: Damage, decay, earthen sites, terminology

Abstract

Traditional and contemporary earthen construction can be identified in most European countries. The ecological and sustainable advantages associated with European earthen-building traditions make it a relevant material for construction nowadays. However, despite recent technology, earthen heritage remains fragile and threatened. This is why the protection of this unique heritage and the diffusion of contemporary earthen architecture in Europe deserve to be further acknowledged and supported.

In that aim, a European project was implemented in 2006-2007 making a state of the art of earthen architecture in Europe, particularly in France, Italy, Spain and Portugal. In order to complement these results at the scale of the European Union and to ensure a widest dissemination, a new project “Terra InCognita – Earthen Architecture in Europe” was launched in November 2009 for a period of two years. The aims of the research project were challenging: a scientific publication gathering the contributions of authors from the 27 European Union countries; an updated European cartography concerning traditional earthen techniques; a scientific exposition and a photography exhibition, a European label, as well as a comprehensive website (www.culture-terra-incognita.org). The research project also initiated the launch of a European network during a symposium held in Marseille (4-6 May 2011).

This paper presents the results of the Terra InCognita project, as well as a reflection concerning the relevancy of these kinds of initiatives, as they can contribute for the advancement of knowledge regarding earthen heritage, as well as the establishment of strategies to protect earthen heritage.

1. INTRODUCTION

1.1 The need for a glossary of deterioration patterns

The need to document earthen architecture and its deterioration has been an issue since the development of the scientific approaches to conservation. The start date for earthen architecture is often considered to be 1966 with the establishment of ICCROM’s scientific program through a partnership between the University Museum, Philadelphia and the Italian Archaeological Institute in Baghdad and Turin (Carter and Pagliero, 1966). Documentation has been an issue highlighted at many of the Terra conferences, since their initiation in 1972 (Hughes, 2002; Matero and Cancino, 2002; Cooke, 2010a).

ICOMOS-ISCEAH International Scientific Committee for Earthen Architectural Heritage supported the compilation of the document, as consolidating both vocabulary and terminology would be of great help for practitioners and academics. At present, there is no similar tool that deals with earth, as a building material. As such, the current initiative is the response to a growing need for a standardized approach for documentation of deterioration patterns, particularly in light of the growing interest in the conservation of archaeological sites. There is also recognition of needs for both research-led documentation of earth structures alongside more rapid documentation of earthen architecture, given the assumed complexities of its environmental susceptibility and given the likely impacts of climate and climate change.

Moreover, the professionalism of ‘documentation’ as a discrete technical discipline allied to, but not necessarily undertaken by, archaeologists, conservators or earth building specialists – and particularly the one undertaken by technicians

(such as 3D-scanning) – can present difficulties in managing data that can have relevance for conservation planning. This is in the context of a growing trend throughout archaeology and conservation to establish norms and procedures, and some of these have been undertaken in different contexts by ICOMOS.

2. BACKGROUND AND OTHER INITIATIVES

A number of different initiatives have been undertaken for a glossary of deterioration patterns of earthen architecture. There exist a number of institutional approaches (such as ICCROM, CRAterre, and GCI), alongside with project-based approaches (such as Ancient Merv and Ajina Tepa) or individual-based approaches. Many of the ICOMOS-ISCEAH group members are able to bring their own experience and approaches to the debate. The key to this debate is to separate ‘personal preference’ terms from more analytical terms, which are more suitable for an ‘international’ glossary. Even this approach is also complex (see discussion below).

These ‘earthen building’ approaches exist alongside with those undertaken in a similar context but for different materials (such as stone and fired brick). Given the scale of past and present initiatives, it was clear that there was a need to review past process, and understand what does and does not work effectively. At present, the current stage is still collating glossaries and approaches for understanding, whether they are of practical applicability to real-world cases.

2.1 Examples

The development of standard approaches to documentation was a component of the influential Getty Conservation Institute’s Fort Selden Test Wall project and its various of-shoots (Agnew, 1990; Caperton, 1987; 1990). Similar approaches were used at Casa Grande and other sites from the University of Pennsylvania students (Matero, 1999). Other approaches were developed specifically in the context of UNESCO projects, such as Ajina Tepa in Tajikistan (Fodde, Watanabe and Fujii, 2007) and Burana in Kyrgyzstan (Fodde, 2008), as well as other research projects, such as Ancient Merv in Turkmenistan (Cooke, 2008) and Hili in Abu Dhabi (Cooke, 2010b).

Additional examples of glossaries from non-earthen materials include the ISCS (ICOMOS International Scientific Committee for Stone) stone glossary and the damage atlas for fired brick (Franke and Shumann, 1998). It took seven years to compile the ISCS document on stone and develop a hierarchy of terms to describe deterioration patterns observable by the naked eye, but with some variation, such as ‘mechanical damage’. The ISCS stone glossary only contains terms related to stone material as an individual element within a built object or sculpture. As a consequence, the terms do not relate to the description of the deterioration of a stone-masonry structure as a whole (ICOMOS-ISCS, 2008, p.6). This is an important aspect to consider when narrowing down and refining our approaches to the ISCEAH glossary.

	Advantages	Disadvantages
B/W photography	Clarity of image Ease of reproduction	Limited palette to demonstrate
Colour photography	Clarity of image Accurate record	Difficulties of reproduction
B/W line drawing	Clarity of drawing Ease of reproduction Establishes drawing convention	Limited palette to demonstrate
Colour drawing	Clarity of image Accurate record	Difficulties of reproduction
Point cloud (static or 3D)	Accurate record	New technology, not all familiar with technique Difficulties of reproduction

Table 1. Comparative analysis of advantages and disadvantages in using graphic methods (credits: ICOMOS-ISCEAH)

2.2 Problems and issues

Language is the greatest complexity when developing any glossary – each person has his/her own terms to describe what is seen, and as individuals, each one knows precisely, to what they are referring to. Furthermore, the expansion of earthen materials across different continents, together with different and local specialism’s make the task immensely complex – this being the difference between personal terms of reference and those more suitable for an international glossary. Just one example of a characteristic deterioration pattern affecting earth structures can demonstrate this - capillary action takes place at the base of the building, often creating a zone of damage cut into the base of the wall. Even by a single practitioner this can be variably known as: undercutting, basal erosion, wall-base cavities and coving, amongst others.

Other issues are made complicated for earthen architecture, as different types of earth construction are more or less liable to demonstrate particular deterioration patterns. This is similar to how different geologies demonstrate different deterioration patterns for stone deterioration.

Methodologies for graphic portrayals of the glossary have also been discussed (particularly by William Remsen and Pamela Jerome). These include black-and-white or color photography, black-and-white or color line drawing, and use of point-cloud data (from 3D laser-scanning) (Table 1).

How and in what ways, the illustrative support is developed, largely depends on how the glossary will be used and disseminated. There are advantages and disadvantages in the different methods depending on print/online distribution – with perhaps a rather idealistic aim that this could eventually be a hand-held or smart-phone application. For the time being focus has been on black-and-white line drawing, alongside color photography (Table 2).

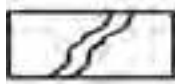
Term and drawing convention	Definition	Representative photograph	
Crack and deformation (ISCS)			
Cracking 	Fractures of variable length and orientation, greater than or equal to 0.40mm in width, with or without associated planar displacement of the finish, and differentiated by depth and pattern. (MV)		Fig.1 - House of Beit Seif and Khalfan Bin Abdallah Al-Zahiri, Al Ain, UAE (credits: E. Fodde)
Structural crack Seismic crack Masonry crack 	Crack through a load-bearing wall. Structural cracks appear especially on single structures that are left exposed to the elements and to improper drainage. Earthen walls are sometimes not properly connected and are therefore free to move individually. Crack thickness in the order of cm. It also applies to seismic structural diagonal or shear crack, to through wall cracks, with variable thickness.	 	Fig.2 - Buttress-wall disconnection (corner crack) in rural Peruvian highlands (credits: D. Quiun) Fig.3 - Acllahuasi of Pachacamac, Lima, Peru (credits: J. Vargas-Neumann)

Table 2. An example of a page from the ISCEAH glossary

3. DEVELOPMENT OF ISCEAH GLOSSARY

Following on from the discussions at Terra 2008, the archaeology scientific sub-theme of ISCEAH, focused on establishing a glossary of deterioration patterns. This immense project just begun to be tackled and the momentum is complex. To date, the authors have not progressed, as much as they would have hoped.

We have reviewed a number of glossaries used by our members, and looked in more detail at how and in what ways the ISCS stone-glossary approach could work for deterioration patterns of earthen architecture. We have attempted to fit terms from our various glossaries (in particular the Mesa Verde glossary developed by Frank Matero) into a hierarchy of terms (as used in the ISCS stone glossary). What is presented in the table is an early attempt to create a glossary. This has been done in reference to the authors individual approaches to site documentation, and with reference to particular documents – Franke and Shumann (1998), ICOMOS-ISCS (2008) and Matero (n/d), alongside earlier work at Casa Grande (Cancino, 2001) and GCI work at Mogao Grottoes (GCI, 2004). The approach comprises three types of information (the term, and black-and-white drawing convention, the definition, and a representative color photograph). This utilizes the hierarchy of terms from the ISCS stone glossary: crack and deformation, detachment, features induced by material loss, discoloration and deposit, and biological colonization.

4. CONCLUSION

ISCEAH needs now to consider how, and in what ways, the ISCS approach needs to be tailored to earthen materials. It is also relevant, to consider other earth-specific terms that need to be added, and those less relevant that can be omitted. The group would like to further define and develop approaches to the glossary, and this paper become an important opportunity to review progress and develop a strategy for completing the project.

Within ISCEAH, this project will also be evaluated to determine how it contributes to other initiatives, such as the atlas of earthen architecture. There is perhaps an interplay here, between identifying a number of sites that could be used to test-run approaches, to review and to evaluate the glossary.

It is likely that in the future, a great variety of terms will be included, in order to incorporate the concepts of the growing number of specialists involved in conservation, including archaeologists, engineers, architects and conservators. Other categories will also be considered, such as seismic damage, and damage caused by inappropriate repair. In addition, further languages also need to be contemplated, such as Spanish, and French, beside the English.

This paper aims to demonstrate the ongoing commitment of ISCEAH to develop new approaches and the understanding of earthen architecture. The initiative will continue to be developed in the following years.

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PROTECTION OF AN EARTHEN-ARCHAEOLOGICAL SITE: A COLLABORATIVE EFFORT BETWEEN COMMUNITY AND EXPERTS, CHILE

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Theme 3: Documentation, Conservation and Management of Archaeological Sites
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The prehistoric village, Tulor 1, is located about 10 km southwest of San Pedro of Atacama in northern Chile. It is the oldest sedentary archaeological site in northern Chile, whose chronology dates back to 2250 years ago. It was excavated by archaeologists from 1981-1985. At that time, it was clear that the site was undergoing an accelerated process of deterioration, resulting from the advance of a large dune that originally covered it that currently was in the process of withdrawal. Studies were made to find a solution to the natural processes of destruction affecting the site, and it was concluded that the active and irreversible damage is caused by the condition of the environment in which it is located.

Research has shown that the best way to preserve the site was to keep it in a “buried” state. In order for that to be achieved, it was necessary to stabilize the top of the earthen walls, which had been irreversibly degraded, by designing “capping” solutions and binding based on satisfactory studies with more than 20 years of permanence. Moreover, the study of the grain size of the dragged material allowed determining of the minimum particle size necessary to cover the site with a thin layer of sand with similar features, preventing it from being carried away by the winds forecasted by the weather station installed in situ. In addition, and because it is a site whose management and care is in the hands of a small indigenous community, it was necessary to raise awareness of the site’s fragility, and to provide technical training for indigenous community to be able to perform the work of supervision and future maintenance.

1. INTRODUCTION

Culture and cultural heritage are living concepts, constantly changing according to societies where they belong. Similarly, the definitions of conservation and restoration have undergone significant changes over recent history; changes that directly affect the materials used in an intervention, the technology applied and, above all, the chosen criteria.

The prehistoric village of Tulor is located in the immediacy of the ayllus of Coyo and Tulor, about 10 km southwest of the town San Pedro of Atacama in northern Chile. The environmental framework is established to the east by the colossal Andean highlands, to the west by the mountain range of the Cordillera de la Sal, which ends northwards to merge with the eastern edge of the great Salar of Atacama. In its surroundings remain active dunes, on which are found scattered shrub species, maintained by subsoil moisture. The chronology of occupation of the site ranges from 800 BCE to 500 CE that is, the settlement would have originated about 2,250 years ago. Some experts have considered it to be one of the best-preserved archaeological sites of the Neolithic period (Barón, 1986).

The site is located on the large area of alluvial deposits of the San Pedro River. The village itself is built on a site of clayey soil.

Geological theories hypothesize very different environmental conditions to the present ones of the entire area, theorizing that probably there was a greater availability of water resources, and thus the existence of more vegetation and wildlife than currently. However, fluvial activity, which depends on the climatic cycles of the High Andes, produced over time, sharp changes in the course of the River San Pedro, which moved further away from the Tulor sector.

Dryness drastically deteriorated environmental conditions, making the site uninhabitable and forcing its occupants to emigrate from the territory in which the village was located.

A slow process of desertification began, leaving the ground bare. Strong windstorms dragged the salty sands from the Cordillera de la Sal, forming active dunes that gradually covered the entire site, which also preserved it. It remained in this condition approximately 1,700 years until, in the early decades of the 20th century, the dune covering the site moved southeasterly, revealing the first structures, which was reported by Priest G. Le Paige, in 1957 (Le Paige, 1957-58). For its historical and heritage value, as well as its fragile condition, it was placed by the World Monuments Fund, on its Watch List for endangered cultural sites around the world.