

A SYNOPSIS REVIEW OF EARTHEN ARCHAEOLOGICAL HERITAGE

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Abstract

A large number of archaeological remains from earthen settlements have been identified throughout the world. This paper presents a summary review of literature addressing this archaeological heritage. From a first approach developed by the author (Correia, 2006), the literature review intends to go further and emphasize how earthen architecture was part of monumental heritage of ancient civilisations, but also important settlements from complex cultures. In distinct continents and antique times flourished a great diversity of societies that applied earth, as major building material. This paper addresses a review of ancient earthen sites identified in the Middle East, Iranian plateau, Ancient Egypt, Southeast Asia, Central Asia, Eastern Asia, American continent and European first landmarks. As a synopsis review, main examples of earthen archaeological sites will be mentioned throughout the paper.

1. INTRODUCTION

Since pre-historic times, soil has been used for protection, through sheltering and building. Diversity in earthen architecture is revealed by the variety of the built heritage, but also by the multiple building techniques applied, from pre-history to the present day. Each technique incorporates an extensive diversity of typologies. Each variant presents intrinsic characteristics that determine its building application. The variety of these features is broadened, especially if it is taken into account the distinct construction tradition of each region and country with regard to type, morphology, systems and applied materials. The mentioned diversity is also recognised through time and location. In the same time period, exceptional earthen archaeological heritage is revealed in different continents. This paper intends to address a summary review of these earthen structures.

2. EARTHEN ARCHAEOLOGICAL HERITAGE

Throughout the world, several archaeological campaigns have identified a very rich variety of earthen construction. Through the review of literature of earthen heritage surviving from antiquity, it is recognised that there are specific regions known to the present time, where earth was more consistently used, as a material of construction for monumental structures and important settlements. In fact, most of the oldest surviving earthen structures are located in the Valleys of the rivers Tigris (Iran), Euphrates (Iraq and Syria), Nile (Egypt), Jordan (Israel/Palestine, Jordan), Indo (India and Pakistan), the river Murghab (Afghanistan, Turkmenistan) and the river Huang (China).

However, there is a general predominance of earthen heritage in the Middle-East, in particular in the region formerly called Mesopotamia, considered the birthplace of the first cities. The Mesopotamian cultures that emerged around 6.000 BC started the urban revolution (Aurenche *et al.*, 2001, p.1191). Nowadays, this area is partially integrated in Iraq, Syria and western Iran, extending to the Persian Gulf. The development that took place in this territory created a current of tradition that lasted more than three millennia, based on the cuneiform writing (Bahn, 2005, p.159). Several earthen cities from this period are known. This is the case of Mari in the centre of Mesopotamia, or Susa in its southeast. To the south of Mesopotamia, approximately

around 2.750 BC were located the cities of Babylon dominated through some time by the Acadian empire and even south, the Sumer empire dominated Uruk, Ur and Eridu cities with several identified remains in earth construction (Guillaud, 1997, p.387-388). Some of these settlements will be examined through.

3. THE FIRST COMPLEX CULTURES BUILT IN EARTH

3.1 Middle East

During the early Neolithic, there were several complex cultures living in earth structures. Some of them will be mentioned, as they illustrate the constancy of earthen building in Neolithic societies. Located in Palestine, **Jericho** is one of the earliest settlements, clustered between 8.400 to 8.000 BC (Aurenche *et al.*, 2001, p.1195). In the circular huts of the original agglomerate, adobes were identified dating from 6.800 BC (Sauvage, 1998, p.41). In 5.500 BC, dwellings already presented a rectangular plan, with a stone foundation and walls in adobe. The pavement and the roof were of earth and daub (Owen, 2009, p.5). Since then, until the decline of the city, there was a continuous improvement in constructive and organizational terms. The renowned wide surrounding walls of Jericho were made of earth, which allowed the fortification and protection of the city from several outside attacks (Correia, 2006, p.14). From the Pre-Ceramic Neolithic, around 8.000 BC, hand made earth bricks constituting circular dwellings were identified in **Netiv-Hagdud**, also located in Palestine (Chazelles-Gazzal, 1997, p.47). One of the first examples of large Neolithic settlement is **Çatal Höyük**, dated from 7.300 to 6.800 BC (Aurenche *et al.*, 2001, p.1197) and located in the actual territory of Turkey. Bahn mentions the place was vast, extending to about 13 hectares (2005, p.274). It contained approximately 5.000 inhabitants at a time, when the traditional Neolithic village was considered to be of much smaller dimensions. In the city, the structures were built so close to each other that probably most of the entrances were by the top. The interior of the buildings were highly decorated. The archaeological station keeps being actively researched.

During the Mesopotamia period, the city of **Tell Hassuna** (on the present territory of Iraq) was built in adobe, approximately around 5.500 BC (Owen, 2009, p.5). Another important ancient city is **Samarra** from 5.500 to 4.800 BC (Guillaud, 1997, p.382), which reveals rectangular adobe houses with multiple rooms and external buttresses (Owen, 2009, p.8). In Samarra, adobe city walls surviving through thousands of years can still be observed nowadays (Warren, 1999, p.15). In spite of major erosion, which created great decay and degraded structures, the walls are still standing. There is also reference from 3.500 to 3.000 BC to **Uruk**, the most populated urban settlement from the Mesopotamia first period. In Uruk, two large temples built in adobe can still be visited nowadays (Bahn, 2005, p.158). Unfortunately, the site is abandoned and archaeological remains are decaying rapidly. In **Ur**, capital of the ancient civilization of Sumer, dated from the 3rd Millennium BC, was the large Ziggurat of Nanna. Originally, this structure, consisting of multiple platforms (typical architecture from the Mesopotamia period) was built in adobe and later was faced with fired brick. On the last platform was located the sanctuary. The royal cemetery at Ur, dated around 2.600-2.500 BC, also reveals earthen decorated structures (Bahn, 2000, p.68). Several of these ancient earthen structures have been excavated, with minimum conservation procedures and lack of comprehensive protection of the archaeological excavations.

In the antique Assyria, part of present Syria, the ancient city of **Ebla** and its fortified earthen walls are true remains of a highly organised culture, which is also revealed by the thousands of clay tablets founded in the city. Ebla was a state-city from the late 3rd millennium BC (Bahn, 2005, p.336). Ebla's royal palace built in adobe also reveals some architectural complexity. Another important earthen city is **Mari**, from around 2.800 BC (Guillaud, 1997, p.385). Presently, it is going through major archaeological campaigns, which is exposing the city and the adobe palace. For 20 years that the

Bureau des Antiquités from Syria, within the University of Damas and CRATerre-ENSAG have been working in cooperation for the conservation of the archaeological site. A major and consistent conservation process is being applied in daily terms.

3.2 Iranian plateau

One of the oldest adobe remains were identified in **Tell Aswad** and **Sialk** sites. These square moulded adobes were identified as being from the 5th millennium (Chazelles-Gazzal, 1997, p.47). It is also important to mention the ancient city of **Susa** (known also as Sush), a site still under the influence of Mesopotamia, from 2.250 BC (McEvedy, 1961, p.27). Susa is located in the southwest of actual Iran, near the border of Irak. These archaeological ruins were excavated for 30 years without conservation measures. As a result a layer of 11m was extracted from the hill, and the ancient old city was exposed to the weather conditions. Recently some conservation procedures were implemented, but they were discontinued. Presently, much of the remaining walls continue to decay. An interesting site is Kabnak, more known as **Haft Tappeh** which was mostly built in adobe and dates from 1.500 BC (Gandreau, 2005, p.17). When visited in April 2008, it was also observed that conservation actions had been applied and monitoring was being taken place. Another impressive example of earthen ancient architecture is the ziggurat of **Chogha Zanbil**, the ancient Dur-Untash in the southwest of Iran. It has 25m high and dates from 13 century BC (ibid., p.17). The ziggurat has been having a consistent management plan implementation, with intensive recording; for instance, the drawing and analysis of each brick and archaeological finding, to the development of procedures for material and site conservation. It is considered a case study example with constant measures of maintenance and systematic monitoring. From another standpoint, the ramparts of **Tous**, in Iran, with an impressive extension of 7100m of length, and a surrounded area of 348,5 hectares (Azad, 2003, p.31) are a remarkable example. In spite of an existence of 500 years with no maintenance, the walls are still standing fairly well. The remaining rampart walls present at its highest point 10 meters and a width of 6 meters ground level and 2.5m at the top (Bahn, 2000, p.31), which can justify their durability to weather conditions. Iran presents extensive examples of remarkable earthen sites, such as **Arg-e Bam**. This ancient citadel with more than 2000 years became World Heritage Site in 2004, following a damaging earthquake.

3.3 Ancient Egypt

The site of **Shunet el-Zebib** built in approximately 2.750 BC, in Egypt is one of the oldest adobe standing monuments in the world and one of the last remains of *'monumental mortuary complexes built at Abydos by the early dynastic pharaohs'* (World Monuments Fund, 2008a). If there is no urgent intervention *'the walls of this highly important and very rare monument could collapse within a few years.'* (ibid., 2008a). In Ancient Egypt, the **Ramesseum** a store for cereals from the time of Ramses II was also built in adobe (Steele, 1997, p.25), with 'Nubian' arches and vaults. It is impressive that with close observation, the fingerprints of the workers that moulded the adobe can still be seen. Unfortunately, the original structure is in structural danger. Also of great plastic expressivity are the **Fatimid tombs**, built in adobe, in Egypt at the end of 10th century AD (ibid., p.26). They are vigorous structures, of waving forms. As the Ramesseum, they were fundamental in the affinity of the architect Hassan Fathy, with the historical and vernacular earth architecture of his country. Presently, they are abandoned, without adequate protection.

3.4 Southeast Asia

In Pakistan are located the ruins of the adobe village of **Mehrgarh**, from about 7.000 BC (Bahn, 2005, p.154). This is the village that gives few evidence concerning to the origins of agriculture in the Indian subcontinent. It is relevant to note the large round towers added to the high adobe walls. After being exposed from archaeological

diggings, the structures are actually neither protected from the weather nor under conservation procedures. This entails rapid material decay. Another important site to be mentioned in Pakistan is the vast city of **Moenjodaro**. Located in the Indus valley, this World Heritage archaeological ruin was listed in 1980. Moenjodaro presents invaluable remains built entirely of adobe from the 3rd millennium BC providing 'evidence of an early system of town planning' (ICOMOS Documentation Centre, 2008, p.153).

The monastery of **Paharpur**, in Bangladesh, built from the 7th century AD onwards, is the biggest Buddhist monastery in the south of Asia. It is located 40kms from the capital Mahasthan. Due to the almost non existence of stone in the region, the central part of the sanctuary is entirely built in adobe and is considered a wonder of engineering. The other components are constructed in fired brick. Presently, it is 22m high, but originally, it was supposedly 30m (Scarre, 2000, p.135). Unfortunately, it is without consistent conservation action.

3.5 Central Asia

In the region of Turkistan (embraced by Kazakhstan, Uzbekistan, Turkmenistan, Afghanistan, Tajikistan, Kyrgyzstan and Chinese Turkistan) several earthen structures should be mentioned. Grandreau analyses the important earthen archaeological sites of Nisa, Merv and Gonur Depe in Turkmenistan and Adjina Tepe in Tajikistan (2005, p.15). Abduraschidow *et al.* refer that in the Republic of Uzbekistan the city walls of **Afrasiyab**, the predecessor of today's Samarkand were built in earth (2004, p.248). The historic complex of **Kirk-kis** in the old city of Termiz, but also several wall remains from palace structures near **Sarafschan** were built in earth (ibid., 248). The city of **Buchara** has its walls of earth profoundly affected by erosion. Unfortunately, the lack of maintenance has caused some areas to partially collapse. Warren mentions that the earth rendering on the top of these adobe walls, delayed the process of degradation (1999, p.145). Another important site to be mentioned is **Merv** dated from VI to IV BC (Grandreau, 2005, p.18) located in Turkmenistan. Merv also presents earthen remains with the same type of abandoned excavations. Cooke underlines the particular risk of erosion present at the Archaeological Park of Merv, due to 'the intensity of the earlier archaeological work' (2003, p.102). The same happens with the three adobe fortresses at **Ayaz Kala**, in Uzbekistan. These are the few remains of palaces and forts built between the 4th century BC and the 7th century AD. After 1.300 years of abandonment, they were exposed by the archaeologist Tolstov in the 1940's (World Monuments Fund, 2008b). Since then, they have been unprotected, surviving hardly to natural decay. The fact that they were not reburied and did not received any measurement of protection, exposes them to rapid decay. Most of the mentioned heritage never went through any kind of comprehensive conservation process, just small repair actions. This explains the creation of *Central Asia Earth 2012 (2002-2012)*, a UNESCO programme directed to the protection and conservation of earthen monumental heritage in this region.

3.6 Eastern Asia

Large parts of the **Great Wall of China**, built between V-III BC and XV-XVII AD were constructed in rammed earth. The thickness of the layers varied between 0.03m and 0.20m (Scarre, 2000, p.214). Some of its sections were later faced with stone. The first walls were constructed in earth pressed between formwork. In the Gobi Desert and the region of steppes, the compacted soil was mixed with palm leaves and bamboo, and the layers had a thickness of 0.15m. In spite of the erosion, the survival of parts of the great wall, dated to 656 B.C., certifies to the durability and resistance of this construction (Correia, 2006, p.14-15). Other important standing earthen structures in China are the hundred or more **towers of Dunhuang** region. They were built in rammed earth or large flat adobes of 38cm by 25cm by 9cm. These towers have 17m

of diameter, 25m of height, and contributed to long distance communication (Scarre, 2000, p.215).

3.7 American continent

In South America, throughout the Peruvian territory, one can identify ancient pyramids mostly built in adobe. These earthen structures, better known as **Huacas** are monumental sacred structures. In this context, it is important to mention the Huaca de Las Flores in Lima, the Huaca Las Estacas in Túcume; Huaca Las Ventanas and Huaca Loro in Sicán; Huaca Cão Viejo and Huaca El Brujo, in Magdalena of Cão; Huaca del Dragón, in Trujillo (Franco Jordan, 1993), among other huacas spread across the country. Murals, bas-reliefs, friezes and sometimes the existence of tombs of noblemen are common to find in the Huacas. Unfortunately, if not informed, tourists could believe that some are mountains of earth debris, as most of them are suffering from severe degradation. The complex of **Huacas de Moche** is located 7kms from Trujillo and it was built during the Moche Period (100-600 AD) (Franco Jordan, 1993, p.1). The complex is composed by the Huaca del Sol, believed to have a more administrative function at its origin. This Huaca was probably built with 140 million adobes, which converts it probably in the widest world structure built in adobe (ibid., p.64). Whereas the Huaca de La Luna had a ceremonial and religious function and measured approximately 32m of height, 290m from north to south, 210m from east to west and used 50 million adobes in its construction (ibid., p.64). The archaeological excavations revealed adobes of different shapes and sizes, from different time periods. Also vital to be mentioned is the complex of **Chan Chan**, the capital of the Chimor Empire that reached its splendour in 1.450 AD. Actually the earthen complex has 14 Km², however, its original area was about 20 Km² (Valle Alvarez, 2004, p.9). It is considered the largest earthen site in the world. Unfortunately, the few entailed conservation measures are not sufficient to discontinue the rapid material loss. This world heritage site is at risk of being irremediable lost.

In North America, several **Chihuahua missions** located in Mexico, and dated from the 16th to the 19th centuries have not received adequate intervention conservation measures. This is the case of San Juan de Dios (Janos), San Antonio de Padua (Casas Grandes), Santa Rosalia de Cuevas (Belisario Dominguez), among others. Several of these missions are archaeological ruins listed in the 2008 World Monuments Watch List of 100 Most Endangered sites, in need of urgent intervention (World Monuments Fund, 2008c).

In the United States, numerous archaeological earthen ruins are important witnesses of vanished Native American cultures (such as the Anasazi), but also remains of recent American history, as is the case of **Fort Selden** and **Fort Union**, from the XIX century, or several **Missions** from the XVIII and XIX centuries (such as Mission de San José de Gracias, Mission El Santuario de Chimaye, Mission de San Gerónimo, Mission San Xavier del Bac, etc) (Correia, 2006, p.16). Most of the archaeological remains are scientifically study and under comprehensive conservation processes. For instance, **Casa Grande**, in the state of Arizona has been thoroughly researched through the years. It was one of the earliest (1932) world monuments to receive one of the largest shelters over a single structure, in order to delay the decay of the monument (Matero, 1999, p.204). Some structures were built in naturally occurring scarps, which is the case of **Montzuma Castle**, a remarkable example of an earthen structure built

3.8 European first landmarks

The existence of several pre-historical landmarks identified in Europe should be mentioned. These are considered cultural landscape heritage through erected and excavated elevations. This is the case of **Maumbury Rings**, near Dorchester, Dorset, in the UK, with hand made concentric land formations (Whitbourn, 2000, p.47). Also the

huge circle trench in **Avebury** is profoundly embedded in the rural landscape of Wiltshire. **Silbury Hill** is another example of a Neolithic fortification (ibid., p.47) that can be found in the south of England. Several remains of this earthen heritage can be identified throughout Europe, especially in France, Portugal and Spain. The understanding of earthen building in cultural landscapes gives a more balance and integrated approach to earthen architecture significance.

Several other sites with earthen archaeological remains were identified in Europe. For instance, in **Saint-Blaise**, but also in **Saint-Pierre-les-Martigues**, France, adobes were recognised from the VI century BC. In the Hérault valley, the two sites of **Agde** and **Bessan** with adobe structures were identified as having Hellenistic foundations (Chazelles-Gazzal, 1997, p.51). In Italy, the sites of **Russellae** and **Vetulonia** are evidence dating from the VII century BC with adobe structures in the top of stone foundations (ibid., p.49). In Spain, importance should be given to the earth remains identified at **Los Saladares**, south of Alicante and **Cerro del Real**, north of Granada dated from the VIII century BC and in **Cerro del Prado**, Cadiz, from the VII and VI centuries BC (ibid., p.51-52). In Portugal, several archaeological sites attest the existence of an early use of earthen construction in the territory. This is the case of **Paniachos**, in Quinta do Freixo, Alte, from the Neolithic period, or **Monte da Tumba**, in Torrão, near Alcácer do Sal, with adobe walls from 2.500 BC (Correia, 2007, p.32). The existence of numerous earthen archaeological sites through Europe and the world is recognised as of major importance. Nonetheless, there is not enough awareness dedicated to the preservation of this heritage.

4. CONCLUSIONS

Excavating ancient remains is a passionate and intensive challenge. However, archaeologists with no earthen building knowledge and experience recognising earthen structures and building techniques can have difficulties to distinguish earthen architecture from covered soil. It has been also very damaging for this fragile heritage, archaeological campaigns that do not integrate adequate and comprehensive conservation interventions. Most of the mentioned earthen archaeological heritage has no measures of long-term protection and no specific conservation procedures during and following excavation.

As a result, earthen remains from ancient cities are vanishing fast, due to natural decay (strong erosion, floods, etc.), the human factor (vandalism, abandonment, war, and climate change), etc. This entails the acceleration of decay of these fragile earthen structures, which originates a heritage severely endangered. Still, there are few examples of archaeology research, with preventive conservation and systematic measures for conservation of the earth material and structures. Conservation and maintenance, preventive procedures to avoid decay or, when needed, reburial of the earthen excavated structures are essential to be considered, as it will assure the survival of this fragile material, witness of ancient societies and civilisations.

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Curriculum

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