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### ► To cite this version:

Thierry Joffroy, Bakonirina Rakotomamonjy, David Gandreau. Earthen Architectural Heritage: which representation on the World Heritage List by 2022?. Terra 2022 World Congress on Earthen Architecture, Getty Conservation Institute, Jun 2022, Santa Fe, United States. hal-04362327

**HAL Id: hal-04362327**

**<https://hal.science/hal-04362327v1>**

Submitted on 15 Jan 2024

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## Earthen Architectural Heritage: which representation on the World Heritage List by 2022?

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### Introduction

Over the last fifty years, earthen architecture has been increasingly taken into consideration by heritage professionals (Joffroy, Guillaud 2016), resulting in numerous nominations and new inscriptions on the World Heritage List, some of which are even among the best known on this prestigious list<sup>1</sup> (Fig. 1). Efforts to prepare a formal inventory of earth-built properties within this list are rather recent, with a first attempt in 2007 resulting in the identification of 106 properties. The outcome of this first attempt was considered unsatisfactory by several experts, so that further work was launched in the framework of the first WHEAP programme in 2010. With more precise criteria for identification / selection, this new exercise led to the development of a new list, published in 2012<sup>2</sup>, which included 150 properties, representing at the time 20% of the total WH List. An update was carried out in 2015, then in 2019, and a final update after the 44<sup>th</sup> meeting of the World Heritage committee in Fuzhou (China) in July 2021. This latest list now includes 203 properties, being 17.6% of the total World Heritage list. However, in the meantime, and for various reasons, several of these properties have been inscribed on the List of World Heritage in Danger. Thus, earthen heritage properties now represent 34 % of the properties of the List of World Heritage in Danger, including 51% of cultural properties in Danger (18 out of 35): a preoccupying situation.

### Methodology and criteria

Inventories aim to be as comprehensive as possible. Therefore, in 2011 and again in 2015, the criteria were revised by involving professionals from various cultural regions who have a better knowledge of the properties in their region. In fact, a major difficulty for the selection is that few properties are specifically nominated with reference to their building materials, but rather for other (outstanding) values. Thus, in many cases, a very detailed reading of the description of the property in the nomination file is necessary and, when it is only assumed, the presence of earth has to be verified by contacting the site manager / institution in charge (Fig. 2). Since 2015, properties are inscribed in this inventory if earth is used for at least one of the following building components:

- Load-bearing walls (different techniques, rammed earth, adobe, cob, hand shaped earth);
- Mortars: in stone or burnt brick walls;
- Filling of wooden structures: mainly in "wattle-and-daub" constructions, with many variations;

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<sup>1</sup> First inscriptions in 1978: City of Quito (Ecuador) and Rock-hewn churches, Lalibela (Ethiopia) in 1979: Ancient city of Damascus (Syria) and Ancient Thebes with its necropolis (Egypt).  
<https://whc.unesco.org/en/list/stat/#s7>

<sup>2</sup> At the occasion of Terra 2012 international conference, organised in Lima, Peru, by International scientific committee on earthen architectural heritage (ISCEAH) and the ministry of culture of Peru.

- Roofs and floors: in the form of vaults or domes, or in connection with load-bearing wooden structures;
- Coatings and paintings, exterior or interior;
- Large-scale landscaping works requiring specific technical solutions.

Properties in which earth is not used specifically for the purpose of “building”, taking advantage of at least one of the intrinsic properties that the material has to offer in terms of cohesion, compressive strength, water resistance, etc. (e.g. earth fills as part of foundations and wall bases, gardens) are not taken into account. Conversely, the presence of earthen structures in the buffer zone has been considered where there are clear links with the assets within the core zone, thus contributing to the overall significance and understanding of the inscribed property (e.g. Rock-hewn churches, Lalibela in Ethiopia, M’Zab valley in Algeria).

### **Results of the latest inventory (July 2021)**

The last update of the inventory was achieved by adding the properties inscribed at the 44<sup>th</sup> session of the World Heritage Committee. The inclusion of these 53 new properties<sup>3</sup> led to a new total of 203 properties (Fig. 3). This brings the proportion within the World Heritage List to 17.6 %, which is lower than in 2011, but similar to the situation in 2015. Over the past ten years, the change has come mainly from the Asian (+20, almost 45 %) and Arab (+9) regions, with more modest contributions from Latin America (+6), Africa and North America (both +4), and Europe (+3).

As stated in the introduction, these new listings have had little effect on the proportion of earthen properties on the WH List, resulting in a slight reduction (from 20 to 17.6%). And while some efforts have been renewed during this period for greater recognition of earthen architecture in general, it is difficult to sense a specific trend other than the significant increase in the proportion of properties in Asia. Actually, the overall number of inscriptions each year has been reduced, which did not favour a radical change in representativeness. But what can be mentioned is the irregularity of these entries. Indeed, in 2014, 14 new earthen sites were listed, whereas the previous year, 2013, there were only 2 and in 2016, only 1. Another aspect is the tendency to nominate large groups of properties. A major example is the Silk Roads: the routes network of Chang’an-Tianshan corridor, which includes properties in China, Kazakhstan and Kyrgyzstan, and groups many earthen architecture sites under one single inscribed property. Of particular note is the case of 2021, when properties already proposed in 2020 were also examined by the World Heritage Committee during its 44<sup>th</sup> session, resulting in 9 new inscriptions of properties with earthen structures.

In terms of the representativeness of the building techniques, uses in the structures and heritage categories (Jokilehto, Cleere, Denyer, Petzet, 2005), the proportions also remain similar, with a predominance of Historic ensembles and Archaeological sites (34%), Historic Cities (28%)<sup>4</sup> and Monuments (27%).

With regard to the criteria<sup>5</sup> proposed and recognised by the Committee, there is also still a predominance of criterion iv (72 %) and, to a lesser extent, of criteria iii and ii (58 and 49 %), a lesser use of criterion v, but with a still very rare use of criteria vi and i. This results from the fact that

<sup>3</sup> That includes 9 properties inscribed in 2021, 37 properties inscribed since 2015 and 7 already in the list before 2011 for which evidence of the use of earth has been recently demonstrated.

<sup>4</sup> These percentage needs to be understood with the presence of several typologies at the same properties.

<sup>5</sup> List of criteria available at : <https://whc.unesco.org/en/criteria/>

earthen architecture sites are mostly archaeological sites (Fig. 4) or best examples of traditional / vernacular architectures (Fig. 5). This specificity is clearly linked to the progressive consideration of the notion of cultural landscape, as building with earth is often an opportunity to carve the land chosen to establish settlements through the careful choice of locations for the extraction of the large volumes of earth often required. This may also illustrate that the choice of location for a settlement would have taken into account the availability of this important resource, as much as criteria of water availability or natural security.

This also illustrates the fact that the values presented rarely refer to the use of the building material itself. In some cases, the presence of earth is not even properly quoted, if not totally absent<sup>6</sup>. This leads to misinterpretation of the role that earth, as a ready-made building material, has played in facilitating the rapid development of many settlements around the world. Moreover, this often leads to conservation problems as the specificities<sup>7</sup> of this building material are not sufficiently taken into account in the conservation process. There is also often confusion about the building techniques used historically, which sometimes leads to inappropriate conservation decisions. As for the rare use of criterion vi, it could illustrate the persistence of an insufficient consideration of the intangible aspects of the listed properties. In the field of earth construction, this is probably a weakness considering the important role of communities in the proper maintenance and conservation of built structures (Fig. 6). Although this situation is long-standing, it is surprising that the efforts of international organisations (UNESCO, ICOMOS, ICCROM) to promote the role of local communities seem to have so little impact.

### **Inscription on the World Heritage List in Danger**

In 2012, we wrote (Joffroy, Gandreau, Delboy, 2012): *“Earth architecture plays a vital role in defining the identity of local communities, involving sustainable building techniques and often conveying true artistic expression. There is a growing interest in its ability to contribute to social, ecological and cultural development. However, earthen architecture is increasingly affected by natural and human threats, including floods and earthquakes, damage caused by industrialization, urbanization, modern building technologies, disappearance of traditional conservation practices, etc. It is thus not surprising that about ¼ of sites included in the World Heritage List of sites in Danger are earthen sites”*.

In 2021, this situation has unfortunately changed drastically with the proportion of earthen properties on this list reaching 34 %, resulting from the emergence and establishment of new threats linked either to climate change or to conflict and post-conflict situations, in many cases adding to already fragile country situations linked to some level of poverty. Currently, most of the earthen properties on this list are in countries affected by conflicts. These are Afghanistan, Iraq, Libya (Fig. 7), Mali, Syria, Venezuela, Yemen, countries where 14 of the 18 properties on this list are located. The impact on conflict, particularly in countries that were already struggling to meet their protection and conservation responsibilities, is tremendous, with some situations at high risk. In Timbuktu, Mali, for example, during the occupation by armed groups, while a large majority of the listed Mausoleums were destroyed, no maintenance of the three old mosques of the WH Property could be organised. Fortunately, in this case, with the support of the international community, the Malian government and UNESCO organised some emergency work, but the long-term conservation of these monuments depends on the good will of the local population and their ability to organise maintenance. But such interventions are not possible in all the places concerned, and with limited resources - also due to

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<sup>6</sup> e.g. Ancient Thebes with its necropolis in Egypt, Historic city of Lyon in France, Sukur Cultural landscape, Nigeria

<sup>7</sup> Knowing that, historically, conservation practices are often linked to prevention or regular maintenance practices that are important to take into account when willing to intervene with best results in terms of authenticity (Joffroy & al., 2005).

the total disappearance of tourism activities – what can the people and the institutions do? The current tendency of these conflicts is rather to last for a long time, often with less intensity, but with a kind of permanent insecurity, a major hindrance to the re-establishment of favourable conditions for the preservation, maintenance and especially the proper conservation of many heritage sites.

### **Continuities of the dynamics**

On the other hand, and on a positive note, there is now a worldwide revival of interest in earthen architecture as a discipline. Not only is its character as a symbolic expression<sup>8</sup> of the human capacity to build and make the best use of the resources available in the nearby environment widely recognised, but earth is also increasingly seen as a potential resource for achieving some of the Sustainable Development Goals (UN Web site). While this requires specific research and the multiplication of formal training<sup>9</sup>, the role of heritage sites is essential. Generally built with few resources (tools, equipment, transport), they are often very good examples of how to build a settlement with frugality: one of the concept promoted by the international community to mitigate our impact on our planet (Radjou, Prabhu, 2015).

In this respect, in addition of being a living space and a source of income through tourism activities, earthen World Heritage properties also have a great potential as examples of past best practice in earthen architecture: location, implementation, (town) planning, design, organisation and management, construction techniques, technical details, maintenance and adaptation(s). From these different aspects of property production, we can now use reverse engineering (Fig. 8) / reverse design processes that allow us to benefit from the long-lasting knowledge behind these outstanding heritage properties, while offering great possibilities for reinterpretation with contemporary means (materials and techniques) to adapt to today's needs and expectations.

Many organisations are now working on this concept, which in fact responds to the UNESCO recommendation on the Historic Urban Landscapes. A major example of such initiatives is the one undertaken in Iran, which brings together organisations such as UNESCO, ICOMOS, ICHHTO (Iran's cultural heritage, handicrafts and tourism organisation) and the municipality of Yazd with strong contributions from CRAterre, as well as the universities of Yazd and Grenoble (ENSAG). Sponsored by the European Union, this development project includes several complementary activities aimed at identifying the strengths and weaknesses of heritage structures in order to propose and implement both revitalisation and new construction projects. University of Yazd's main role is also to promote the continuing education of architects, but also engineers and craftsmen. Similar projects have been carried out by UNESCO – WHC in Cuenca (Ecuador) and Timbuktu (Mali), while a major new project is also being facilitated by ALIPH<sup>10</sup> at the Tombeau des Askia in Gao (Mali). Other initiatives are carried out within the UNESCO Chair<sup>11</sup> / Unitwin network on earthen architecture and by ICOMOS-ISCEAH.

### **Conclusion**

Thanks to the efforts of a growing number of professionals around the world for more than 50 years, earthen architecture is increasingly recognised. The fact that earth is one of the oldest building materials is of course reflected in the composition of the World Heritage List. Over the last 10 years, its presence has stabilised with a representation between 17 and 20 % of the total number of properties inscribed on the World Heritage List. An important evolution since the first inscription in 1978 is that today the presence of earth as a building material is almost systematically mentioned, even if its presence does not necessarily contribute to the Outstanding Universal Value of the

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<sup>8</sup> In WHEAP presentation Flyer (Eloundou, Joffroy, 2008)

<sup>9</sup> To compensate gradual vanishing of traditional modes of knowledge and know-how transmission

<sup>10</sup> ALIPH : Alliance internationale pour la protection du patrimoine dans les zones en conflit :

<https://www.aliph-foundation.org/>

<sup>11</sup> <https://terra2016.sciencesconf.org/>

property inscribed on this prestigious list. However, this was not necessarily the case for past inscriptions, which may have led to situations that were not conducive to a good understanding of the specific conservation approaches, methodologies and practices to be followed. Nevertheless, the latter have been studied in depth in specific projects such as Gaïa (undertaken by ICCROM and CRAterre) and Terra (ICCROM, CRAterre & GCI), with continuities in the Terra series of conferences that culminated in 2016 in the establishment of the 'Declaration of Lyon' which sets out both general and specific recommendations for the identification, protection, appropriate conservation and enhancement of earthen architectural properties.

In spite of a situation that seems on the whole quite positive (recognition, practices) for earthen architectural heritage inscribed on the WHList, there is however a recent evolution that is worrying. With 18 properties, earthen architecture represents 34 % of the properties inscribed on the WHList in Danger, and even 50% if only cultural properties are considered. This situation seems to be strongly linked to the fact that many of the properties concerned (14 out of 18) are located in areas exposed to climate change, or in areas where armed conflicts have occurred and, in many cases, are ongoing and will take time to be resolved. This, combined with the fact that most of these properties are urban historic centres, located in areas with development difficulties, confirms (unfortunately) the relevance of the three axes<sup>12</sup> that were set in 2018 for the second phase of the WHEAP programme (UNESCO/WHC-CRAterre). Terra 2022 and the series of seminars to be organised on the occasion of the 50th anniversary of the 1972 Convention will provide new opportunities to discuss these three topics and possibly raise more specific issues to be addressed over the next decade, with the likely identification of issues strongly related to the need to anticipate climate change and also related to practices that better promote the implementation of the sustainable development goals, taking better advantage of the potential of earthen architecture around the World.

## **Bibliography:**

### **Articles, books and reports:**

Joffroy T., Guillaud H., Introduction, in Proceedings of Terra 2016 global congress on earthen architecture, Ed. Craterre, Grenoble, 2017

Joffroy T., Gandreau D., Delboy L., World heritage: Inventory of earthen architecture. UNESCO-CRAterre, 2012. Downloaded on May 28, 2021 at: <file:///C:/Users/joffroy.t/AppData/Local/Temp/activity-21-20.pdf>

Joffroy T. & al, Traditional conservation practices in Africa, ICCROM series N°2, Rome, 2005 ISBN 92-9077-191-7, [https://www.iccrom.org/sites/default/files/publications/2019-11/iccrom\\_ics02\\_traditionalpractices\\_en.pdf](https://www.iccrom.org/sites/default/files/publications/2019-11/iccrom_ics02_traditionalpractices_en.pdf)

Radjou N., Prabhu J., L'innovation frugale, comment faire mieux avec moins, Ed. Diateino, Paris, 2015).

Jokilehto J. Cleere H. Denyer S., Petzet, M. (2005) *The World Heritage List: Filling the gaps - An action plan for the future = La Liste du Patrimoine Mondial: Comblent les lacunes - Un plan d'action pour le futur*. Documentation. ICOMOS, München, 189p. Monuments & Sites (2001-), Vol. XII. [Monographie]

### **Web sites :**

<https://whc.unesco.org/en/list/stat/#s7>

<https://whc.unesco.org/en/criteria/>

<https://sdgs.un.org/fr/goals>

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<sup>12</sup> Those axes are : 1/ Architectural earthen heritage in post-disaster situations; 2/ Historic city centers built in earth; 3/ Earthen heritage and sustainable development

<https://terra.hypotheses.org/>

<https://terra2016.sciencesconf.org/>

Fig. 1. The historic city center of Quito, Ecuador, inscribed in 1978 (photo credit: @CRAterre T. Joffroy)



Fig. 2. Main street of La Croix Rousse, a quarter of Lyon part of its World Heritage sector. (photo credit @CRAterre S. Moriset)



Fig. 3. The historic centre of Agadez, inscribed in 2013 (photo credit: @CRAterre T. Joffroy).





Fig. 4 : The great Kiz Kala, Merv Turkmenistan under restoration (2015 campaign) (photo credit: @CRAterre G. Gandreau).



Fig. 5. Koutammakou, the land of the Batammariba in Togo, inscribed as a cultural landscape in 2004 (photo credit: @CRAterre T. Joffroy).



Fig. 6. Maintenance of the Friday mosque in Bandiagara by the local community under supervision of their master masons, may 2007 (photo credit: @CRAterre T. Joffroy).



Fig. 7. The old town of Ghadames, Libya, inscribed in 1986, and on the World heritage list in danger since 2016 (photo credit: @CRATerre T. Joffroy).



Fig. 8. The old city of Yazd, Iran, inscribed in 2017, currently subject to reverse-design works in view of developing adaptations to contemporary needs (photo credit: @CRAterre T. Joffroy).

