

Which course of action for earthen architectural heritage preservation?

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ABSTRACT: This paper addresses courses of action to consider for best practices in earthen architectural heritage preservation. The research methodology of this investigation is based in a case study strategy using qualitative methods. Following a multi-method approach, a combination of sources was used for data collection concerning conservation of earthen architecture, crossed with data emerging from three World Heritage earthen sites, selected as case studies. As a result, four approaches were established to address courses of action in order to preserve and conserve earthen architectural heritage: 1) Education, awareness and research; 2) Anthropological conservation; 3) Scientific conservation; and 4) Preventive conservation. This paper will contribute for an overview of findings to consider in earthen heritage preservation.

1 INTRODUCTION

There is very little literature or research that deals with the earthen heritage conservation process and even less, with the theoretical approach to conservation. The literature is restricted concerning the assessment of conservation framework. The few existing assessments covering earthen built heritage conservation and preservation are generally addressed in the International conference proceedings (Terra 2000), in their Post-proceedings or Recommendations (Terra 93) (Terra 2000) or in the few literature reviews covering the field (Guillaud and Avrami, 2003) (Avrami *et al.*, 2008). Besides, in comparison with other materials, the literature concerning the preservation of earthen built heritage is still insufficient. This entails a need for a consistent evaluation and review of the literature in the preservation and conservation of earthen built heritage, but especially the response to a prominent gap in conservation intervention dealing with failure, lack of procedural approach assessment and conservation planning for courses of action.

2 RESEARCH METHODOLOGY

The research methodology of this investigation is based in a case study strategy using qualitative methods. Following a multi-method approach, a combination of sources was used for data collection: published literature, reports from international or-

ganisations, collection of local data, field studies with sites observations, open interviews and survey questionnaires concerning conservation of earthen architecture, crossed with data emerging from three World Heritage earthen sites, selected as case studies. A questionnaire survey was addressed at a selected group of stakeholders and international key-experts in earthen built heritage conservation. The survey approach provided a real overview of the present reality in the field of earthen built heritage conservation. The triangulated approach made it possible to correlate results from case studies with expert's perspectives, encompassing the framework of failure, strategies, courses of action, planning systems, methodology of intervention, conservation practice, criteria for intervention, and conservation theory significance. This paper addresses specifically the courses of action to consider for earthen heritage preservation.

3 COURSES OF ACTION

Through the analysed surveys and case studies, four approaches emerged as best practices for the preservation of earthen heritage:

- ‘Education, awareness and research’, which also integrates publications and dissemination, inventories and terminologies;
- ‘Anthropological conservation’ covering anthropological approach, craftsmanship, cultural and

social aspects, empirical approach, know-how and intangible knowledge and tradition;

- ‘Scientific conservation’ including consolidants, diagnosis, intervention, physical condition and treatments;
- ‘Preventive conservation’ which deals with maintenance, monitoring and follow-up, continuous management and preventive approach.

The last approach regarding preventive conservation was considered by 40% of the international key-experts, but also some of the site questionnaires experts to be a major need. All four approaches enjoyed a growing interest by different organisations through the years.

4 EDUCATION, RESEARCH & AWARENESS

In this category, five themes were identified as fundamental to be addressed:

4.1 Awareness

50% of the international key-experts questioned supported the need to raise more public awareness towards the significance of earthen architecture, in terms of sustainability, ecology, heritage, etc. 60% of the international key-experts questioned confirmed that there has been an increase of interest and awareness regarding earthen built heritage preservation, especially from international institutions. However, more awareness has to be promoted in society, communities, stakeholders, international and national institutions, and governments, by explaining the benefit of the earthen building technology, but also the values associated with earthen architecture. 30% of the international key-experts that were questioned even argued for the need of more active publicity, branding and dissemination directed at stressing the importance of earthen architecture.

4.2 Education

In the last two decades there has been a slow increase of efforts directed at the need for education in earthen architecture. 45% of the international key-experts that were questioned underlined the importance of addressing earthen architecture in specific education programmes. But 25% emphasised the need for more post-graduate courses devoted to conservation of earthen structures at international and national levels. An interesting 50% of the international questioned key-experts called attention to the need to include more training courses in earthen architecture conservation directed at masons, as well as qualified professionals, such as architects and engineers. According to 60% of the international questioned key-experts, communities should be more in-

involved in capacity building for preventive maintenance. Furthermore, 25% of the international questioned key-experts supported an increase of awareness of the benefits of earthen architecture at all levels of education, even among children. This is interesting to note when analysing conference proceedings that there is a growing interest in courses, workshops and exhibitions related to earthen architecture that are directed at children. The importance of education could be noticed, even in sites, where training courses concerning earthen built heritage conservation were developed for different sectors of the public. Earthen sites can become resourceful opportunities for educational programmes. There is a need to further develop the educational strategy on this field.

4.3 Inventories and Terminology

In spite of modest attention given to this issue, it is important to further develop a clearer understanding in the development of inventories and terminologies, including definitions and taxonomies. In terms of interpretation, this will avoid misconceived concepts and mixed interpretations. Additionally, 15% of the international questioned key-experts agreed with the need to create and contribute to national inventories concerning earthen architecture, but also to promote earthen sites through an inventory of existing information. Furthermore, the creation of data bases with open access through the Internet and available in different languages would allow universal access to knowledge in this subject.

4.4 Publications and dissemination

In the last decade there has been an increase of research and intellectual production as can be seen by the multiplicity of conferences, seminars and exhibitions, as well as conference proceedings and books dedicated to earthen architecture. However, it is generally noticed that publications and conference papers concentrate in building methods and case studies. The reality is that there are too few publications focused in earthen architecture conservation. More assessment and impartial evaluation of conservation approaches has to be undertaken and published in order to disseminate best practices approaches. During the visits to the case studies, it was noticed that conservation coordinators and professionals working on site had a lack of access to information concerning earthen architecture publications. Besides, the Internet did not always provide the best conservation intervention data about earthen built heritage. Therefore, beside publications, the need for an effective dissemination of information addressing accurate conservation practices was discerned. This was supported by 25% of the international questioned key-experts.

4.5 Research

Presently, the framework addressed in the conservation process entails anthropological and physical approaches, but also a combination of both.

Research in anthropological conservation is starting to evolve and will certainly produce useful findings in the next years. There is a general need to address research to develop local knowledge understanding concerning mixtures of plasters and of materials. It is also relevant to devise research projects to identify and understand the know-how related to measures and procedural methods of earthen construction, local seismic measures, vernacular architecture, local building culture and its adaptation to context, climate, etc. in order to try to understand why buildings were built in a certain way, and how masons or inhabitants built in reaction to factors such as earthquakes, intense weather conditions, etc. Therefore, a research data base should be created relating to social and cultural key issues that includes aspects such as intangible (local) knowledge (to collect and conserve this immaterial knowledge); knowledge transfer (how are skills and knowledge passed between generations); social participation (individual or family actions, community actions, etc); and other components. There is still a vast amount of research to address regarding anthropological conservation. In what concerns the physical and scientific conservation, there is a tendency to concentrate research on soil mechanics and engineering performance. However, it was recognised by 25% of the international questioned key-experts that there is a need for further research related to study and testing of materials, including laboratory analysis, performance tests, field tests, etc. There is also a need for tests to analyse and optimise the resistance against abrasion because of erosion; and against running water because of rain erosion; but also to integrate tests of soaking, fermentation and addition of stabilized additives, to try to reduce shrinkage; to try to understand how the water affects earth structures and the way of dealing with it concerning moisture from the ground and in the air, mechanical action of rainfall, the cycles of freeze/thaw, etc. It is relevant to note that both approaches, anthropological and scientific can also be combined in research. There are investigations that can be made that are based on a common foundation, such as: to analyse in the laboratory chemical admixtures used in the past; to address the performance of key-elements used during centuries in local seismic conditions (counter-arches, horizontal reinforcements, linear connections at angles, etc.); or for instance, to address scientific research concerning historic repair techniques in earthen vernacular contexts. It is essential that the research carried out throughout the world has a clear impact on intervention and on the advance of knowledge. This is possible through strategic re-

search, but also depends of continuing research, as confirmed by 20% of the international questioned key-experts. In this investigation field, cyclic research developed from repetitive investigations of projects that is without impact on earthen architecture or the advancement of earthen knowledge, should be avoided. Unfortunately, results often do not have further applications following the research project's conclusion. Responding to the questionnaire, Isabel Kanan even bemoaned that research results are, most of the time, due to individual efforts or personal academic research and not institutional or governmental efforts. John Hurd also stressed in the questionnaire response that earthen architecture research should be more rigorous.

5 ANTHROPOLOGICAL CONSERVATION

Throughout the last years, there has been an increasing interest in an anthropological approach to earthen architecture, which might be due to the actions of Africa 2009 programme, but also due to a growing international interest in vernacular architecture. This tendency was perceived in some of the papers of Terra 2003 Proceedings, but become more noticeable in Terra 2008 papers, presented in Mali. Anthropological conservation has had a more academic approach emphasising the need to give relevance to local populations and their know-how, through traditional building, craftsmanship, and empirical knowledge. Additionally, the anthropological approach gives significance to the value driven process.

5.1 Craftsmanship

25% of the international questioned key-experts confirmed the need to address the rehabilitation of traditional craftsmanship. In fact, for some decades, the denigration of traditional works occasioned by industrialisation promoted a lack of general consideration for craftsmanship. In the last years there has been a growing recognition of the importance of good craftsmanship in architecture and conservation practice. Enrico Fodde in the questionnaire response even emphasised the need for a balanced approach between empirical experience, laboratory work and traditional craftsmanship, as well as the need to address a proper use of traditional materials in repair. Good craftsmanship has an important contribution to make in conservation intervention, but craftsmen should be given back their relevant role in conservation practice.

5.2 Cultural and social aspects

It is interesting to note that just 10% of the international questioned key-experts emphasised the rele-

vance of cultural and social environments when approaching conservation intervention. In vernacular architecture, these aspects have a profound impact on local building cultures, which have very rich building typologies. Cultural and social aspects are also at the core of local sustainability and local integrity. Community involvement associated with neighbourhood engagement helps integrate people in society, supports traditional ways of life keeps social cohesion and gives sustained local values and a sense of belonging to the local population.

5.3 *Empirical approach*

During the last years, there has been more recognition for the importance of empirical knowledge. Through thousands of years, building and maintenance were based in empirical experience and knowledge transfer. With increasing attention addressed to scientific methods, knowledge transferred from generation to generation lost its relevance, if it was not explained by science. The increasing interest in an anthropological and social approach brought more understanding for the erudition emerging from empirical knowledge. However, more research has to be carried out in this subject within communities that actively maintain their inhabited structures and sites, as in the case of Mali. Conservation coordinators, experts and professionals should try to aim research towards the analyses of their empirical experience and of the community's empirical knowledge. Investigation should then inform conservation intervention and give more consistency in the empirical approach to intervention.

5.4 *Know-how and intangible knowledge*

40% of the international questioned key-experts supported the view that there is an increase need for specialised know-how in earthen architecture. 30% of the international questioned experts also mentioned that oral history and know-how should be valued and revived. An example can emerge from knowledge transfer among generations, which can encourage traditional values and respect for the building know-how of the elderly generations. Furthermore, 30% of the international questioned key-experts believed that priority should be given to local building knowledge. If there was more research and training concerning this matter, conservation intervention would probably have less universal solutions when addressing earthen architecture. It is also relevant to note that professionals are giving increased importance to intangible knowledge. 25% of the international questioned key-experts stated that it is equally important to conserve the material heritage and the intangible knowledge. The fact is that on the last years, the importance of intangible knowledge has become a relevant type of evidence

when assessing heritage. Jeanne Marie Teutonico also confirmed it, in the international key-expert questionnaire response, stating that in recent years, 'the field has shifted strongly toward anthropological and social issues and away from scientific research'.

5.5 *Tradition*

Recently, there has been more significance given to local know-how and intangible knowledge, which has had an impact on the relevance of traditional values. 20% of the international questioned key-experts agreed that for conservation authenticity it is fundamental to make all possible efforts to keep the uniqueness of tradition. 25% also agreed that there should be more awareness for local population's traditional knowledge. This means that, as much importance should be given to the conservation technique as to the value of the traditional methods and materials from the ancient structure or site. Unfortunately, this does not always happen, as there is a tendency for the application of universal conservation solutions, even if it is in an earthen technique. Local traditional know-how is an important resource that can be applied in conservation intervention. Mostly, it is not even acknowledged and more importance is given to international expertise, which is sometimes not aware of the local building cultural traditions. 10% of the international questioned key-experts confirmed this evidence. Experts from the open interviews supported the same evidence.

6 SCIENTIFIC CONSERVATION

Scientific Conservation has been directed to the approach based on cause-effect phenomena and has developed little in the appreciation of the significance of process. In spite of being more costly than anthropological conservation, scientific conservation acquired major importance through the years, especially by saving from irremediable loss properties that were in a serious threat.

6.1 *Consolidants*

It is now commonly accepted that there are chemical products that are compatible and are less costly than some years ago. Pamela Jerome responding to the questionnaire argued that Peru has had a 35-year track record using chemicals, such as ethyl silicate, consolidating ancient polychrome earth murals in relief. Therefore, the use of chemical products can be justified in societies with a recognized field experience in the field.

There are also different opinions regarding the use of consolidants. Morales Gamarra argued that only consolidants that did not alter the earthen fabric should be used, even if irreversibility had to be con-

sidered (1983: 112-114). However, Pamela Jerome in the questionnaire response stated that if the right chemical consolidants were used and the porosity of the original material was maintained, then the alteration to its composition would be an acceptable compromise. Also to consider, the fact that according to the questionnaires analysis and the case studies, to some experts, ethyl silicate as a consolidant and lime as stabiliser are often used solutions for conservation problems. More assessment of carried out interventions, advantages and disadvantages of conservation methods, materials, treatments and consolidants should be undertaken and disseminated.

6.2 *Diagnosis*

During the assessment of physical condition, there is a tendency to evaluate pathologies and devise a course of action almost immediately, without a previous careful diagnosis directed at structures and sites under intervention. This was also confirmed by 15% of the international questioned key-experts that underlined the lack of full analysis and diagnosis. For instance, following major hazards, it is important to have different teams dealing with recording and surveying of the earthen sites, assessment of condition including diagnosis, and conservation practice. For more conservation process consistency, these components have to be more interconnected.

6.3 *Physical approach*

Physical approach is addressed through scientific methods of conservation, concerning the analysis of modified earthen materials encompassing stabilisers, additives, adhesives; organic and inorganic consolidants; structures stabilisation that can include surface coating, and intrusive or non-intrusive techniques, amongst others. Moreover, as physical and scientific approaches rely on exact sciences, there is a tendency to use laboratory and engineering solutions to repair and retrofit. Difficulties emerge when combining physical and anthropological approaches.

6.4 *Physical condition*

To address the physical condition of a structure or site was considered essential by 40% of the international questioned experts, with 30% being directly concerned with the assessment of pathologies. This is an important issue particularly relevant at in danger sites. Besides, the identification of the causes for failure leads to diagnosis, followed by an adequate solution for the pathology. According to 15% of the international questioned key-experts, the response should be appropriate to local conditions. Following major earthquakes, physical assessment has to be carried out intensively and in short period of time, due to the beginning of the recovery.

6.5 *Treatments*

Conservation treatments in earthen built heritage have been much analysed during the last years (Terra 2000) (Terra 2003) (Terra 2008). However, there should be more accuracy in the selection of treatments to implement. It is frequent that treatments are used as they had good results in other sites, in very different conditions and contexts, and without a real assessment of the impact of the treatment on the earthen fabric. Besides, it is also relevant when developing a conservation plan to include a phased treatment approach. On the questionnaire response, Anthony Crosby also stressed that attention should be drawn to adequate conservation treatments, as 'their role is to protect the values of the structure or site'.

7 PREVENTIVE CONSERVATION

Preventive conservation relates to introducing, preventative measures at the present time to avoid future damage of the structure or site.

7.1 *Maintenance*

Continued maintenance was considered important by 40% of the experts questioned. However, maintenance has to be properly understood to avoid unexpected failure. When well kept, maintenance becomes one of the best evidences for long-term successful conservation. This is why 45% of the international key-experts that were questioned mentioned the need to consider maintenance capabilities when addressing the conservation process, which justifies the approach of capacity building in this respect. Furthermore, 35% of the international questioned key-experts considered crucial to address continuous maintenance. This also explains why preventive conservation and maintenance plans should be integrated as a component of a successful methodology of intervention.

There is a strong focus to deal only with daily maintenance for site protection. Most of the times, there is no preparation of maintenance plans or preventive conservation considered. Sometimes short-term actions are even not considered. It is essential to have a straightforward approach dealing with medium and long-term site preventive maintenance. Then, a site management with a proactive approach would address a preventive conservation plan.

7.2 *Monitoring and follow-up*

In earthen structures or sites, monitoring is of vital importance, so that conservation intervention arrives on time to reduce, and if possible, to stop the causes of decay. A general need for structures and sites to

be constantly monitored and followed up were supported by 30% of the international questioned key-experts. Even after maintenance is addressed, monitoring should be carried out in a systematic way by experts, conservation team members or by the local community. As mentioned by Sébastien Moriset responding to the international key-expert questionnaire, 'the population should be trained to monitor and report changes to whoever is responsible for the site conservation'. Additionally, it is relevant in world heritage earthen sites to assure that there is a national and international expert's monitoring and follow-up, which will contribute on one side, to a more effective assessment from different view points, and on the other side, following-up will entail continuation of the conservation process.

7.3 Continuous management

The decision-making process is part of the daily management of conservation practice. It is crucial to involve the local community also in management decisions. However, decision-making regarding conservation intervention and its connection with the site's statement of significance should be tackled, through the management planning process and specifically during the management meetings. This does not always happen, as sometimes the assessment of value does not relate directly with conservation intervention. It is important that decision-makers continue with a holistic approach, and a more proactive attitude rather than reactive.

Integrated in management is also the implementation component, important for the achievement of good management. Full implementation of conservation projects and management systems is essential for the achievement of the overall process.

There is the need for long term objectives related with the preparation and implementation of planning systems. This follows most of the times, the imposition that all the World Heritage Sites develop a planning system. The problem arises from the fact that after the plan is concluded, often it is not implemented, or at least not entirely.

7.4 Preventive approach

25% of the questioned international key-experts supported a preventive approach to conservation. This encompasses the integration of a maintenance plan, and a disaster preparedness plan, but also addresses preventive measures and precautionary principles during management and conservation practice. Preventive measures can include reburying, in case of archaeological remains; use of shelter; application of protective coatings; the use of sacrificial layer of gravel; erosion control as happened at the three analysed sites; and other preventive methods.

Additionally, it is interesting to note that the engagement of the population in preventive maintenance was supported by 55% of the international key-experts that were questioned.

8 CONCLUSIONS

Some heritage entities relate to the anthropological approach, contributing with a community participatory process. In this case, experts base the conservation approach on experience and empirical knowledge of local communities. Other approaches relate to scientific conservation, and have a more technical and engineering background leaning towards laboratory and physical condition assessment and intervention. Frequently, the anthropological and scientific approaches are not directly connected. The difficulty arises when trying to combine these two approaches. Due to the complexity, very few entities and experts manage to have a holistic approach combining all the components.

By recognising gaps and needs, establishing priorities, integrating opportunities, defining targets, long-term objectives and short-term aims, it becomes easier to identify courses of action within the strategy. However, it is fundamental to embrace the different scales and components addressed throughout the conservation process holistically and comprehensively. These components encompass a multi-faceted process, with components interrelated to each other, all composing a sustainable system. To take a limited view can jeopardise the survival of the fragile earthen fabric and earthen architecture in general.

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