3. CONCLUSION: THE URGENCY OF DOCUMENTING THE SOCIO-CULTURAL KNOWLEDGE SYSTEMS PREVALENT IN EARTHEN ARCHITECTURE

In the contemporary modern context, it cannot be doubted that sound documentation lies at the heart of the urgency of preserving and utilizing the indigenous-knowledge systems harnessed in earthen architecture that have emerged in previous sections of this paper. As a conclusion, therefore, now is the time for more in-depth studies coupled with protecting and publishing about these neglected architectural semiotics. By means of this strategy, preserving Ugandan earthen-architecture-driven indigenous-knowledge systems is poised to become a pragmatic experience replicable in other cultures with similar or comparable knowledge resources. Local knowledge gurus would then have a tangible basis for accurately uploading their formal education enterprises with indigenous-knowledge templates. In this regard, Ma Rhea (2004, p.5) states:

> *"Accurate documentation also enables nations and other interested parties, such as national systems of education, to enter into agreements and contracts with traditional knowledge holders that will strengthen the capacity of these communities to develop economically sustainable livelihoods and see their knowledge included in national education systems."*

However, documentation of these knowledge systems requires patronage from political intelligentsia, educational policymakers, and academics, all of whom at the moment seem to be passive on this matter. In a related synergy, managers of Uganda's postal services, who take charge of producing postal stamps, could champion a publicity drive for some of the exemplary local indigenous semiotics' design splendor by using their respective images on postage stamps. It has often been an odd occurrence in the past to see Ugandan and, indeed, other African countries produce postage stamps with images celebrating knowledge systems and/or monuments of, for instance, their past Colonial masters, instead of bringing forward such powerful heritage of their own.

It is the opinion of this author as well, therefore, that it would pay off to co-mingle the above-enumerated synergies with some modest-scale public prototype-building projects in modern contexts that stand out to radiate knowledge or developmental messages to the people. Such archetypes can be commissioned by governments in collaboration with architecture schools, artisans, museologists, social scientists, conservators, etc. Furthermore, cultural departments of the State can liaise with museologists in unfolding regional heritage buildings, museums or galleries that promulgate the conservation of outstanding earthen-architectural semiotics, as well as other diverse heritage material. It is no doubt that such synergies would trigger greater spin-off influences that would further augment the character of stylistic contemporary and future culturally driven built environments.

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SURFACE PROTECTION: CONSERVING THE RELATIONSHIP BETWEEN ARTIST AND MATERIAL IN ISFAHAN AND TCHOGHA ZANBIL, IRAN

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Theme 5: Local and Regional Knowledge, Intangible Heritage and Social Impact
Keywords: Surface protection, intangible heritage

Abstract

Surface protection of Iranian earthen architecture has been continuously accomplished with a variety of decorative covering materials based on traditional symbolism and vernacular aesthetic, which reflect two general principles: high flexibility and sacrificial decorative material for protecting the inner meaning (the spirit) of the architectural space. This cultural phenomenon enjoys strong theoretical foundations, as well as technical skills that are transferred by generations of traditional artists through specific training patterns in the process of repair and maintenance of historical buildings. Considering this issue is essential to achieve a holistic approach towards the tangible and intangible dimensions of historic earthen architecture. This paper presents the experiences of conservators and local craftsmen in evaluating the state of transferring this intangible heritage during the conservation programs in historic (Tchogha Zanbil) and traditional (Isfahan) environments. A four-year program of evaluation and cooperative interviews shows that the conservation workshops have provided a supportive field for rethinking vernacular knowledge of construction.

However, in the absence of a common language among younger and older generations of local artists and conservators for exchanging the ideas about cultural values, their cooperation may be reduced into a few technical details. In order to present the intangible values of traditional maintenance to the conservators, promoting these traditions among the younger generation of craftsmen, and recognizing the craftsmen not as technicians but as creative agents in the conservation system, practical measures were proposed. These measures include participation of local artists in developing conservation-management plans and publications, dedicating virtual spaces for introducing local repair systems to the public, and promotion of creative and critical approaches towards conservation technology through the joint participation of local artists and conservators in training workshops.

1. INTRODUCTION

Surface protection – covering the adobe structure with sacrificial materials, such as mud plasters or decorative ceramic layers – has been frequently used by Iranian traditional architects in order to maintain earthen buildings from environmental degradation, e.g. rain, abrasive sand particles in desert winds, etc. (Houben and Guillaud, 2003, p. 334).

Due to gradual deterioration, these coverings need to be replaced at certain intervals, which depending to the type of the covering or its location in the building, vary from a few years to decades. This continuous maintenance is a part of its architectural style (Falamaki, 1986, p. 26). Therefore, the vulnerability of adobe has become an opportunity for manifesting intangible forms of heritage through the relationship between local artists' ideas and the dwelling spaces of earthen material. Establishing such a relationship would not be possible without a comprehensive knowledge of architectural space, decorative-preservative layers and the dynamic interaction of the two in the passage of time. During the recent decades, social changes and fading of the local cultural values in design of contemporary architectural forms has led to the neglect and loss of traditional maintenance methods, which affects the continuation of social life in historic urban textures and the conservation of outstanding cultural monuments.

Because the most important characteristic of intangible heritage is their reproduction from time to time, training and transferring the concepts necessary for the accomplishment of these reproductions became the concern of conservators, especially after the definition of intangible cultural heritage

(2003). The research that is presented in this paper has concentrated on the cultural values of these traditional conservation methods, the importance of the still-active local artists' knowledge, and the problem of transferring it to the future generations.

2. RESEARCH METHODOLOGY

Cooperative interviews with artists in their conservation workshops was the main strategy for gathering data in this research, in addition to analyzing the content of literature on Persian traditions of art and architecture. Opinions of experts, who have worked with local artists as supervisors or planners of conservation programs, were also evaluated.

2.1 Selected historical sites

During the last century, two distinct approaches enjoying different cultural backgrounds were established in the conservation of the historical city of Isfahan. and the archaeological sites of Tchogha Zanbil and Haft Tappe. These have attracted national support and had great influence on conservation of earthen architecture in other parts of the country. The earthen structures in Khuzestan province are the remains of a kind of life style, which has lost its dynamism for a variety of social-historical reasons (Talebian, 2003, p. 570). The modern conservation of earthen architecture in this area was started during the excavations at Tchogha Zanbil by Ghirshman with a team of master builders who had come with him from Kashan (Ghirshman, 1994, pp. 14-15). The importance of relying on a local human resource, skilled in surface-protection methods, was first recognized during the excavations at Haft Tappe (Negahban, 1991, p. 10), and thereafter was the main topic of studies in conservation in the aforementioned area. In the beginning of the 20th century, development of Isfahan as a centre of tourism with an outstanding 400-year architectural tradition was highly considered by the city governors, as well as architects and conservation researchers (Shirazi, 1974, pp. 590-591).

2.2. Scope of study: diversity of decorative-preservative coverings

Decorative-preservative coverings of earthen architecture consist of a variety of technical types with distinct aesthetic characteristics that require years of practice to gain the skill for their implementation. Continuing this legacy, without knowing these different types, relationships between them, and the rules for using them in vernacular buildings would be impossible. This wide range of methods is categorized in three main classes as follows:

- Mud plasters (coatings) – at least two types of these diverse coatings has been studied comprehensively up to now: Kahgel and Simgel (Galdieri, 1979, p. 62);
- Gypsum plasters (Ibid. p. 61);

a) b) c)

Fig.1 Experience of surface protection in Isfahan, a) and b) French School, Jolfa, before (2002) and after the repair of Simgel decorations (2011); c) application of tile and brickwork in combination with gypsum plasters and mud coatings in the façade of a house in the neighborhood of Meidan Emam (credits: Reza Vahidzadeh, 2011)

Fig.2 Surface protection and visual reintegration of the peak of Tchogha Zanbil Ziggurat by Kahgel (credits: The World Heritage of Tchogha Zanbil, 2004)

- Ceramic coverings, including brickwork, simple monochrome tilework, polychrome mosaic tilework (Moarraque) and painted tiles (Haft-Rang).

There is historical evidence of the application of all these three classes of coverings in the two selected historical sites. The adobe structure of the Tchogha Zanbil Ziggurat was covered by layers of brickwork, glazed bricks and tiles. Other parts of the site were mainly protected by mud coatings and gypsum plasters. From the time of excavations up to now, brick and Kahgel has been used for surface protection of the Ziggurat and other parts that were exposed to rain. The main decorative covering of the architectural body of Meidan Emam are brick-workings and outstanding fine colorful tile-workings which are very stable against the humidity and abrasive matters. Isfahan is still the main centre of Iranian tile-making with more than one hundred and forty active workshops (ICHTO, 2008, pp.190-195). However, mud coatings and gypsum plasters and stuccos have also been widely used in the adjacent residential and trading areas such as "*Posht-e Masjid*" district and "*Qaisarieh*" bazaar. These kinds of decoration created a sense of visual unity with respect to the territorial landscape and regional characteristics.

Because the authors have the experience of working in the Research Centre for Conservation of Tchogha Zanbil and Haft Tappe, the interviews were held in a very intimate space and the interviewees expressed their beliefs and findings without any hesitations. It took more time in Isfahan to reach to a common language and better understanding of the interviewees. Seven workshops with significant

Field of Experience	Name & Location	No.
Restoration of brickwork and Kahgel coating	Tchogha Zanbil Conservation Workshop	1
Kahgel coating	Haft Tappe Conservation Workshop	2
Restoration of brickwork and Moarraque tilework	Naghsh-e-Jahan tile making (Isfahan)	3
Restoration of Moarraque and Haft-Rang tilework	Restoration of tilework of Ali Qapu (Isfahn)	4
Restoration of gypsum stuccos	Restoration of stuccos in Jameh Mosque of Oshtorjan (Isfahan)	5
Simgel and Kahgel coating	Tech-Civil Office of Art University of Isfahan (Isfahan)	6
Restoration of Moarraque tilework	Esfehantile-Art (Isfahan)	7
Restoration of Haft-Rang tilework	Haj Reza Fuladi (Isfahan)	8
Restoration of Moarraque tilework	Ostad Kamal Pakdel (Isfahan)	9

Table 1. Characteristics of the surveyed workshops

history in conservation of the historical monuments in the area of Meidan Emam were selected for the interviews (Tables 1 and 2).

Interviews started from 2008 and continued for nearly four years. Eight main subject areas were considered during the interviews in Tchogha Zanbil and Isfahan as follows:

a) ritual origins and theoretical foundations of the decorative covering of earthen architecture; b) the place of repair and renewal of decorative coatings in the history of conservation of earthen architecture; c) the current status of local artists active in the field of decorative-preservative coatings; d) methods of training and transferring knowledge necessary for the repair and renewal of decorative coverings; e) apprenticeship as the training method for surface protection of earthen architecture; f)current strategies of master artists to make the training programs more effective; g) the role of conservators in managing conservation projects towards the holistic protection of intangible and tangible aspects of earthen architecture; and h) achievements of joint collaboration between conservators and local artists in order to use modern methods for safeguarding of vernacular architectural knowledge.

3. RESULTS

Haj Ahmad Qanbarpour (1933-2007), a great traditional architect of the Tchogha Zanbil workshop, frequently reminded his apprentices, "*Clay particles are made of a heavenly essence. We all have clay particles in ourselves.*" Some of the researchers have considered the presence of man (craftsmen) in the continuous activities for maintenance and plastering of earthen architecture as breathing a spirit into the earthen body (Jayhani and Omrani, 2003, p. 462). The historical experience of local artists in the maintenance of monuments shows that there is no clear boundary between the spirit and body of an adobe structure. About 400 years ago, the Iranian philosopher, Sadra, questioned the dualistic approach toward distinction of body and soul, and described the inseparable coherent Being (Khatami, 2003, pp. 17-26). This idea can be considered in assessing the attempts for making earthen architecture sustainable. The earthen structure (body) is the unique possibility by which a definite architectural place comes out of infinite space and takes its coordination and orientation. Despite the physical changes taking place in time, such a body still retains the character of place and manifests the historical evolution of its inner meaning as a monument. Even the recalling of the monument in man's mind is not possible without imagining a body for it. Therefore, the interaction between human and the monument should be directed toward sustaining the meaning (spirit) by preserving the body, not by interrupting or falsifying it. The covering of earthen architecture is not only a preservative and sacrificial matter but also considered as a decorative element.

This dual function is conceptualized as the interpretation of preservation and decoration, which are influenced by each other. The artist during the redoing of surface protection attaches a layer, which belongs to our time and to the old body of the architecture. Therefore, he approaches the monument in an intimate mode so that what is placed on the surface will not affect its historical existence. Such an approach requires a hermeneutic study of the monument. The man who repairs or renews the decoration must inherit the sense of creativity and consciousness of the artist who created them first. This requires a comprehensive recognition of the architecture, its decoration and the relationship between the two. He must be able to restore or recreate these relationships with respect to the time-varying values of the architecture. Haj Ahamad in one of his last lessons said, "*The world is totally in change … the true nature of the world is its changes.*" Incompatibility of post-excavation interventions with the authentic building culture (workmanship) of Tchogha Zanbil, especially in the form of the poor accomplishment of surface protection, has led into intense deterioration, which became a real disaster in the

Work experience years	Responsibility in the workshop	Birth date (year)	Education	Name	No.
55	Traditional Architect	1944	--	R. Salamatifar	1
12	Traditional Architect	1971	--	M. Hajivand	2
18	Conservator	1969	Conservation (BA)	B. Heidarizadeh	3
12	Quality-Control Researcher	1976	Geology (BA)	Rahim Banna	4
12	Workshop Manager	1972	Civil Engineering (BA)	A. Khenifar	5
11	Assistant Craftsman	1978	Primary school	S. Al-Kasir	6
11	Assistant Craftsman	1978	Secondary school	D. Dinarvand	7
12	Assistant Craftsman	1978	---	S. Abdolkhani	8

Table 2. Interviewees in the Tchogha Zanbil Workshop

inner wall (Guillaud, 1998, p. 6). Since 1999, a continuous and developing dialogue has begun among the local artists under the supervision of Haj Ahamad and Haj Nezam Ardeshirzadeh (1944-2010) and conservators, which led to the formation of a sustainable conservation pattern for the site. In Isfahan, the arts for decorating/preserving the earthen structures were well-preserved in continuous cycles of master-apprentice training until the beginning of the age of modernity – the Constitutional Revolution. In this period, when the historic urban fabric was altered by new wider main streets to introduce modern traffic into the old city, the artists were still able to adopt the local methods for decorating the façades of the houses built on the sides of the main streets, in order to link the lifestyle of the middle-class residents of these houses to the vernacular architecture of the city. By substituting parts of the humble and uniform layers of mud coatings (Kahgel and Simgel) with colorful tilework they also made the old fabric ready to play its role in the social life of modern Isfahan (Montazer, 2006, pp. 14-15). During the next decades, in parallel with the rise of modernism in training of arts and architecture in universities and the irregular development of the city, resulting in serious damage to the historic urban fabric, attempts were made for the recomprehension of local artists specifically as the keys for decoding the forgotten secrets of creation of new forms of architecture in accordance with regional resources and ecological consciousness (Owlia, 2009, pp. 8-9).

Comparing with interviewees in Isfahan, fewer people in Tchogha Zanbil can recall what was taught by the old master builders. Despite the apprentices coming from rural areas, traditional patterns of life seem exotic to them. Traditional diverse agriculture was substituted with the single-product cultivation of sugarcane in the area and most of them have had the experience of working for the sugar factory as simple workmen. Therefore, some of the young apprentices were not ready to accept their new roles as younger generations of local artists, not skilled workers (or technicians). The traditional atmosphere of Isfahan, especially in the bazaar of handicrafts, and the attention that is paid from tourists to these markets, act as a motivator for apprentices to learn more about the theoretical basis of their traditional arts. In Isfahan, training of traditional principles is done practically in the process of analyzing the past experience of great masters accompanied with the usage of artistic media, such as poems, stories and myths, to find new methods for creating art. Nowadays, in the workshops of Isfahan, masters who accomplished their training before the revolution in the old master-apprentice system work with the younger generation of artists that are mostly college graduates due to the expansion of higher education in recent decades. Attending modern schools, traditional training for these young people was limited in time. Therefore, some of the ancient traditions, which require closer familiarity between master and apprentice to be trained, were not fully learnt by them. For example, among the new generation of craftsmen, poetry, knowledge of local resources of raw materials, and the history of profession is at a lower level than the previous generation. Changes in their livelihood concerns, due to their level of education and labor laws that sometimes act to bolster them against the workshop laws, have resulted in an evolution of the cooperation of art masters with their apprentices.

Compared to the limitations in the transfer of theoretical doctrines, progress in building the practical skills was more acceptable. This may be due to the fact that the successful application of traditional techniques can rapidly return the order to the appearance of a damaged historic site. However, it should be noted that in traditional art, the practical know-how, which may be interpreted as the "knowledge by presence" (Ha'iri Yazdi, 1992, p. xii and p.1), is to bring the spirit

Fig.3 Transferring the responsibilities from masters to apprentices in the Tchogha Zanbil Workshop; a) Morteza (left) during his apprenticeship under the supervision of the late Haj Ahmad, b) Morteza as a master builder training a new apprentice (credits: The World Heritage of Tchogha Zanbil, 2004)

of artisanship to the mind of the artist and unifying the mind with this spirit. Therefore, it is not possible to define a boundary between the ancient ritual forms and the technical aspects of vernacular know-how. That is why the old artists believed that the technological approaches towards traditional construction methods, even from conservators or young artists, would only be partially successful. In Tchogha Zanbil, art masters attempted to show the moral effects of vernacular arts to encourage the apprentices to continue their training. For this reason, they explained the close relationship between the traditional practice of architectural decorations on one hand, and the spiritual promotion of the practitioners benefiting local society on the other hand. In Isfahan due to the greater dynamic nature of the historic urban fabric and diversity of entrusted works, art masters own their personal workshops, in spite of depending to the government, and are able to pay their apprentices themselves. As a result of the debates about the intangible heritages associated with Iranian vernacular architecture in recent years, attempts have been made to propose new patterns of cooperation between local artists and college-graduate conservators who are the supervisors of government-sponsored conservation plans for historic monuments.

4. PARTICIPATION OF CONSERVATORS IN TRANSFERRING THE VERNACULAR KNOWLEDGE: THE USE OF MODERN METHODS

In 2004, the official internet website of Tchogha Zanbil in the Persian language was launched. In this website for the first time, comprehensive information about craftsmen and local artists working at the historic site was included. It was the first time that they were regarded as a creative potential and not only labor force for conservation. In Isfahan, although the older generation of artists does not rely so much on modern media, younger artists have become used to software for design and the internet for professional communication. Older masters tend to publish papers and memoirs related to their outstanding achievements. They are also interested in partnering with conservators to produce training materials, which can be used for the next generations. In its first step towards these interdisciplinary collaborations, the Research Centre for Conservation of Tchogha Zanbil planned a glossary of technical terms of the local architecture in the Dezfuli dialect. At present, the "Master plan for documentation of living heritage of architectural craftsmen of Khuzestan province (with emphasis on Dezful, Shushtar and Shush cities)" is in progress (Vahidzadeh, Frhadpoor, Heidarizadeh, and Razavian, (2011). This program consists of identification of retired and active master builders, documentation and publishing of their experience in the form of videos, photo collections, books, and devoting webpages on the official internet site to this subject. In Isfahan, an attempt is being made to shift the interest of young craftsmen to collecting data on successful past experiences (i.e. photos, maps, drawings, poems and more) from their personal digital archives towards creating a more comprehensive public archive. ICHTO has founded a database for identification of active artists and workshops, and evaluation of their work, which can be very important in awarding conservation projects to them. Because the documentation of the experiences of these artists is a very professional task, the most acceptable results in this field has been obtained from research that was supervised by conservators acquainted with the artists' histories, their technical methods, as well as social and economic concerns. These collaborations have resulted in the presentation of academic papers (Enayati and Vahidzadeh, 2011; Pedram, Owlia, and Vahidzadeh, 2011, p. 26-27), and the holding of a joint-training workshop for restoration of architectural decorations with the support of the Meidan Emam Site Office (Vahidzadeh, Enayati, Mosadeghzadeh, and Hemmatyar, 2010).

5. CONCLUSION

This study shows the feasibility of developing different approaches to the continuation of traditional methods of

Fig.4 Examples of Moarraque, a method for surface protection of earthen architecture in Isfahan: a) brickwork in David's House; b), c) and d) design, cut and installation of mosaic pieces on earthen walls; diversity of approaches in the early 20th century in e) Sadr Madrasa and f) Harunieh alley (credits: Vahidzadeh et al., 2011)

surface protection for earthen architecture as an intangible heritage at different levels of craftsmanship and workshop-management systems. In the Tchogha Zanbil workshop, craftsmen have used new forms of interaction with apprentices to sustain this tradition. In contrast, the improvement of the social status of art masters in Isfahan through receiving funding from tourism, conservation and traditional society have led to the reproduction of historical patterns of apprenticeship. The generation gap and declining of the quality and quantity of entrusted works in both of the regions were limiting factors, while independent and private workshops have made it possible to continue the traditional art creation. The younger artists working in private workshops of Isfahan show a great tendency to the usage of modern technology in practicing vernacular architectural decoration. The older generation of artists in both regions are willing to document and publish their experiences in the form of classic media. Holding joint educational and research programs, dialogue and cooperation between conservators, younger artists and older art masters, has increased in order to achieve a common language for transferring the vernacular knowledge in its most comprehensive forms to future generations in recent years, especially after the definition of intangible heritage in 2003. There is a slight shift in the debates from recording and understanding the technical properties of traditional architectural materials to the protection of vernacular knowledge as an existential wisdom of interaction with the environment and an alternative lifestyle based on cultural diversity.

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PROTERRA INTERNATIONAL INTER-LABORATORY PROGRAM

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Theme 6: Research in Materials and Technology for Conservation and Contemporary Architecture
Keywords: Inter-laboratory program, adobe, testing methodology

Abstract

At the end of 2007, the PROTERRA Iberian-American Network began an international inter-laboratory program aiming at establishing test procedures and control parameters for materials and products for earthen architecture construction.

This paper reports the development and presents the results of the first stage of this program, which aimed to define the most appropriate procedure for determining the compressive strength of adobe. For this, two types of sampling and three different dimensions were established. The summary of the work plan, participating institutions, and details relating to the development of work in each laboratory are presented, along with the first considerations based on the results obtained. The test results for the earth characterization, the development of the samples preparation and the procedure for implementing the compressive-strength test are highlighted. At the end, the importance of the inter-laboratory program for the establishment of procedures and for testing products' qualification are reviewed, highlighting those produced with earth, and the effect of the inter-laboratory program at the PROTERRA Iberian-American Network.

This activity, as well as others developed within the scope of the PROTERRA Iberian-American Network, is an example of how it is possible to develop joint activities of international nature, solely with the involvement of interested professional volunteers, and disseminating knowledge gained on earthen architecture and its construction.

1. INTRODUCTION

PROTERRA is a network of international and multilateral technical cooperation that promotes the transfer of technology in earthen architecture construction. PROTERRA began in October 2001 as a temporary research project of four years, from the Iberian American Science and Technology for Development - CYTED, in order to encourage the use of earth as building material, using demonstration projects, publications, courses and other events. In February 2006, when the research project PROTERRA/CYTED was concluded, the PROTERRA Iberian-American Network was created, with almost all members of the project, along with other interested professionals. The aims and directions of action were similar to the ones of the concluded project.

At a first stage, PROTERRA's attention was focused on social housing, whose proposal was to have a group of Iberian-American experts provide technical support for building programs to be developed in different countries. Then, it was understood that the use of earthen construction for social-housing programs had not been occurring. With the formation of an international team of professionals, which already existed in each country, competent professionals could provide the necessary technical support. However, it was necessary to promote and to disseminate the use of earthen materials through other actions, in order to provide scientific support to earthen architecture and its construction, including the development of an appropriate updated bibliography applicable to the current circumstances of each country and region.

One of these actions corresponds to the identification and recommendation of tests, and the parameters for the classification of products, such as adobe and CEB (compressed earth block), as well as masonry walls and other different building systems using earth.

A collaborative program began in late 2007, whose first activity was the definition of test procedures to determine the compressive strength of adobe and the parameters for its qualification. Several papers and published documents described the results or limits of the compressive strength of