Journal of Civil Engineering and Architecture 15 (2021) 288-295
doi: 10.17265/1934-7359/2021.06.004

The Evolution of Vernacular Architecture in Siwa Oasis, Egypt

Riham Mohammed Jaber Ahmed

Bartlett school of Graduate Studies, Institute for Environmental Design and Engineering, University College London, London WC1E 6BT, United Kingdom

Abstract: Not always climate and cultural contexts are discussed at the forefront of architectural discussions on traditional or vernacular architecture, nevertheless, the construction material also plays a significant part in defining places' architectural languages. Building from the local materials is an essential ingredient of the local distinctiveness, whilst forming the architectural grand gesture in its context. In Siwa oasis, salt architecture has formed that architectural grand gesture. The vernacular vocabularies adopted by old Bedouins using salt bricks generated Siwa's unique spirit. In this paper, some examples are illustrated based on a series of site visits to three main sites in Siwa, namely: Old Shali, Abu Shuruf, and Aghourmy. This shows the evolution of Siwa's vernacular architecture and the role of the architectural language or detrimental effect on the overall quality of architecture. From the site visits, it was observed that building with the traditional technique is now becoming abandoned in Siwa, explained by the local builders to be due to the huge costs required; forcing them to shifting to modern architecture. The influx to building using modern techniques has led to a significant transformation in the urban morphology and spirit of Siwa. Herein lies the scope of this paper: to discuss the impact of the evolution of vernacular architecture on the overall quality of architecture in Siwa and thus identifying the problems which will lead to policy formulation and guidelines for the redevelopment of Siwa in order to "revitalize/ resuscitate" its vernacular style accordingly.

Key words: Vernacular Architecture, Neo-vernacular Architecture, Siwa, Egypt.

1. Introduction

Vernacular architecture has been unfortunately losing ground over the last couple of centuries, as modern methods and technology prevail. According to statistics made by Dublin Institute of Technology to investigate the impacts of technology on buildings, it was found that in order to achieve sustainability it is highly demanded that we rethink the extractive habits of the industry in countries, and reconnect them with the natural world and ecosystems that support life whilst looking for advanced solutions for achieving cheaper and a more energy-saving conventional alternatives [1].

Siwa was selected for this study owing to the richness of the vernacular vocabularies adopted by the local people, marked by using salt bricks. Most importantly, towards the end of the nineteenth century, building with salt and using the traditional building techniques has started to become abundant. As a result, the spirit of the place has transformed significantly, becoming a "modernized" city of a nuclear urban morphology formulated by contiguous dwellings. A key question has therefore arisen: what impact this evolution of vernacular architecture had on the spirit of the place and on the architectural language as well as the overall quality of architecture in Siwa, and whether the traditional vernacular style could be "revitalized" or "resuscitated" through the provision of affordable schemes by the government.

Siwa oasis is located in Egypt's remote Western Desert, situated in the western desert close to the Libyan border, around 650 kilo meters west of the capital city Cairo. Siwa is considered to be one of the

Corresponding author: Riham Mohammed Jaber Ahmed, Architect, lecturer, doctoral candidate and researcher; research fields: vernacular/neo-vernacular architecture, sustainable and environmental design, thermal comfort, indoor air quality, cognitive performance, wellbeing and productivity in the built environment.

ancient oases since pharaohs' days in the XXVI century [2]. The climate is extremely arid all the year except in the duration between January and June [3]. Siwa maintains are narrow, compact and in an irregular pattern which allows pleasant environment for pedestrians while restricting vehicular movement [4]. Its relative seclusion has allowed the community to maintain its unique cultural heritage and being dependent on its resources. Inland saline lakes, rock inselbergs and cultivated land are the main features within the depressions. Naturally flowing springs are confined to the floor of the depression. The spring waters are used to irrigate the palm and olive plantations, and drain into the salt lakes [5]. Also the cultural context played a significant role in shaping the urban morphology of Siwa. Due to the strong connection between the local people and their insisting need for protection from desert raiders, as well as the need to be safe from this harsh climate, Shali fortress was designed on that basis (Figure 1). The main composition of Shali walls, roots and ceilings is evaporites. Evaporites are highly susceptible to extended and strong post-depositional digenetic processes due to the highly reactive character of their chemical constituents. The salt mortar dehydrated due to the harsh climate and particularly in summer which led to partial dewatering of the cement components, and subsequently compaction and lithification [6]. The people abandoned Shali accordingly, searching for more secured dwellings, leaving behind derelict structures.

1.1 Traditional Building Technique in Siwa

It was not surprising to find the local builders using salt for building since Siwa extends in east–west direction along a depression 17 m below the sea level bordered south and east by the sandy dunes of the great sand sea. Inside the depression there are four great salty lakes, surrounding which salt efflorescence on the topsoil and salt crusts are formed. The local people have made the salt bricks from those salt crusts and utilized them in the masonry with a mud mortar very rich in salt obtained from different clays.

Fig. 1 Panoramic view of Shali fortress, showing the external architecture of Shali buildings in which houses are built one above the other.

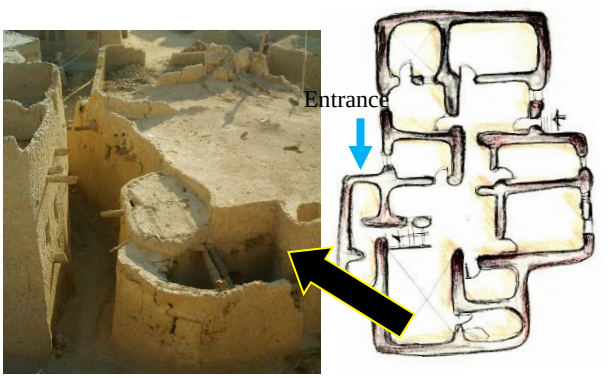

Fig. 2 A typical dwelling built using the traditional techniques and Kershef blocks. The dwelling is comprised of an area outside the house for men. The entrance hall consists of three rooms: the guest room, storage and an unroofed kitchen which leads to a backyard fold. Bedrooms are located at the back, away from guests for privacy purposes.

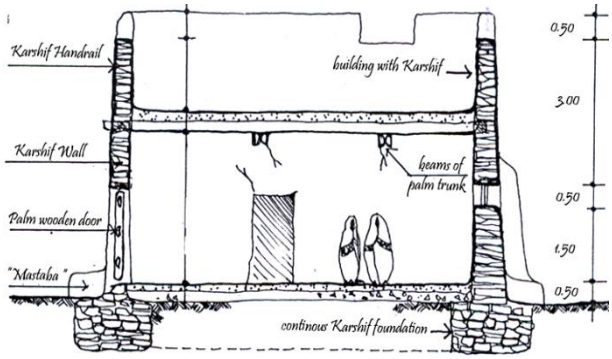

Fig. 3 A sketch drawing showing the structures of a traditional style dwelling and the integration of wood with kershef with reference to the height of building which normally doesn't exceed 5 meters high.

During the drying process of this particular kind of mortar, a strong connection is established between the salt blocks and the mortar due to the crystallization of the salt inside the mortar itself, giving rise to a sort of monolithic conglomerate [6]. This salt brick is known as "Kershef".

The builders first construct 50 cm high concrete wall to isolate the ground water from the first layer of Kershef blocks. Then they determine the area of the room they want to build, so that for each wall of this room they mark axis on the ground using wood. Afterwards, they put the thick Kershef blocks and cement "Tlakht" in between till they reach the desired height. This process is repeated for each single wall. Since there is no strong connection between walls, the buildings end with curves. Yet more expensive when sharp edge corners are integrated in the design. Within this structure, a leading role is played by the palm trunks which constitute the supporting structure of the floors at the different levels. Figure 2 illustrates the form of a typical dwelling built using the traditional techniques and Kershef blocks, and the integration of wood with Kershef in the structure of typical dwellings in Siwa is presented in Figure 3. This technique constituted the main feature of buildings in the oasis and dated back mainly to the XIX century [7].

1.1 The Vernacular Vocabularies Adopted

It was observed from the three sites which were visited, namely: Old Shali, Abu Shuruf, and Aghourmy, that the simple vernacular vocabularies adopted by the local people played a significant role in the indoor environmental quality of buildings in Siwa. For instance, in Old Shali dwellings are generally characterized by being compact in shape for minimizing the amount of building surface exposed to the direct radiation of sun and the alleys in between are narrow, often covered, which made the narrow alleys shaded to avoid the heat of sun and extreme brightness. Moreover, it was stated by the local people that the 50 cm thickness of Kershef walls enables not only cooling the houses in the high temperature summer period, but also to sustain this cooling. In winter, when cold winds sweep down from the high desert plateau, the Kershef also enables the houses to be warm. Another natural technique which is used for cooling the air during the hot summer is the use of vegetation beside the openings and hence improving cooling the air before passing through the windows. In addition, wind towers and atriums were built inside the houses for passive ventilation. Also the windows were oriented opposite to each other's to promote cross ventilation as a replacement for air conditioners. Most importantly, adopting beautiful robust palm tree trunk ceilings, matching with the layout of Kershef building and also as a material for climatic responsive zero carbon emission. Inside the dwellings, it was observed that toilets are built as composting toilets, where the floor of toilets is constructed with only sand on floor to absorb the water, and with coal to absorb the smells.

All of these vocabularies have created the vernacular style of Siwa as a whole since old Shali is the main center of Siwa and main attraction for tourists. Interestingly enough, this vernacular style is still retained in Aghourmy, yet mixed with "modernized" buildings. Almost all the buildings which were built in the last couple of decades are built with cement blocks. It was observed that these newly built houses were painted externally after construction to match the adjacent traditional buildings. This hasn't added much on the other hand to the architectural value of Aghourmy. Overall, buildings are of a good status and the old buildings were mostly well maintained. It is also worth mentioning that Aghourmy is characterized with vast green areas for agriculture. The olives and the dates are the most cultivated fruits. The olive trees and the palm trees produce massive quantities of fruits; one of the most popular products used in Egypt and also exported to entire Europe [8].

Nonetheless, in Abushruf, it was observed that the existence of traditional buildings is almost negligible where the few remaining ones were found to be

abandoned and in a very bad condition. Cement architecture has completely taken over, and it was reported by the local people that they prefer to live in modern buildings to traditional buildings, supported by the fact that the income status of people in Abushruf is not enabling them to build with Kershef. Hence, Abushruf has lost its architectural spirit and vernacular identity as a natural consequence.

2. Evolution of Vernacular Architecture in Siwa

Not only has the economic status contributed to diminishing the vernacular architecture of Siwa, however, the long-term exposure of the external walls to the harsh environmental conditions also led to dramatic mineralogical changes due to overburden, and salt crystallization of the Kershef buildings. Simultaneously, the newly developed initiatives did not adequately consider the impact on the environment. Land was rapidly purchased by outside investors, the social fabric of the region started to change and traditional methods of sustainable use of resources were no longer practiced [4]. Furthermore, the traditional building technique was regarded by the local people as a costly technique as is it requires more time to allow each layer of Kershef to dry before laying the other (Figure. 4), which increases the labor costs per day as a consequence, as well as the need for regular maintenance.

As a consequence, the builders started using the typical white blocks and cement as an affordable alternative. In addition, it is much easier building method compared to the traditional technique, and also because it takes less time in construction. This resulted in the recent dominance of common form of the "modern" building style replacing the traditional building vernacular style. It is worth mentioning, it was reported by the local people in all the visits that they never wanted to lose their local architectural spirit inherited from their ancestors; clarifying that they were very keen on painting the facades with the same color of the adjacent traditional buildings, as a mean by which they thought it may help retaining the identity and spirit of the place (Figure 5).

Figure 6 below illustrates the status of building conditions in Siwa in the occupied areas, from which it could be noted that only less than one third of the buildings are well maintained compared to the size of modern buildings which are not maintained and/or in a poor condition.

Fig. 4 Building with Kershef blocks row by row, where the builders have waited for the first rows to dry before laying the new layers.

(a)

(b)

Fig. 5 A traditional Kershef dwelling, b. A cement recently built dwelling inspired from the traditional adjacent buildings and painted in the same color.

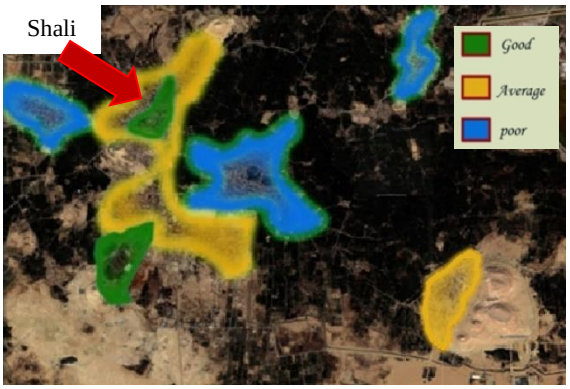

Fig. 6 A Satellite photo representing the buildings' conditions in Siwa in colored zones.

4. Neo-vernacular Architecture in Siwa

Neo-vernacular architecture has emerged in Egypt from the wise use of technology in achieving the attractive luxuries vernacular. In the last few decades eco lodges started to emerge in Egypt for tourism promotion. Taziri, Shali and Adrere Amellal eco lodges in Siwa were selected. The main features which characterized these eco lodges, and made them successful applications one can refer to are summarized as follows:

4.1 Best Utilization of the Local Materials

Taziri eco lodge was built at the foot of the mountain in order to build on non-arable ground and to appropriately coat the arrangement in a manner that merges the mountain with the building. The building is characterized with its furniture, made with the local materials of sand blocks, various Kershef patterns (Figure 7), unique sky light roof made of palm tree trunks blended with sand blocks, and furniture carved from palm tree trunks [9].

4.2 Employing Affordable Climatic Responsive Construction Techniques

In Shali lodge, no electricity was used unlike the other eco-lodges. The building technique adopted relied mostly on best utilizing the available resources. Also, the building was built with Kershef and the interior walls exposed to the sun were painted in light colors for emitting solar radiations. Open air atrium

Fig. 7 The varies uses of salt brick (Kershef) in Adrere Amellal eco-lodge.

between the rooms has been created for passive ventilation, and the windows were oriented in an opposite direction for cross ventilation.

4.3 Social Interaction and Economic Development

In Adrere Amellal eco lodge, Mounir Neamatalla (The president of Environmental Quality International (EQI) in Egypt) have established a contracting company for kershef blocks to carry out the building work since not many local people were skilled for the task. As a result, further demand in kershef building techniques occurred and thus creating more job opportunities. Moreover, part of the project was dealing with proper management of Siwa's assets, which attributed to raising the awareness of the local people to the importance of protecting the non-renewable resources of the oasis. As a result, land reclamation was significantly limited by agriculturalists while also water depletion was prevented and agriculturalists started to grow organic pesticide-free crops [9]. The following Figures provide examples of how the vocabularies adopted in the eco lodges were inspired by the traditional local vernacular vocabularies without technological inferences and thus no more costs were added.

Fig. 8 Comparative pictures; left column: the traditional local vocabularies; right column: the renovated vernacular vocabularies employed in the eco lodges.

5. Discussion and Conclusions

There is no doubt that the construction technique which took over in the last few decades had a significant impact on the overall vernacular architectural value of Siwa. Moreover, the economic status has contributed significantly to diminishing the traditional building skills. The overwhelming impression left is that the historical value which characterized the place is disappearing leading the local people towards a more spiritless "modernized" life, considering architecture as a form of a life changing process. Thus, it could be suggested that not only the economic status of people have a significant effect on the attitude towards the existing buildings' conditions, however, cultural awareness in any community have a huge influence on what gets built and what needs to be preserved.

5.1 Impact of the Architectural Evolution on the Vernacular Architecture of Siwa

With regards to the overall building' conditions in Siwa, it could be noted that the quality of buildings deteriorate gradually away from Shali, the heart of historical Siwa. This presents no tangible evidence of the continuity between the past, present and future and hence no reflection of the relation to ancestors is observed.

Moreover, the great reliance on modern construction techniques and building with cement blocks has become inhibiting for the emergence and sustenance of the overall architectural quality in Siwa. This was supported by the minimum intervention of the local people in innovating new ideas for retaining their local identity and architectural value, attributing to diminishing the traditional Kershef skill and thus Siwa has started to lose its cultural heritage accordingly. As a result, apart from the eco lodges, the evolution of vernacular architecture in Siwa over time didn't reflect the environmental, cultural, technological, economic, and historical context in which it exists.

5.2 Would the "Revitalization" or "Resuscitation" of the Traditional Vernacular Style of Siwa Become Possible?

In order to answer such a question, one may refer to the examples employed in Siwa's eco-lodges for tourism, yet to incorporate the social enterprise dimension of the local people with the local architectural practices. It could be concluded from those examples that Neo-vernacular architecture could be successful, when applied on well- established basis afforded by the public and the government, where they added a good value to their vernacular architecture through the wise use of technology. Nemattallah has also showed that sustaining vernacular architecture might contribute to better living conditions, by motivating the people to raise their standard and providing them climate conscious designs using their local materials and at the same time considered to be energy efficient.

5.3 Guidelines for the Revitalization/ Resuscitation of the Vernacular Architecture in Siwa

Based on the previous discussion and in view of today's trend of building construction and architectural style in Siwa, the main guidelines for the revitalization/ resuscitation of Siwa's vernacular architecture and traditional spirit could be summarized as follows:

1. Prompting industrialization of the natural resources of such an enriched environment for enhancing the economic status; and thus investing on the adaptive use of the local availabilities and the traditional building techniques to achieve neo-vernacular architecture that accurately preserve Siwa's architecture as it was historically.

2. Promoting and encouraging the wise use of technology in achieving climatic responsive design strategies with minimum costs, whilst achieving neo-vernacular architecture that produces symbols that gives a sense of what this specific place means to its inhabitants and visitors.

3. Opening schools and educational centers dedicated to teaching the traditional construction techniques and building with Kershef and Palm tree trunks in an aim to transferring the knowledge of Kershef buildings' profession to the younger generations. This will lead to creating more job opportunities for the local people as well.

4. Engaging the community in environmental awareness programs which aims at explaining to the local people the damaging effect of the newly introduced building construction trend on their historical value in addition to the architectural value and spirit on the long run, whilst encouraging them to innovate in their vernacular architecture and create new ideas for low cost, zero carbon buildings which best suits their historical, cultural, climatic and environmental context.

In fact, all of the aforementioned guidelines could be employed not only in Siwa, but also in all other enriched environments where the local availabilities can enhance the economic status of the poor and most importantly enhance the architectural value and quality of the place.

References

[1] K. Beattie. Sustainability and Sustainable Architecture- Dublin Institute of Technology. Available online at: http://www-new1.heacademy.ac.uk/assets/cebe/documents/resources/habitat/beattie.htm (2015).

[2] A. Fakhry. Siwa oasis. American University of Cairo Press (2004).

[3] A.R. Gindy, M.A. El Askary. Stratigraphy, structure and origin of the Siwa depression, western desert of Egypt. American Association of Petroleum Geologists Bulletin 9 (1969) 603-662.

[4] A. Dumairy. Siwa: the present and the future, Egypt (2005).

[5] F.A Hammad, T.A Aggour., A.R Shabana, Water overflow in Siwa oasis, the problem and the solutions. In: 5th International Conference on the Geology of the Arab World. Cairo University (2000) 889-900.

[6] A. Abdel-Motelib, A. Taher, A.El Manawi. Composition and diagenesis of ancient Shali city buildings of evaporate stones (kerchief), Siwa Oasis, Egypt. Quaternary International (2014) 1-8

[7] L. Rovero, U. Tonietti, F. Fratini, S. Rescic. The salt architecture in Siwa oasis – Egypt (XII–XX centuries). Construction and Building Materials 23 (2009) 2492–2503

[8] Egypt agriculture in Siwa. Available online at: http://www.egypt-cairo.com/siwa/agriculture_in_siwa.html, 2015.

[9] R. Ahmed. Lessons learnt from the vernacular architecture of Bedouins in Siwa oasis, Egypt. ISARC 31st International Symposium On Automation And Robotics In Construction And Mining (2014)