Chapter 5
Sustainable Reuse of Heritage in the Middle East Constrained Environments

Silvia Mazzetto

Abstract This chapter presents some interesting examples of restoration projects, recently completed in Middle East regions, by comparing the sustainable principles and highlighting how traditional construction techniques are also sustainable because they are perfectly integrated into the constrained environments. The chapter explains that there is currently a growing need to enhance local traditions and architecture in the Middle East for searching and defining the local identity of places. The adopted research approach has integrated the use of analysis and comparisons based on the literature review and site visits, for some particularly significant examples of heritage adaptive reuse. The projects were analyzed and compared, considering the aspects related to the sustainable approach of the interventions concerning the constrained environments, and to the cultural, social, and economic, criteria of analysis. The results show many compatible elements between the reuse of a nation's heritage, the restoration of traditional materials, the advocacy for local cultural values, synergy with the landscape, and climate adaptation that must be compatible with the buildings reuse and with the constrained environmental conditions. Therefore, the sustainability concept is addressed through its meaning of harmony and unity and harmony in a comprehensive meaning, considering the materials used, respect for the ecosystem, cultural aspects, investments, costs, and the enhancement of the sense of community belonging. The aim is to define a persistent approach in the heritage restoration and reuse, capable of enhancing the Middle East culture, by respecting sustainability and constrained environmental conditions.

Keywords Sustainability · Socio-cultural values · Economic growth · Environmental context · National identity · Tradition

S. Mazzetto (✉)
Italian Ministry of Education, University and Research MIUR, Rome, Italy

S. Azzali and K Thirumaran (eds.), *Tropical Constrained Environments and Sustainable Adaptations*, Managing the Asian Century,
https://doi.org/10.1007/978-981-33-4631-4_5

5.1 Introduction

The historical development of many Middle Eastern countries has always been severely affected by the constrained environmental conditions, which have caused fragility and slowness in the development of local economies. The heat and drought of many subtropical territories of the Middle Eastern countries have led to stressful life conditions due to the inhospitable environment. However, in recent decades, the oil discovery and exportation have produced radical transformations both in the economy and in local societies, generating unprecedented construction booming and accelerating construction processes, infrastructures, and transportation. Unfortunately, the rapid growth has also led to a dangerous detachment from the traditions and natural characteristics of the places, seriously affecting the safeguard of culture and national heritage, which has, in many cases, been neglected, destroyed, or abandoned in adverse conditions. Only recently, the growing interest in history and the protection of traditions has led many Middle Eastern countries to finance and complete many restorations and reuse interventions of heritage for enhancing the values of culture and traditions affected by constrained environmental conditions.

The Middle East Area and particularly the Arabian Peninsula has always been characterized by tropical and subtropical environmental conditions, particularly inhospitable for the survival of communities, business development, and economic growth. However, in the last decades, the discovery and exportation of oil have radically transformed, which has rapidly become a new regional and international economic hub. The local villages have quickly turned from small tribal settlements into new globalized economic centers.

The first discovery of some oil fields started in 1938 in the Saudi Arabia and Bahrain countries (Salama 2012), and immediately the traditional economy link to the survival of the local population in such constrained environments, changed into a fast construction booming which completely changed the economy of the Middle East regions. The traditional communities' adaptation to survive in such a constrained environment, wholly changed into Gulf countries' and Emirates' cooperation, the Gulf Cooperation Council (GCC), founded in 1981 to support the common business interest of the affected countries.

The limited natural resources of the Middle East regions, in the 1970s, were completely transformed into new businesses and the industrialization process generated by the oil exportation, which generated an industrial revolution and an extensive fast, economic growth, by completely changing the traditional urban fabric, the local social organization, and the life of the place. The old monuments and buildings are currently the last testimonies of the ancient culture (Carbonara 2012) for the adaptation and resilience of people and activities to the limited natural resources of the place. Understanding the heritage testimonies of past centuries is vital for transmitting the local culture and traditions to future generations of Arab cities, which show the artistic creativity and identity of the places (Feilden 2015). Any element of heritage is a complex product of the society (ICOMOS 2008), having unique "values"

and meanings and is indispensable for the understanding of the local transformation and the popular adaptations to the sites.

5.2 The Safeguarding and Reuse of Heritage in the Middle East Regions

The definition of a sustainable approach for safeguarding the heritage for the United Nations Educational, Scientific, and Cultural Organization (UNESCO-ICOMOS 2010), and the World Heritage (UNESCO 2002) is linked with the values of improving the life cycle of any historic structure to reach some significant cultural, social, economic, and environmental results that should respect the diversity of cultures and places (Landorf 2009). The sustainable intervention on heritage has to adapt to the constrained environment and involves the use of available resources and materials to permit adaptation to specific environmental circumstances and meet local requirements and community needs.

In the past years, many cases of conflicts related to the protection and safeguard of heritage buildings raised for the different methodologies adopted in the sustainable direction of countries' growth. Many buildings' protection laws are often in contrast with the historic buildings' reuse or specific sustainable elements of protection.

The chapter aims to analyze some restoration projects recently completed in the Middle East area, by comparing the past functions with the current reuse and how interventions have promoted the sustainable approach and the appreciation for ancient social values and cultural traditions in the diverse countries and a various constrained environment.

The research presented some considerable examples of recently completed heritage restoration projects (case studies), chosen from the literature and from site visits among diverse scales of interventions (urban, architectural, landscape), to demonstrate how the reuses and the sustainable awareness can enhance the promotion of the local identity. The selected projects Al Jahili Fort and mosque, Al Bastakiya Quarter in the United Arab Emirates; Barzan Towers, Al Zubarak Fort, Al Taghab Fort, Old Amiri Palace, Heritage Houses complex, Al Dakkira Mosque, Al Ruwais Mosque, Al Wakrah Souq, Souq Waqif, and Al Zubarak archeological site in Qatar, Old Sana'a Settlement in Yemen, Saifi Village, and Horsh Beirut in Lebanon after completion, have produced many environmental, economic, and social benefits, and have promoted the values of their country's identity too.

The sustainable approach of reusing old historical buildings and urban areas has adopted local natural materials that are compatible with the conservative/restorative interventions, has promoted reuses compatible with the constrained environment, and has reduced the emission of pollutants. Economically, by adopting local materials, the construction costs have been reduced, as well as the quantities of energy consumed. From a social point of view, throughout the compatible and sustainable reuses, the

local economic growth has been promoted, enhancing the culture, perceiving and appreciating the heritage, synergy with the environment, and the country's climate.

Field observations, site visits in the Arab Countries, sets of photographs taken onsite, hand sketches, and drawings, served as a comparative tool and helped contextualize the analyses and confirm the findings.

The comparisons of the case studies in the constrained environment of the Middle East regions have focused mainly on three sustainable criteria: socio-cultural, socio-economic, and socio-environmental, derived from the adaptive reuse proposals, over a range of dedicated principles on the various scales of interventions (urban, architectural, landscape), as for the following list:

A. Socio-cultural criterion;

1. To enhance the social inclusion
2. To promote cultural diversity
3. To discover personal and community belonging
4. To enhance social attachment
5. To improve appreciation of cultural values
6. To improve the quality of labors' working conditions

B. Economic criterion;

7. To improve the highest social values
8. To enhance economic growth
9. To support the local economy

C. Environmental criterion:

1. To respect the environmental context
2. For the benefit of natural and climatic resources
3. To reduce pollution and materials' waste
4. To minimize the climatic changes
5. To reduce the natural hazard effects

The research compared five main typologies of adaptive reuse interventions, which have promoted different principles over the sustainable criteria:

i. Restoration and reuse of historic defensive buildings to enhance the value of local building traditions;
ii. Restoration and reuse of historic residential buildings, settlements and quarters of old and contemporary city centers to strengthen the sense of community belonging;
iii. Restoration and reuse of religious buildings such as mosque to improve appreciation of cultural traditions and enhance the highest social values
iv. Restoration and reuse of commercial areas such as ancient souqs (market) to support the local economic growth and attract tourists.
v. Conservation, restoration, and reuse of natural and archeological parks, to respect the environmental context, and climatic resources.

5.3 Adaptive Reuse of Defensive Structure: Rediscovery the Building Traditions

The tropical and subtropical territories of the Middle East present numerous and varied defensive structures with different shapes and characteristics: forts, watch-towers, and fortified residential buildings. The defensive constructions protected the inhabitants and villages from attacks by nomadic invaders, which occurred frequently in the past. In such constrained territories, the local inhabitants used to protect the few wells of drinking water and the groves palms, fundamental and indispensable sources for the survival of the local peoples. After the oil discovery such structures were abandoned and neglected for many years and consequently subjected to acute deteriorations, however recently, many governmental institutions, in charge for heritage safeguarding in the Middle East regions, have financed and completed many restoration works and adaptive reuse interventions to provide new life to defensive structures.

Al Jahili Fort, located in the Emirate of Al-Ain in the United Arab Emirates, was probably constructed in 1891 for defensive reasons, lately used as a residence, and recently in 2007 restored by Abu Dhabi Tourism and Culture Authority (Abu Dhabi Department of Culture and Tourism 2017). The fort is constructed by local materials such as coral and limestone blocks and mud mortar and masonry. The restoration project has adopted natural materials and traditional construction techniques, together with reinforced concrete and cement mortar to consolidate structurally the massive defensive walls and the round towers located on the corners. The fort is currently reused as a permanent exhibition of Sir Wilfred Thesiger's explorative discoveries in the area. The state of conservation after the intervention is excellent, and the structural stability is wholly guaranteed. The fort used as a museum permits the discovery of ancient traditional construction techniques and the historical traditions of the community life and the shared support of the inhabitants to defend their lives and survival, the fort attracts many local and foreign visitors every year. It is today one of the best-preserved examples of a defensive fort in the Emirates.

In Qatar, the two Barzan Towers were restored in 2015 by the Qatar Museum Authority. The towers constructed as part of Doha's defense system against the Ottomans attacks were also used to protect the natural valley where the rainwater was stored. In 2015 the consolidation works were extended to the foundations and buttresses, severely damaged by structural cracks due to the structure weight.

The plan of the two towers is rectangular, and the defensive walls were constructed with local materials, such as limestone and coral blocks, mud mortar, mud, and gypsum plaster, wooden lintels ("danchal") and rainwater gargoyles ("marazim" usually protected by a layer of bitumen ("basgijl"). The structural consolidation works have increased the structural stability by reinstating the corners buttresses, and most of the original materials were consolidated such as plaster, lintels, doors, and windows, joisted floors so that the towers today are reused as a museum of the defensive structures, where to explore the traditional construction techniques and

Fig. 5.1 Al Zubarah fort reused as a museum of the fort, after the completion of the restoration works (Credits: author)

materials. The towers attract many visitors every year, although the museum is not yet served with any thematic visit tour.

In Qatar, many forts have been recently restored and reused by the governmental authorities, such as the Al Zubarah and Al Taghab Forts, which are located on the northern side of the country. Al Zubarah fort (Fig. 5.1) was constructed to protect the area from foreign attacks (Walmsley et al. 2010) nearby the archeological remain of the ancient Al Zubarah settlement.

The fort has four defensive towers and massive defensive walls built with local materials, such as coral and limestone blocks, mud mortar and plasters, wooden lintel, and joisted floors. The historical materials, during the restoration, works in 2015 carried out by the Qatar Museums were preserved and protected to guarantee a sustainable intervention by planning the maintenance to preserve the structure from any damage. The fort is currently used as a museum and a cultural center for the archeological findings of the nearby Al Zubarak and is part of a touristic circuit for visiting the country. In the museum, the drinking water well has been restored, and the thematic visit tour permits to discover the local residential and life culture of ancient inhabitants. It is the best-preserved and restored example of a fort in Qatar. The reuse intervention has strengthened the socio-cultural values of the site by the rediscovery of Qatari defensive traditions, the values of community belongings while enhancing the socio-economic attributes of the site, able to adapt and integrate over the centuries, with the environmental characteristics of the constrained climatic conditions (Mazzetto 2018a, b).

Fig. 5.2 Al Taghab fort in Qatar. Completed restoration works (Credits: author)

In Qatar, Al Taghab fort (Fig. 5.2) is another traditional fort in the desert built in the nineteenth century to protect the drinkable water wells, in use from 1911 onwards.

The fort is rectangular in plan with three circular towers and a fourth rectangular tower on the corners and a central courtyard used to store goods and for the social activities of the inhabitants' community lives.

The defensive structure was mainly reconstructed by local authorities' end of the 1990s using layers of coral stones and limestone blocks bonded with mud mortar and gypsum plaster to increase the wall thickness for structural reasons of foundations and wall consolidation and to protect the inhabitants from thermal insulation. Today, the recently reconstructed layers of blocks are still readable, and the fort is in a good state of conservation having stable wooden structures for the roofs and stairs. The fort is currently used as a museum of the fort, being open and accessible for visits, although it is still not in place any specific thematic tour. Here the restoration works, and the reuse has strengthened the socio-cultural values of the place by discovering the traditional construction materials and techniques mixed with the adopted approach to reconstruct the collapsed portion of structures to give back the idea of the original shape and function of the fort.

5.4 Residential Buildings: The Rediscovery of Community Life Traditions

The attention for heritage restoration and reuse has also interested in many examples of residential buildings. In Qatar, the Old Amiri Palace was built by Sheikh Abdullah bin Jassim Al Thani under Ottoman authority. The structure includes three courtyard houses and an extended majlis (living room) (Bulosan 2016). Recently (2013–2015), the palace complex has also been subjected to a detailed restoration project and maintenance program by involving mainly the structural consolidation of foundations, walls, slabs, and floors under the supervision of Qatar Museum Authority Conservation Team. The walls structures are made of limestone and coralline rubble covered with mud plaster layers to protect the buildings from the aggressive sea environment, that have severely damaged the structures over the last decades. Other natural materials such as wooden lintels, bamboo strips, and woven matting, lime and mud mortar have been restored and replaced with other natural products and materials. Basic structures for the new additions were built with concrete slabs and beams during the last restoration projects to reinforce the structures. The Palace is part of the Qatar National Museum complex. The restored buildings provide an authentic image of the traditional residential structural system and construction techniques and have improved the appreciation of suburban life's cultural values in a constrained climate environment, showing the people adaptation to survive and desert environment before the oil discovery.

The restoration project (2015) of the Heritage House Quarter in Msheireb Downtown Doha, was recently completed in 2015, by the Private Engineering Office. It consists of four traditional Qatari houses: Bin, Mohammed and Bin Jassim House, Company House, Radwani House, and Jelmood House constructed in the early twentieth century. The residential buildings are built with local materials, such as limestone blocks, mud, and clay mortar, mud plasters, and currently represent an example of the local building traditions, that were mainly preserved during the restoration works. The intervention approach was guided by principles of preservation and recovery of all the original construction materials to replace only a few missing parts. Such an approach has permitted the preservation of essential testimonies of traditional residential life inside the houses by discovering the sense of personal and community belonging and enhancing the social attachment to the traditional values of life in Qatar's constrained environment. The cultural values have been promoted by reusing the houses as the new Msheireb Museums where to discover the local tradition, memories of the site history, and the past social conditions of life.

In the historic center of Dubai in the United Arab Emirates (UAE), the Al Bastakiya Quarter (Salama and Wiedman 2013) was restored in 2003 by the Dubai Municipality. The residential district built in the nineteenth century has important testimonies of heritage values, after being abandoned for many. Before the restoration, the houses' structures were severely damaged by structural collapses and have been reconstructed and consolidated to provide new stability. The rooms are currently

used as cultural museums for local and touristic visits to rediscover the country's ancient traditions.

In Lebanon, another example of interest in safeguarding the heritage has been realized during the reconstruction of the country after the civil war to safeguard the local culture, throughout the supervision of the company Solidere (Société Libanaise pour le Développement et la Reconstruction de Beyrouth).

The Beirut Central District (BCD) area was almost totally reconstructed by preserving only the old alignments of traditional buildings dating back to the nineteenth century and restoring few remaining ancient structures. The intent was to reduce the memories of the pre-war to a minimum and avoid any link with the old architectural structures. However, the neighborhood of Saifi Village (Fig. 5.3) located on the south side of Beirut Central District, was an experimental reconstruction that adopted the reference to French colonial buildings, recalling the traditional past style of the place, existing before the war. Since the area was completely bombed and destroyed during the war, the intervention was entirely a reconstruction that anyhow adopted a recall of the vernacular style to link the future with the past of the country with the aim of requalifying and reconnecting its traditional reconstruction to the new globalized city of the future.

Unfortunately, the project's intention did not reach the expected results, and the reconstruction was not able to bring back the residential vitality to the capital Beirut synonymous with the past, because the Al Saifi Village area is mainly empty with not much residents. The reconstruction project, based on high standards quality of interventions, have produced a costly business center. Although the vernacular style architecture calls back the traditional residential characteristics and the sense of past community around the new urban piazzas, the public spaces do not generate a sense of social connection and interaction, and the places are not populated enough yet.

Another complex restoration project was completed at the end of the 1980s in Yemen (Fig. 5.4). The Old Sana'a, the residential settlement, was completed by adopting the vernacular typology to reconstruct a part of the old city, under the supervision of the General Organization for the Preservation of Historic Cities of Yemen.

The old residential structures of the city, built with local materials by combining layers of mud, bricks, and stone blocks, were reconstructed using the same old materials and construction techniques, by respecting the place history, integrating the old structures with the new needs, recognizing the feeling of community belongings and enhancing the sense of mutual support typical of traditional Islamic settlement during early years of Islam. The house's architecture reflects the Ottoman style that dates back to the beginning of the sixteenth century, and the adopted local materials have improved the respect to the environmental context by demonstrating the adaptation of the traditional residential buildings to the constrained environmental conditions, to protect the inhabitants from heat and the constrained local weather conditions. The residential palaces and historical buildings today are reused as museums and exhibition places (Lewcock 1986) to improve the appreciation of local cultural values still existing in this heritage site.

Fig. 5.3 Saifi Village after the reconstruction works (Credits: author)

The analyzed interventions, although located in diverse countries, have reused most of the heritage residential areas in the cities' centers. The reuses have permitted to appreciate the local residential uses' values by enhancing the transmission of cultural tradition linked to old spaces and functions. Most of the socio-cultural principles have shown the capability of the old buildings to adapt to the population's needs, after the restoration works and the new functional uses. They have become allowed to strengthen social values, thanks to the recognition of old social cohesion in the territory.

Fig. 5.4 Al Ruwais Mosque during the restoration works (Credits: author)

5.5 Religious Buildings to Improve the Highest Social Values

In the Middle East in past times, religious buildings (mosques, minarets, etc.) were important public places able to host a congregation of people to pray and perform their devotion, because, although nowadays the functions of mosques are various in the past they were mainly used for praying and for primary religious children education. During the spread of Islam across the Islamic world, in the Middle Eastern area constrained by the critical environmental conditions, many ancient buildings were transformed and adapted to the religious function. In the past, the presence of a mosque was always linked with the human spirit of mutual support and the attachment to the community.

The neglected old Al Dakhira Mosque (Fig. 5.5), located on the north side of Qatar, after the oil discovery in the country, has been abandoned for many years, in a bad state of conservation till when was restored in 2015 through the supervision of Qatari Private Engineering Office.

The mosque structures were severely damaged, the foundations presented various cracks and were restored during the works throughout a massive reconstruction done with reinforced concrete. Although the intervention tried to privilege the use of traditional local material such as limestone and coralline blocks, wooden poles, mud mortars, and plasters, the structural consolidation has done with cementitious

Fig. 5.5 Al Dakhira Mosque, reused as a religious center (Credits: author)

materials necessary to guarantee the building stability. Today, the mosque is reused as a new cultural and religious center calling back inhabitants and local people to the religious function after many years of abandonment.

Similarly, the old Al Ruwais Mosque (Fig. 5.4), located on the northern side of Qatar, was abandoned for many years and restored in 2015 by the Qatar Museum Authority. The mosque was constructed in the 1940s over the ruins of an older building dating back to the seventeenth century.

Due to the long years of abandonment and negligence and the critical environmental conditions, the external walls, built with natural and local materials, were severely damaged, risking the entire collapse of the structures. The structural consolidation works have adopted reinforced concrete systems and cementitious materials to permit the reuse as a new religious and cultural center. After restoration works, the social aggregation values of the place have been enhanced, and nowadays the people share social spaces and meet in the same way in wish used to happen in the old past, by enhancing the local social attachment values.

In Al- Ain in The United Arab Emirates, in 2017 under the supervision of Abu Dhabi Tourism & Culture Authority, were executed the restoration works of the oldest heritage buildings of the area: the Al Jahili mosque, restored in 2007. Before

the completion of the restoration works, the place was abandoned for many years and subjected to severe damages. The structural consolidation works have brought the mosque to a new life, currently reused as a social place for sharing social and religious life. The reused mosque attracts many tourists, fascinated by the history of the place. (Mazzetto and Petruccioli 2018). All the restoration works of religious buildings have enhancement and the diffusion of cultural knowledge and social cohesion. They have supported the transferring of socio-cultural principles, such as the sense of community belonging and the enhancement of social inclusion by improving the social interactions between people.

5.6 Commercial Reuse of Old Spaces: Enhancement of Economic Growth and Support the Local Economy

In the category for the restoration of commercial heritage sites characterized by constrained environmental conditions, were analyzed three significant projects: the Al Wakrah fishermen village (Fig. 5.6) and the Souq Waqif in Qatar and the Jbeil souq located in Jbeil in Lebanon.

In Qatar, the old fishermen village in Al Wakrah was abandoned for many years, after the oil discovery, becoming an extended urban slum till 2015 when the Qatari Private Engineering Office restored it. After completing the reconstruction and restoration works, the old structures were reused as the new souq in Al Wakrah's. Due to abandonment, many old structures collapsed and were reconstructed by adopting the local constructive style, typology, materials, and construction techniques to reduce pollutions and materials' waste. Today the reused urban places have preserved their old social character with many traditional commercial activities, together with restaurants and cafeterias located in front of the seaside. The social identity of the old village commercial spaces has been safeguarded into the new commercial area of the souq that recalls back the local commercial activities and has supported the local economy by respecting the environmental context.

Another analyzed project in Qatar is the restoration of Souq Waqif in Doha (Fig. 5.7) completed in 2008 thanks Qatari Private Engineering Office. The souq located in the city center of Doha was objected to widespread demolitions, becoming a vast urban slum until the restoration works, started in 2004. The buildings, built before the 1950s, were restored and reconstructed by respecting the traditional typology and use of old materials and construction techniques, such as load-bearing walls done by using sun-dried bricks, gypsum mortar, coral stone, and the wooden beams. It was also adopted the reinforced concrete system to implement the structural stability of the buildings. However, the main restorative aim has been the integration between the past and the contemporary constructive approaches and the traditional architectural style combined with the innovative technologies and systems, which have permitted the

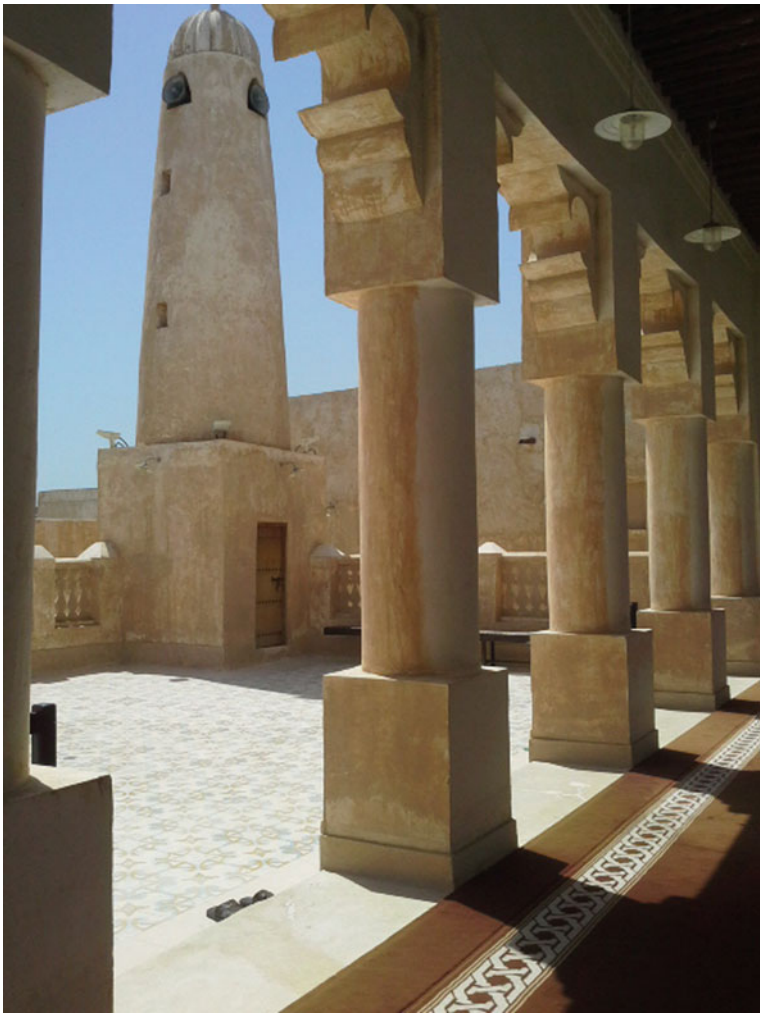

Fig. 5.6 Al Wakrah fishermen village currently reused as the new souq (Credits: author)

respect of the environmental context and the benefit of natural and climatic resources. After the restoration works, Souq Waqif area was has been entirely requalified and hosts an interesting combination of traditional commercial activities, together with many restaurants, cafeterias local shops which have supported the local economic growth and enhanced the appreciation of the rediscovered cultural and commercial values of the site (*souq*) (Mazzetto and Petruccioli 2018).

Fig. 5.7 Souq Waqif in Doha, after the restoration works (Credits: author)

5.7 Natural and Archeological Sites: Landscape Requalification to Respect the Environmental Context

In the Middle East, many interesting restoration projects have recently safeguarded and promoted the environmental aspects of the local context of heritage landscape, for the benefit of the natural and climatic resources. Two presented interventions after

Fig. 5.8 Horsh Beirut Park and the heritage landscape of the pine forest (Credits: author)

the requalification and reuse have brought to light the old values of social cohesion embedded in the areas, together with the enhanced respect for the local environmental context, by showing the site's capability to adapt to the new community needs.

In 1992 started the requalification works and landscape redesign project for the well-known urban park "Horsh Beirut" (Fig. 5.8), financed and supervised by the Municipality of Beirut in together with the Council of Île-de-France,

The park is a landscape heritage site of a pine forest extended over 300,000 sqm. In past times, the park was invaded and was destroyed by frequent attacks and invasions, by ancient populations such as the Crusaders, Mamluks, Ottomans, it was also bombed and burnt during the World war, and it was lately reconstructed after the Lebanese civil war, after being bombed many times during the fighting. (Shayya 2010). The park opened after the works in 2014 and became an important example of heritage landscape requalification that has improved the quality of the population's life, by offering green oxygen for the Beirut capital. Horsh Beirut Park includes values, such as being an example of a sustainable environment, a space for recreation, a cultural heritage landscape, a space for social gathering and practices, and it has become famous for the Beirut's inhabitants since it is also a symbolic representation of freedom and democracy because it is a public space that "belong to the city."

The restoration works have brought to light the historical distribution of green areas and ancient paths inside the park by respecting a sustainable landscape

design approach. Horsh Beirut's requalification has improved the place's socio-environmental values by respecting the environmental context and has raised the levels of social quality the Beirut inhabitants. The sustainable approach of the intervention has promoted the reduction of pollution and waste by enhancing the values of natural and climatic resources.

Al Zubarah archeological site, in Qatar, in 2009 was included in a specific safeguarding national law to protect the "Heritage Park of Northern Qatar" and the neighborhood where many archeological remains are still visible, and the entire territory of Al Zubarah in 2013 was inscribed on the heritage world list of UNESCO (the United Nations Educational, Scientific and Cultural Organization).

In the old past, around in the eleventh century, Al Zubarah was an important commercial city, but then it was attacked and destroyed by invasions and latterly abandoned at the beginning of the twentieth century. In 2014 some essential archeological excavations discovered the rests of Zubarak's old and vibrant commercial society by bringing to remains of its old culture and society. The conservation project has discovered, cleaned, and protected the foundations' walls of the traditional buildings, such as courtyard houses, palaces, fishermen hunts, commercial souk's areas, defensive walls, and towers. The project intended to protect and prevent any future loss of archeological testimonies of local heritage, methodologies of construction, and adaptation techniques to the constrained environmental context, which is are unique examples of the interaction between humankind and the surrounding natural and environmental conditions. Such outstanding cultural values are still clearly perceived in Al Zubarah archeological heritage park, locals, and tourists every day appreciates the unique remains through the exhibition spaces.

5.8 Comparison of Adaptive Reuse Interventions in a Constrained Environmental Context

The presented analyses of the heritage restoration and reuse projects in the Middle East constrained context, have taken in consideration some different typologies of intervention (defensive structures, residential and religious buildings, commercial areas, landscape, and archeological sites), the scale of interventions (architectural and urban), and the comparison between some principles associated with the adopted criteria of analysis: socio-cultural, socio-economic, socio-environmental.

The intent has been to analyze different reuse projects and understand how sustainable adopted approaches can enhance the cultural, social, and economic values of the nation's heritage. Table 5.1 shows a summary of the categories of intervention analyzed in the restored heritage case studies in the environmentally constrained context, by presenting a brief description of the project, the new function for reusing the heritage structures, buildings and areas, and the governmental institutions involved for the finance and supervision of the works.

Table 5.2 presents each intervention's typology, the value of the adopted principles of analyses inside the criterion of sustainability used for comparing the case study.

Table 5.1 Schematic comparison of the adaptive reuse projects analyzed

Name Place	Date/Institution	Category/Scale	Project description	Type of materials used	Original use	Adaptive reuse	Sustainable principle
Al Jahili Fort Al-Ain UAE	2007/Abu Dhabi Tourism & Culture Authority	Defensive/Architectural	Restoration, consolidation	Natural materials and cement mortar	Defensive structure	Fort Museum	Socio-cultural Environmental
Al Barzan Towers Doha Qatar	2015/Qatar Museum Authority	Defensive/Architectural	Conservation, restoration, consolidation	Natural materials and cement mortar	Defensive structure	Towers Museum	Socio-cultural Environmental
Al ZubarahFort Doha Qatar	2014/Qatar Museum Authority	Defensive/Architectural	Restoration consolidation	Natural materials, limestone rocks, gypsum mortar, wooden poles	Defensive structure	Fort and Cultural Museum	Socio-cultural economic
Al Taghab fort Doha Qatar	1990/Qatar Museum Authority	Defensive/Architectural	Restoration, reconstruction	Natural materials, cement mortar, concrete blocks, and reinforced concrete	Defensive structure	Fort Museum	Socio-cultural

(continued)

Table 5.1 (continued)

Name Place	Date/Institution	Category/Scale	Project description	Type of materials used	Original use	Adaptive reuse	Sustainable principle
Old Amiri Palace Doha Qatar	2015/Qatar Museum Authority Conservation Team	Residential/Architectural	Restoration, Structural consolidation	Natural materials, limestone rubble, wooden poles, and cement mortar, reinforced concrete.	Residential Palace	Museum of the Palace, Qatar National Museum	Socio-cultural
Heritage Houses Doha Qatar	2015/Msheireb Property	Residential/Urban	Restoration, Structural consolidation	Natural materials, limestone rocks, gypsum mortar, wooden poles	Residential quarter	Museums of the culture	Socio-cultural
Al Bastakiya Quarter Dubai UAE	2003/Dubai Municipality	Residential/Urban	Restoration, consolidation	Natural materials, mud, cement mortar.	Residential Quarter	Religious and Cultural Center	Socio-cultural economic

(continued)

Table 5.1 (continued)

Name Place	Date/Institution	Category/Scale	Project description	Type of materials used	Original use	Adaptive reuse	Sustainable principle
Saifi Village Beirut Lebanon	2014/Le Solidere	Residential/Urban	Reconstruction	Cement mortar, concrete, reinforced concrete	Residential neighborhood	Luxury residential	Socio-cultural economic
Old Sana'a Settlement Yemen	1995/General Organization Preservation Historic Cities	Residential/Urban	Restoration, consolidation	Natural materials, wooden poles, stone blocks	Residential Settlement	Residential, museums, exhibitions	Socio-cultural economic environmental
Al Dakkira Mosque Doha Qatar	2015/Private Engineering Office	Religious/Architectural	Restoration, consolidation	Natural materials, wooden poles cement mortar,	Mosque	Mosque, religious center	Socio-cultural
Al Ruwais Mosque Doha Qatar	2015/Qatar Museum Authority	Religious/Architectural	Restoration, consolidation	Natural materials, mud, wooden poles, cement mortar	Mosque	Mosque, religious center	Socio-cultural

(continued)

Table 5.1 (continued)

Name Place	Date/Institution	Category/Scale	Project description	Type of materials used	Original use	Adaptive reuse	Sustainable principle
Al Jahili Mosque Al-Ain UAE	2007/Abu Dhabi Tourism & Culture Authority	Religious/Architectural	Restoration, consolidation	Natural materials, cement mortar-	Mosque	Mosque	Socio-cultural
Al Wakrah Souq Doha Qatar	2015/Private Engineering Office	Commercial/Urban	Restoration, reconstruction	Natural materials, cement mortar, wooden poles concrete blocks, and reinforced concrete	Fishermen Village	New Souq, commercial, entertainment	Socio-cultural economic environmental
Souq Waqif Doha Qatar	2006/Private Engineering Office	Commercial/Urban	Restoration, reconstruction	Natural materials, cement mortar, wooden poles concrete blocks, and reinforced concrete	Old souq	Souq, commercial, entertainment	Socio-cultural economic environmental

(continued)

Table 5.1 (continued)

Name Place	Date/Institution	Category/Scale	Project description	Type of materials used	Original use	Adaptive reuse	Sustainable principle
Horsh Beirut Lebanon	2014/Municipality of Beirut	Landscape/Urban	Conservation	Natural materials, wooden poles, stone blocks	Pine forest	Urban Park	Socio-cultural, environmental
Al Zubarah Archeological Site Doha Qatar		Archeological-Landscape/Urban	Conservation	Natural materials, mud	Settlement	Archeological, open-air museum	Socio-cultural, environmental

Table 5.2 Schematic comparison of areas and principles of sustainability used for assessing the restoration projects. The legend shows the scores achieved from each project during the assessment phase

		Defensive Structure				Residential buildings					Religious buildings			Commercial areas		Natural sites	
Areas of sustainability	Principles of sustainability LEGEND A = for the maximum score (8–10 points) B = for the average score (4–7 points) C = for the low score (0–4 points)	Al Jahili Fort	Al Barzan Towers	Al Zubarah Fort	Al Taghab Fort	Amiri Palace	Heritage Houses	Al Bastakiya quarter	Saifi Village	Old Sana' a Settlement	Al Dakkira Mosque	Al Ruwais Mosque	Al Jahili Mosque	Souq Al Wakrah	Souq Waqif	Horsh Beirut	Al Zubarah archeology
Socio-cultural sustainability	1. To enhance the social inclusion	A	B	C	B	B	B	A	B	A	B	B	B	A	A	C	B
	2. To promote cultural diversity	B	B	C	B	B	A	A	B	A	B	B	B	B	A	C	C
	3. To discover personal and community belonging	A	A	A	A	A	A	B	B	A	A	A	A	A	A	B	A
	4. To enhance social attachment	A	A	A	A	A	A	A	B	A	A	A	A	A	A	B	A

(continued)

Table 5.2 (continued)

		Defensive Structure				Residential buildings					Religious buildings			Commercial areas		Natural sites	
Areas of sustainability	Principles of sustainability LEGEND A = for the maximum score (8–10 points) B = for the average score (4–7 points) C = for the low score (0–4 points)	Al Jahili Fort	Al Barzan Towers	Al Zubarah Fort	Al Taghab Fort	Amiri Palace	Heritage Houses	Al Bastakiya quarter	Saifi Village	Old Sana'a Settlement	Al Dakkira Mosque	Al Ruwais Mosque	Al Jahili Mosque	Souq Al Wakrah	Souq Waqif	Horsh Beirut	Al Zubarah archeology
	5. To improve appreciation of cultural values	A	A	B	A	A	A	A	B	B	A	A	A	B	B	B	B
	6. To improve the quality of labors' working conditions	C	C	C	C	C	C	C	B	B	C	C	C	C	C	B	C

(continued)

Table 5.2 (continued)

		Defensive Structure				Residential buildings					Religious buildings			Commercial areas		Natural sites	
Areas of sustainability	Principles of sustainability LEGEND A = for the maximum score (8–10 points) B = for the average score (4–7 points) C = for the low score (0–4 points)	Al Jahili Fort	Al Barzan Towers	Al Zubarah Fort	Al Taghab Fort	Amiri Palace	Heritage Houses	Al Bastakiya quarter	Saifi Village	Old Sana'a Settlement	Al Dakkira Mosque	Al Ruwais Mosque	Al Jahili Mosque	Souq Al Wakrah	Souq Waqif	Horsh Beirut	Al Zubarah archeology
Economic sustainability	7. To improve the highest social values	B	B	A	A	A	B	B	C	B	B	B	B	A	A	B	A
	8. To enhance economic growth	B	B	C	B	B	B	B	B	A	B	B	B	B	A	B	B
	9. To support the local economy	B	B	B	B	A	B	B	B	B	B	B	B	B	B	C	B

(continued)

Table 5.2 (continued)

		Defensive Structure				Residential buildings					Religious buildings			Commercial areas		Natural sites	
Areas of sustainability	Principles of sustainability LEGEND A = for the maximum score (8–10 points) B = for the average score (4–7 points) C = for the low score (0–4 points)	Al Jahili Fort	Al Barzan Towers	Al Zubarah Fort	Al Taghab Fort	Amiri Palace	Heritage Houses	Al Bastakiya quarter	Saifi Village	Old Sana'a Settlement	Al Dakkira Mosque	Al Ruwais Mosque	Al Jahili Mosque	Souq Al Wakrah	Souq Waqif	Horsh Beirut	Al Zubarah archeology
Environmental sustainability	10. To respect the environmental context	B	B	A	B	B	B	A	C	C	B	B	B	C	C	A	A
	11. For the benefit of natural and climatic resources	B	B	A	A	C	B	C	C	B	B	B	B	C	B	A	A

(continued)

Table 5.2 (continued)

		Defensive Structure				Residential buildings					Religious buildings			Commercial areas		Natural sites	
Areas of sustainability	Principles of sustainability LEGEND A = for the maximum score (8–10 points) B = for the average score (4–7 points) C = for the low score (0–4 points)	Al Jahili Fort	Al Barzan Towers	Al Zubarah Fort	Al Taghab Fort	Amiri Palace	Heritage Houses	Al Bastakiya quarter	Saifi Village	Old Sana'a Settlement	Al Dakkira Mosque	Al Ruwais Mosque	Al Jahili Mosque	Souq Al Wakrah	Souq Waqif	Horsh Beirut	Al Zubarah archeology
	12. To reduce pollution and materials' waste	B	B	A	B	B	B	C	C	C	B	B	B	B	C	B	A
	13. To minimize the climatic changes	B	B	A	B	B	B	B	B	B	B	B	B	B	B	A	A
	14. To reduce the natural hazard effects	C	B	A	B	C	C	B	B	B	B	B	B	B	C	A	A

Many different elements have been considered while analyzing the projects such as the environmental aspects, the context of the historical heritage, the links with the traditions, the transmission of environmental, cultural and social values, the new buildings' functions, as well as the enhancement of the historic values pertaining to the restored heritage.

The research aims to enhance the interest in safeguarding the local heritage that has been neglected and abandoned for many years by discovering that its sustainable reuse can improve the local cultural and social and environmental values by contributing to the construction of the national identity of many growing countries.

In the contemporary social development of emerging countries of the Middle East area is of fundamental importance to adopt a sustainable approach to the restoration of the heritage to enhance the local culture and the appreciation of the national identity.

The results show that there are many elements in common between the safeguard of nation's heritage, the reuse of ancient natural materials and techniques of construction, the promotion of local cultural values, synergy with the context, the heritage resilience, the adaptation to the climate over the centuries, that must be compatible with the buildings reuse, and with the constrained environmental conditions. Therefore, the concept of sustainability is presented and in a full meaning of unity and harmony, by reducing material waste, enhancing the respect for the ecosystem, improve the highest social values, the appreciation of cultural aspects, support the local economy, the promotion of economic growth, and the enhancement of the sense of community belonging together with the need to promote the cultural diversity. The aim is to define a persistent approach in the heritage restoration and reuse, capable of enhancing the Middle East culture, by respecting sustainability and constrained environmental conditions.

Finally, in the light of the need to enhance international information exchange and cooperation, it is essential to improve the current dialogue between ministries, universities, and professional associations by involving other public or private partners and encouraging the formation of the Middle East Restoration Philosophy.

References

Abu Dhabi Department of Culture and Tourism (2017) Al Jahili Fort. http://tcaabudhabi.ae/en/what.we.do/culture/museums/al.jahili.fort.aspx. Accessed 8 September 2017

Bulosan M (2016) Conservation phase of old Amiri palace, Doha, 2013–2016: project documentation. N.p.: Restoration & Reconstruction, 2016. https://www.academia.edu/31061475/_RR-07_Main_Conservation_Phase_of_Old_Amiri_Palace_Doha_2013-2016. Accessed 8 September 2017

Carbonara G (2012) An Italian contribution to architectural restoration. Front Arch Res 1(1):2–9

Feilden BM (2015) Conservation of historic buildings. Routledge, London

ICOMOS (2008) ICOMOS-ISCS: illustrated glossary on stone deterioration patterns. ICOMOS International Scientific Committee for Stone, Rome

Landorf C (2009) Framework for sustainable heritage management: a study of UK industrial heritage sites. Int J Herit Stud 15(6):494–510. Available at: www.tandfonline.com/doi/abs/10.1080/13527250903210795. Accessed 10 October 2019

Lewcock R (1986) The old walled city of Sana'a. UNESCO, Paris

Mazzetto S (2018a) Heritage restoration as a tool to promote the cultural identity in the Gulf Regions. Preserv, Digit Technol & Cult 47(1):3–11 [Online]. Available at: https://doi.org/10.1515/pdtc-2017-0015. Accessed 5 November 2019

Mazzetto S (2018b) Evaluation of the impact of sustainability principles on adaptive reuse interventions: the case of Qatari heritage experience. Arch Res 8(4):129–137 [Online]. Available at: article.sapub.org/10.5923.j.arch.20180804.03.html. Accessed 5 November 2019

Mazzetto S, Petruccioli A (2018) Methods and techniques used in significant restoration projects in Qatar. Stud Conserv 63(5):303–314 [Online]. Available at: www.tandfonline.com/doi/abs/10.1080/00393630.2017.1338932?journalCode=ysic20. Accessed 5 November 2019

Shayya F (2010) At the edge of the city: reinhabiting public space toward the recovery of Beirut's Horsh Al-Sanawbar, publisher Discursive Formations, Beirut Lebanon

Salama A (2012) Architectural identity demystified: visual voice from the Arab world In: Emmons P, Lomholt J, Hendrix JS (eds) The cultural role of architecture: contemporary and historical perspectives. Routledge, London, pp 175–185

Salama A, Wiedman F (2013) Demystifying Doha: on architecture and urbanism in an emerging city. Ashgate, Farnham, UK, pp 43–45

UNESCO (2002) Partnerships for world heritage cities, culture as a vector for sustainable urban development world heritage, Shared Legacy, Common Responsibility

Associated Workshops, 11–12 November 2002 Urbino, Pesaro, Italy [Online]. Available at: https://whc.unesco.org/en/series/9/. Accessed 5 April 2020

UNESCO-ICOMOS (2010) Management plans and the world heritage convention—a bibliography, ICOMOS (International Council on Monuments and Sites) Documentation Centre, Paris [Online]. Available at: www.icomos.org/centre_documentation/bib/Management_plans_bibliography.pdf. Accessed 5 November 2019

Walmsley A, Barnes H, Macumber P (2010) Al-Zubārah and its Hinterland, North Qatar: excavations and survey, Spring 2009. In: edited by Starkey J (ed) Proceedings of the seminar for Arabian studies, vol. 40, 55–68. Archaeopress, Oxford