

REVIEW ARTICLE

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Greener buildings Significance of courtyard houses design in the Arab world

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Abstract. Serious and sober architecture comes from the concept that evolves through time and across generations, and shows its sustainability through innovation and business which is becoming a crucial move along with the product at the time and place of occurrence. Aspirations of the community, cultural identity and urban context are linked to the environment in which they arise. To some extent and up to the middle of the Twentieth Century, the architecture of each country and region reflected the heritage and environment of the residents who dwelled in that part of the area. With the effect of globalization and misuse of the “copy-paste” method, ready-deformed designs have disintegrated architecture in societies. This is inherited through a primitive thought fully dependent on the least efforts of designing. The consequences of this behavior have produced buildings without identity which do not meet the requirements of sustainable development. This article highlights the best practices by ensuring a sustainable environmental community in Bahrain and shows that this has been tackling the issue from top to bottom, by setting a sustainable strategy for the country and introducing a guideline of green building code. However, lack of building regulations is obvious and needs to be revised in favor of greenery and saving lands to allow housing developers to build on the edge of the land plot without a setback from three sides of the land. This will have a flexible solution in designing a court-yard type which demonstrated a successful solution for the need of families as well as saving energy. Environmental best practices are led by the private sector, and some good examples of design have the quality of life. Creative designs can be appreciated when they reflect and inspire the past for the need of the present and looking forward to the future.

1 Introduction

Bahrain is gifted with a large diversity of economic activities by virtue of its geographical location and historical value. This historical fortunate position has been very influential on the country's community activities. In the last three decades, the country has witnessed a very active process to revive and safeguard heritage, as well as enhance the quality of life for the inhabitant, by building parks and gardens within its neighborhoods as much as possible.

Establishing a National Planning Development Strategy (NPDS) in the Kingdom of Bahrain has created a unique opportunity to ensure that sustainability principles are applied for urban development over the next 25 yr which will provide a superior quality of life for generations to come. The article aims at providing a framework for the development that can integrate the many elements of the NPDS, so that these policies and strategies are consistent

with the principles of sustainability and can be implemented in an integrated and coherent manner to help Bahrain become a nation and a society of mixed communities that are sustainable in the long term. Sustainable development has been recommended to “Meet the needs of the present without compromising the ability of future generations as well as meet their own needs” [1].

A Green Building regulations and specifications document has been tailored for Bahrain and is needed to be implemented soon. They are complementary to the NPDS and they benefit the below purposes: [2]

1. To improve the performance of buildings in the country by reducing the consumption of energy, water and materials, improving public health, safety and general welfare and by enhancing the planning, design, construction and operation of buildings to create an excellent city that provides the essence of success and the comfort of living.
2. The regulations intend to support NPDS, create a more sustainable urban environment and extend the ability of the Kingdom's infrastructure to meet the needs of future development.

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3. Green building is the practice of creating structures and using processes that increase the efficiency of resource use – energy, water and materials – while reducing building impacts on human health and the environment during the building's lifecycle and through better setting, design, construction, operation, maintenance and removal.

Sustainable development must be an overriding goal of government policy; whereas sustainable construction is one of the principle contributors to sustainable development. Economic growth and social progress are products of a setting/society created from effective use of resources. Bahrain needs to address local and regional sustainable development while taking into account economic, social and environmental issues as these are seen as the pillars of a holistic and integrated approach to sustainable development.

The inhabitants of Bahrain are distributed over towns, villages and neighborhoods close to the traditional cities. Due to the urbanization expansions, surrounding villages have gradually become dwelling suburbs of the city. The population of Bahrain included 12 347 million inhabitants in 2010; living in an area of over 770 km². The population is projected to be 2.2 million by 2030. The number of built green areas that had been planted by the government before 2010 are equal to 6.94 m per inhabitant, with a massive effort by the Ministry of Municipalities Affairs and Urban Planning (MOMUP) which has increased during the last four years; Bahrain currently has a 7.76 m² per capita ratio; bearing in mind that the population has increased by 3.2% in Bahrain, which was estimated to have 1.4 million in 2014.

A fundamental criterion of sustainability and visibility in Bahrain's community policies is the preservation, creation and management of a sustainable society. Sustainability within this context is demonstrated by the past, present and future condition of landscapes as well as heritage that are developed to encourage a highly livable community. Despite Bahrain's cities being with a compact nature of urban structure, especially in the traditional towns, the community has implemented a flourishing green policy and strategy for every land available to the public.

These policies have contributed to the community's sustainability and are the tools that managed to produce a sustainable countryside for community policies, especially those close to the waterfront. Furthermore, in order to treasure the area's history, roots and traditional practices, the municipal council has adhered to the public's wishes and renovated the fishery ports in Bahrain. Traditional places that live in memories are precious to the community, and thus have been protected. Upgrading, regularization, relocation and other activities related to housing and informal settlements are all determined to a large extent by the leadership role of local authorities and strategies followed at the local level, which should be comprehensive [3].

This article highlights the best practices ensuring a sustainable environmental community in Bahrain and diagnoses as well as analyzes the key issues of the quality of life by protecting and making the enhancement of the

natural and built landscapes as well as environmental sustainability of buildings. Additionally, cover their impact on the city's development and prosperity. Conclusion draws that design and arrangement of new houses along with buildings contain a spacious courtyard that is important in reducing heat.

2 Sustainability and infrastructure strategies of NPDS in Bahrain

Infrastructure is the basic physical and organizational structure needed for the operation of a society, enterprise or the services and facilities necessary for an economy to function. It can be generally defined as the set of interconnected structural elements that provide a framework supporting an entire structure of development. It is an important term for judging a country or region's development.

There is an inherent restraint that must be applied to development, commonly known as the "Triple Bottom Line" or "Three-Legged Stool" that applies economic, social and environmental components to sustainable development. In other words, development must be measured in economic, social and environmental terms if the outcome is to be regarded as sustainable.

Establishing the NPDS of Bahrain has a unique opportunity to ensure that sustainability principles are applied to development over the next 25 yr, which will provide a better quality of life for generations to come. However, the aim of the Sustainable Development Framework is to provide focused sustainable development guidelines and targets that relate closely to the existing and future situation in Bahrain. A principle objective can be seen from this article which is to provide a framework that integrates the many elements of the NPDS so that policies and strategies are consistent and can be implemented in a coherent sustainable method.

3 Environmental best practices

In recent years, public agencies and NGOs have been exploring and adopting best practices when delivering environment, health and human services. In these settings, and in this context, the use of the term "Best Practices" is often used inter-changeably; several best practices and environmental initiatives, small or large have been carried-out in all the cities of Bahrain. The first of these is an initiative related to the Arad Bay project – called Signature Bahrain. It has started a movement to support the environmental organizations and individuals who are making a difference to Bahrain's environment. Other initiatives like Bahrain Green Awards have been created as a platform to enable green initiatives to be showcased to inspire and stimulate others for the benefit of the environment locally, regionally and globally. Bahrain Green Awards is a contribution to the cause; however, it requires collective efforts and active participation of Bahrain's business community to sustain and make it a national success.



Fig. 1. A traditional house with a courtyard and a wind tower to relieve the harsh climate of the inner spaces of houses. Muharraq, Kingdom of Bahrain. Source: Photograph by the Author, 2016.



Fig. 2. Compact buildings in a traditional town increase the shade and wind movement on roads.

Ministry of Health in collaboration with the Ministry of Education created a joint committee in order to monitor health promotion at schools. Other programs included:

1. Healthy living program: this program is directed to women to supply them with best practices and tools that will help them maintain a healthy lifestyle – emotionally, mentally and physically. Working in an alignment with Michelle Obama's anti-obesity campaign "Let's Move" participants will learn the nutrition and benefits of an active lifestyle.
2. "Lose Weight and Begin a Fresh Start" is a campaign established by the community to offer advise (via smartphone devices) on daily and weekly basis in order to slim down healthily as well as attain better concentration and energy along with faster metabolism.

The community is encouraged to take care of gardens and walkways to ensure positive feedback on cleanliness and order by the larger public. There is also a strong vibrant citizen sector in Bahrain – individuals, families and communities who devote their time and energy to public causes. The objectives of the Bahraini communities have been achieved by turning the Bay into a natural park for marine plants, fish, prawns and migratory birds as well as a site for gathering and fitness exercises.

3.1 Health and lifestyle

Quality of life in Bahrain means achieving high-level of human development. Assessing the quality of life in Muharraq will be based on the review of what has been accomplished in meeting the UN Millennium Development Goals. More importantly, economic and social data as well as survey findings have been extensively set, showing that there are currently no issues of insufficient income that exist or what is referred to as extreme poverty. This is achieved by government efforts and the poverty eradication programs which were initiated in the previous decade to provide in every field and for every segment in the society. The free-for-all health care and education services through the state's social welfare services, include productive families or "Youth Employment" programmers – identified as Tamkeen (an empowerment agency).

Furthermore, almost two-thirds of adults in Bahrain are either overweight or obese, which can lead to cardiovascular diseases, cancers and diabetes. The combined burden of these diseases is challenging to the country. The Arad Bay project provides an opportunity and a place for children across Muharraq to exercise and enjoy playing outdoors in the fresh air, while adults exercise. The

3.2 Green areas

The per capita share of gardens and parks has drastically shrunk. However, as a result of recycled and treated water being provided a few years back, Bahrain's municipality was able to expand green areas and roadside planting. Main streets have been planted on either side and in the middle curbs, resulting in small areas of greenery, gardens and



Fig. 3. One of the best-practiced projects that was developed is the Protectorate Areas. This project was the Bronze winner Prize in the LivCom Community Competition in China 2013.



Fig. 4. The project provides 24 hours daily walking and sports activities.

parks in urban areas. Furthermore, the country also currently has a 0.5 m^2 per capita ratio, in gardens and parks [4].

New projects in Bahrain have been undertaken as part of the municipality urban development strategic plan supported by the two strategic initiatives which are set by the municipality. These will increase the number of green spaces and general coastal beaches. Thus, the per capita

share of inhabitants for gardens and parks will reach 1.25 m^2 in 2015, an acceptable rate for a country that lacks freshwater and has very limited rainfall. Despite land and water scarcity, intensive efforts have been made by municipal authorities to provide green areas through increasing the number of parks and gardens.

3.3 Sustainability context

A fundamental criterion of sustainability and visibility in Bahrain's community policies is the preservation, creation and management of a sustainable society. Sustainability within this context is demonstrated by the past, present and future conditions of landscapes and heritage that are developed to encourage highly livable communities. Despite Bahraini towns being a town with a compact nature of urban structure, especially in the traditional towns, the community has implemented a flourishing green policy and strategy for every land available to the public. These policies have contributed to the community's sustainability, and are the tools that managed to produce a sustainable countryside for community policies, especially



Fig. 5. Such landscape in harsh climate is available thanks to recycled treated water. Conservation, rehabilitation, traditional buildings and buildings converted to decent activities are parts of sustainable policy in Bahrain.

those close to the waterfront or desert. Furthermore, in order to treasure the area's history, roots and traditional practice, the municipal council has adhered to the public's wishes and renovated the fishery ports in Bahrain. Traditional places that live in memories are precious to the community, and thus have been protected.

4 Design and layout of traditional houses in Bahrain's old towns

This section is showing how elements like social-economic conditions, regional climate, and building materials have influenced design and layout of the traditional houses in Bahrain old towns. The most important difficulty in the decentralization process is the limitations of authority transfer. Legal and administrative frameworks should promote autonomy over the acquisition and expenditure of public revenues. On the other hand, lack of participatory planning processes, limitations in the capacity of civil society organizations and modalities to involve the most vulnerable groups in decision-making appear as factors at the local level hindering the effectiveness of decentralization. Local level actions within an enabling environment are fundamental to shelter development; particularly for low-income groups.

Environmentally, the courtyard has gone a long way to mitigate, if not to overcome, the conditions of the climate of Bahrain, which falls into the category of hot and dry. Summers are very hot; winters are mild with short transitional periods of autumn and spring. There is a high percentage of sunshine and a high summer diurnal range (i.e. the difference between day and night temperatures) accompanied by very low relative humidity. There is very little rainfall over much of the country and the prevailing wind is mainly from the North-West. Dust storms occur on sixty days on a yearly average and take place in every month with the exception of December and January [5].

The spacious courtyard is the focal point of the house. It acts as an extension to the surrounding covered terraces and the rooms beyond, giving a sequence of open space (courtyard) covered or in between space (covered terrace) and enclosed space (rooms). One the account of its central position, the courtyard acts as a general space where nearly every movement between various elements of the house begins, ends or passes through. Hence, the courtyard helps to reduce circulation space within the house. Incidentally, the courtyard is an ideally safe area for babies and children to play, as they can be easily watched by their mothers. In addition to the bent entrance, reception room and courtyard, the ground floor includes covered terraces on two, three or even four sides of the courtyard, a family or living room/dining room, kitchen, staircase and a toilet. The widest covered terrace lies between the family room and the courtyard. It is in this terrace that the families spend most of their days and have all their meals during the summer season. In a sense, this terrace is an open living-room and contains only essential and easily portable furniture. The favored Arab custom of sitting and eating on mats that are spread on the floor is still practiced [6].

Few houses in Bahrain have been influenced by the Baghidian style of a house with regards to ventilation. Where as in Baghdad, natural ventilation takes place by means of air-scoops, known as Badgeer, other system of ventilation has been influenced by the Arabian Gulf climate, the wind tower, which is rarely found in Bahrain.

The heat that is lost during the night to the clear sky by radiation allows the courtyard to remain cool most of the day. The covered terraces, usually on two or three (occasionally four) sides of the courtyard, and the identical first floor covered gallery that is immediately above, help to reduce the quantity of heat gain during the day by obstructing the direct solar radiation (see Fig. 6).

Since the height of the courtyard is greater than any of its plan dimensions, the area exposed to this radiation is reduced to a minimum, leaving adequate space in the

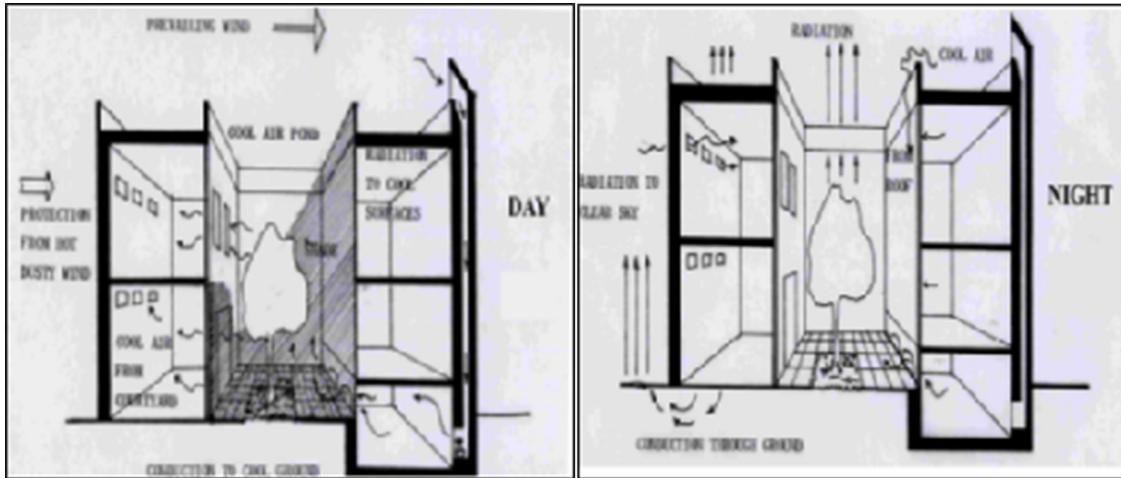


Fig. 6. Diagram of the thermal system for courtyard buildings. Drawing by the author. Source: Mosul: The Architectural Conservation in Mosul Old Town – Iraq, 2010; page 35. Author noticed that the traditional Bahraini house layout was affected by Baghdadian house layouts, however, few houses in Bahrain towns contain Badgeer out of which the underground and wind towers are preferred.

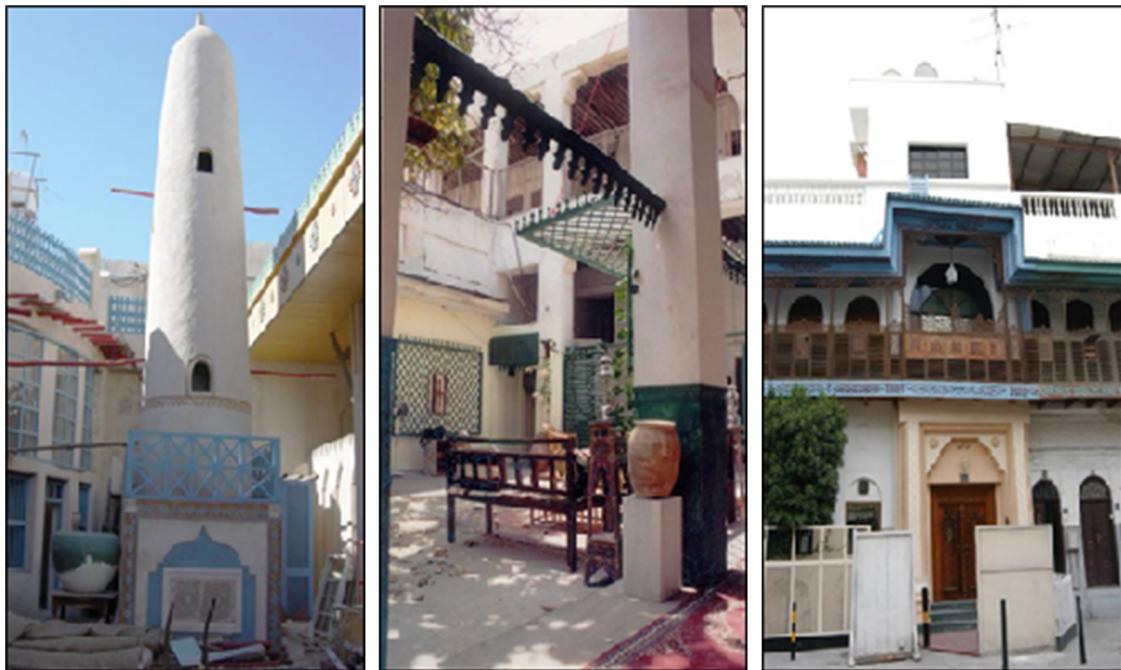


Fig. 7. Good examples of preserving traditional buildings by private sector initiatives. Source: Photos taken by the Author, 2006.

shade, even at mid-day when the Sun is near the zenith. By means of a fountain, plants or both, the very low relative humidity of the air is raised to a comfortable level. The courtyard is much quieter than the alley-ways because of its position within the house. The enclosing rooms, which are built with thick walls, act as a buffer against noise [7].

5 Greenery court-yard houses demanded to heritage tourism

While tourism will be one of the fastest growing segments of the world's economy in the 21st century, not every city can or should look to tourism as a major portion of its economic

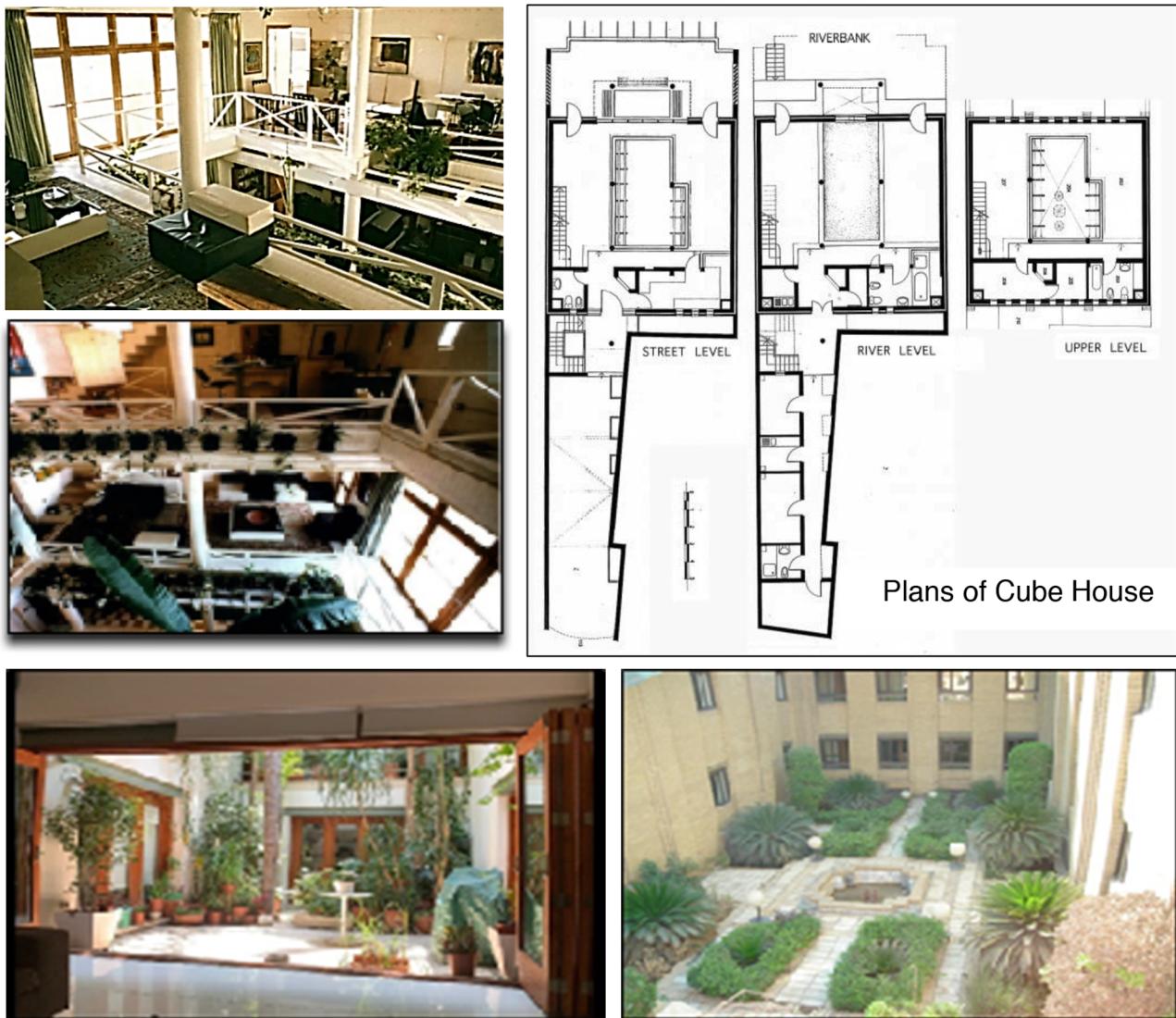


Fig. 8. A cube house in Baghdad, Iraq (above). A hospital and a private house (bottom). Source: Design by Maath Alousi from the Architect Collection.

base [8]. There are cultural, economic, logistical, and sometimes even religious reasons why tourism isn't appropriate for every community. Furthermore, it would be a mistake to only connect historic buildings with tourism — there are many more ways that historic buildings can be used as a local resource. In the USA, for example, 95% of all of the historic resources in productive use have nothing whatsoever to do with tourism [9].

At the same time, when tourism is identified locally as a component of an overall economic development strategy, the identification, protection, and enhancement of the city's historic resources will be vital for any successful and sustainable tourism effort. Worldwide, heritage visitors stay longer, spend more per day and have a significantly greater economic impact per trip. An even more important conclusion emerges: when heritage tourism is done right, the biggest beneficiaries are not

the visitors but the local residents who experience a renewed appreciation and pride in their local community and its history.

6 Inspired historical roots adapted for the future

Any building must be committed to the ideas and content depending on identity and heritage; responsive to the surrounding environment and meet the needs of the community. This is what architectural practices should have been these days, that past is important to be studied and takes the concepts of design for the present — looking forward to the future — “There is No Architecture without Thinking” [10]. Although perceiving around the world that modern technological tools are changing and evolving with time, but the thought of urban architecture must be solid.



Fig. 9. (Above) Examples of six row houses close to Tigris River in Baghdad, which use the courtyard design in two floors covered by a dome, and windows from all sides to provide cross ventilation and wind breeze by using traditional materials only. Designed by the Author in Baghdad, 1992. (Down left-hand layout) – Souq Hamada Neighborhood design by IDRISI Center for Engineering Consultant- Baghdad-Iraq 1992.



Fig. 10. Architect Ahmed Al Jowader built his house in the Hidd area (Bahrain) to contain a wind tower and a courtyard adapting traditional materials to modern use as well as save a massive amount of energy.

Clients' requirements cannot be achieved alone. A designer needs to convey those ideas embodied in the concept of an architect. This is because the client does not understand the tools of architecture; whereas the designer must have architectural thoughts and tools. What we see

now is the phenomena of tools given to architects without any thought – as a pioneer architect once quoted “An architect should wear the shoes of his client” [11]. There are important educational parts to raise awareness among architects first, and the community later.



Fig. 11. Good example of using court-yard type of houses in harsh climate like in Kuwait by DeZone: <https://bit.ly/2Fup5ia>.

7 Contemporary architecture in Arab states

These non-serious pieces of architecture are being designed by Arab architects nowadays and should not be copied from the West. These buildings are nothing but work of glass structures not related to this environment or society. It is clear in the final outcome that the goal is characterized by the superficiality of emotion and intellectual failure in the lack of knowledge of the cultural transformations of vital communities which must be inspired by the past in symbols or traditional characters and employed in new projects, not to reproduce elements for the purpose of decorating buildings in a fake heritage. Here is a good example of adapting court-yard concept of design for a house in Baghdad, Kuwait and Bahrain that all of the spaces in the house are open to four courtyards with solid walls that are exposed to the outdoor. Particular plants grow in the desert and harsh climates, and have been planted in these courtyards (see Fig. 12).

German art historian Udo Kultermann noted in his book: “In the 1960s, oil was discovered in the Middle East, and the economic and cultural impact of that discovery has caused a building boom unparalleled elsewhere in the world at any time in history” [12].

Fortunately, these days, a seminal work on Middle Eastern architecture is focusing not on the plethora of Western companies and architects doing work in the Middle East but on local architects who are mostly unknown in the West, despite years of brilliant accomplishments. Such names include Hassan Fathy, Mohamed Saleh Makiya, Rasem Badran, Rifat Chadirji, Abdel Wahed

AlWakil, Maath Alousi (see some works by the last in Fig. 8), along with many others. Many excellent buildings are designed by Western architects who have shown a sensitivity to the local. The focus on local traditions and the cultures that spawned Arab architect as well as disdaining for the international architecture has no connection to the past or to the people it is designed for.

Arab architects who are looking for inspirations from their predecessors as well as harmonious the merging tradition with contemporary requirements can be referred to the Architect’s Cube House designed by Maath Alousi in Baghdad. The Cube House is a project based on the principle of a cube while surrounding a central internal courtyard, as an example [13]. A private residence is composed of three independent houses on a plot in which the nature of the layout is designed for family interaction. Each of the houses is organized around a central courtyard which is positioned on axis and is identical in each house. This contemporary space arrangement is sensitive to tradition [14]. Other public building projects in Baghdad had the courtyards principle which is adopted by the same abovementioned architect (see Fig. 8).

8 Conclusion

From thousands of years till the 1950s the courtyard type houses had dominated the house design in the Middle East; the arrangement design is driven by two significant factors. Firstly, the privacy of family activities; and secondly, the concept is against the harsh climate such as heat and dust.

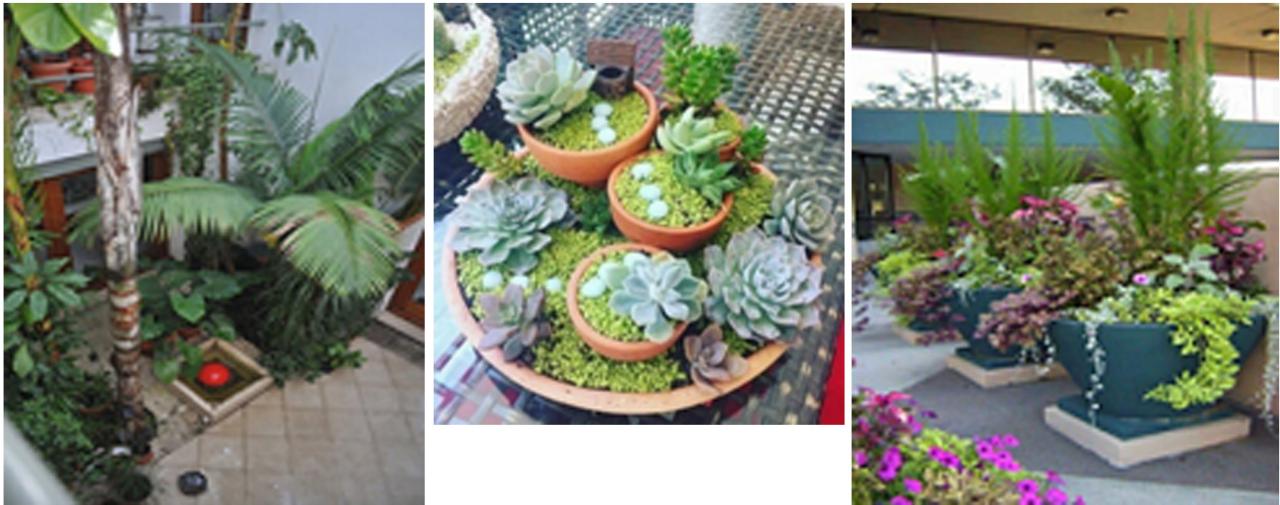


Fig. 12. Type of plants that can be grown in courtyards which have resistant to heat, dust, and require less maintenance.

Other sustainable factors include utilization and save in land area by building over the edge of the land plot, this available factors or characteristics cannot be achieved in villa type buildings.

The article revealed that the architectural preservation systems did not take into account economic factors nor the motivation of profits as a catalyst for investment, which resulted in a waste of resources due to deficiencies in the understanding of the concept of sustainable conservation. A development of regulatory requirements for traditional neighborhoods of towns in general are applied to new housing development in order to encourage the use of court-yard types of designs in new neighborhoods – as a result may draw the following actions:

- to conduct a minimum of structural interventions so as to maintain the architectural heritage shape of the building, allowing the modification of the design and the development of the necessary additions to the development of the building and commercial uses of the occupation investment proposed by the owner or developer;
- blight buildings can be removed or parts of the structure of buildings which are structurally not worth and have no value in heritage elements in order to allow space for new valuable buildings of architectural characters and forms that are to be inspired by the traditional concept into the continuously changing urban form of traditional features of the towns of Bahrain.

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