International Journal on
"Technical and Physical Problems of Engineering"
(IJTPE)
Published by International Organization of IOTPE

ISSN 2077-3528
IJTPE Journal
www.iotpe.com
ijtpe@iotpe.com

March 2016 | Issue 26 | Volume 8 | Number 1 | Pages 17-23

ALGERIAN URBAN HERITAGE BETWEEN TRADITIONAL SOLUTIONS AND URBAN SUSTAINABILITY

H.S. Drissi [1] A.M. Cherif [2]

1. Management of Urban Technologies, University Larbi Ben M'hidi Oum El Bouaghi, Algeria
hossayin28@gmail.com
2. Department of Earth Sciences and Architecture, University Larbi Ben M'hidi Oum El Bouaghi, Algeria
adad.cherif@univ-oeb.dz

Abstract- The population of the city El Oued in Algeria has succeeded in adapting of the harsh climatic factors that characterize the region for the first nucleus building of the city were able to achieve the principles of sustainability by relying on the natural resources available in the environment and access to several goals including: protection from the heat and solar radiation by providing shadows with different planning and architectural methods, work on the air move through the traditional planning of the city which depends on the narrow streets and courtyards within the buildings, temperature regulation for day and night using sustainable building materials with low environmental impact. In this research, the authors tried to know the most important features of sustainability in the traditional urban fabric of the city El Oued, at the planning level and architecture design for the buildings. They tried to seek the impact of climate on both levels and how these processors contribute to the creation of local climate that provides an acceptable level of thermal comfort for the population and enable them to practice their various activities.

Keywords: Urban Heritage, Urban Sustainability, Compact Fabric, Building Materials, Sustainability Assessment Methodology.

I. INTRODUCTION

The architectural and urban properties were a clear reflection on the cultural and physical environment over the centuries in which they prevail every stage of the successive historical stages. Paradoxically, the old man finds solutions despite its simplicity was compatible with its needs and with distinctive climatic conditions in his area while a lot of theories and modern designs failed to achieve harmony with the natural environment. There often were not as a result of the gradual evolution of urban fabric and did not take social and environmental conditions into consideration and it is imported designs and peculiar to the region. We must study the urban heritage of the cities and analysis its characteristics urban, as many of traditional cities proved their worth in the harshest natural conditions.

II. METHODOLOGY

The research depends on descriptive approach through the study of terminology and general definitions of the concept of sustainable development and sustainability of urban which are essential part of sustainable development. In addition, to displaying the most important evaluation of urban sustainability globally made known systems.

We will use practical approach through which built a special system in assessing the sustainability of urban of heritage Algerian regions using the analytical method in the study and analysis of elements and architectural heritage of vocabulary, principles, concepts addressed and the factors affecting it. With some above methods and graphic processors, and study aspects of sustainability in the desert palaces.

III. APPROACH FOR URBAN SUSTAINABILITY

Sustainability can mean many different things among economists and environmental scientists and men of law and specialists in the construction, etc. The achievement of sustainable development requires either reduce the size of community demand on the earth's resources or increase the amount of resources in order to at least reduce the gap between supply and demand to a certain extent. This process is aimed at the gradual unification of the required resources and supply which are determined by the process of sustainable development [1].

In 1993, two scientists Rosenbaum and Vieira managed to reach a definition of a comprehensive definition of sustainable development as "what meets the requirements for present and future which are limited to the use of renewable resources and no harm to the natural and human systems to the site such as air, water, land, energy and bio-system or those sites off-site [2].

Researchers have developed many definitions of sustainable development unlike the previous definition, e.g.:

- Achieve efficiency of the population living in their environment through their living without damaging the content of the environment [3].

- Achieve development in an economic perspective while maintaining the quality and efficiency of the natural resources available [4].

The urban sustainability is an essential part of the issue of global sustainability that occupies a lot of scientists and researchers in all fields, especially urban development. As the sustainable urban design the building should belong to the environment and be a friend where it consumes from its sources to the extent that achieve a healthy environment for the occupants which shall not prejudice the right of future generations to meet their needs from natural sources [5].

IV. HOW TO ASSESS URBAN SUSTAINABILITY

The concept of sustainability is used in various scientific community. However, it is noted that the adoption and drop in the ground varies from one major to another, where each specialty has indicators and strategies relied upon in any analysis of each discipline that uses the concept of sustainability and its principles as permitted by answering the questions.

A. Leadership in Energy and Environmental Design (LEED)

The US Green Building Council established the system of Leadership in Energy and Environmental Design (LEED) to be used as a guide to sustainable building design and as an approach of the green building as well as a checklist to determine the extent of achieving sustainability in buildings. This checklist contains six key elements of sustainable design including in Figure 1 and Table 1.

B. Building Research Establishment's Environmental Assessment Method (BREEAM)

The first urban sustainability assessment system is used in 1990 in the United Kingdom. It is a tool to evaluate the environmental performance in new and existing buildings which identifies the best standards practice in the field of sustainable development within the framework of ensuring quality and efficiency. The BREEAM has been used to certify over 260,000 building assessments across the building life cycle and it is being applied in over 50 countries [7]. The aims and assessment information related to BREEAM are shown in Figure 2 and Table 2.

Figure 1. The basic elements of LEED [6]

Table 1. Guide of leadership in energy and environmental design [6]

Element	Basic requirements	Objectives and strategies
The sustainability of the site	Control erosion site	The efficiency of site selection.
		Technical Urban
		Reduce environmental impact.
		The efficiency of the multiplicity of transportation alternatives.
		The reduction of noise pollution site.
		Rainwater management site.
		Coordinate location of the temperature regulation site.
		Reduce light pollution.
The efficiency of water systems of the building		The efficiency of water use general location.
		The development of technology to use water loss.
		Reduce water consumption.
Energy outer shell	- Quality basic building systems.	Raise the efficiency of energy performance.
	- Lack of energy consumption.	The use of renewable energies.
	- Reduction of the harmful effect of the use of air-conditioning systems on the outer shell	Ensure the efficiency of the building for sustainability.
		Reducing the destruction of the ozone layer.
		Verification of the efficiency of energy and water consumption.
		Direction for the use of non-polluting energies.
The materials used and their sources	- Gathering the materials used reusable.	The possibility of re-use of the building materials.
		Waste Management of buildings.
		Maintaining sources of material.
		The use of recycled materials in the building.
		The use of local materials available.
		The use of renewable resources.
		Encouraging the use of natural wood in environmental.
Homeland climate	- Reduce the use of mechanical means to achieve thermal comfort.	CO_2 ratio control inside the building.
		Raise the efficiency of natural ventilation.
		Control of Indoor Air Quality
	- Control the fumes inside the building.	The reduction of polluted air ratio within the blanks.
		Control the sources of chemical contaminants inside the building.
		The possibility of building control systems.
		Achieve thermal comfort.
		Provide natural lighting and to call abroad.
Innovation and design stages		Design innovation.
		Reliance through LEED

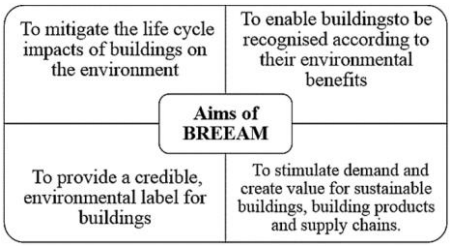

Figure 2. Aims of BREEAM [7]

Table 2. BREEAM new construction environmental sections and assessment issues [7]

Management	Health and wellbeing
Project brief and design Life cycle cost and service life planning Responsible construction practices Commissioning and handover Aftercare	Visual comfort Indoor air quality Safe containment in laboratories Thermal comfort Acoustic performance Safety and security
Energy	Transport
Reduction of energy use and carbon emissions Energy monitoring External lighting Low carbon design Energy efficient cold storage Energy efficient transportation systems Energy efficient laboratory systems Energy efficient equipment Drying space	Public transport accessibility Proximity to amenities Cyclist facilities Maximum car parking capacity Travel plan
Water	Materials
Water consumption Water monitoring Water leak detection Water efficient equipment	Life cycle impacts Hard landscaping and boundary protection Responsible sourcing of materials Insulation Designing for durability and resilience Material efficiency
Waste	Land use and ecology
Construction waste management Recycled aggregates Operational waste Speculative floor and ceiling finishes Adaptation to climate change Functional adaptability	Site selection Ecological value of site and protection of ecological features Minimizing impact on existing site ecology Enhancing site ecology Long term impact on biodiversity
Pollution	Innovation
Impact of refrigerants NOx emissions Surface water run-off Reduction of night time light pollution Reduction of noise pollution	Innovation

C. Comprehensive Assessment System for Built Environment Efficiency (CASBEE)

The Japanese green building evaluation system was established in 2001 which is a relatively new after note climate changes resulting from the environmental pollution and global warming phenomena as comprehensive assessment system for built environment efficiency. It is an evaluation system of urban environment and classification buildings according to their environmental performance.

When evaluating a city, CASBEE city sets a hypothetical boundary to enclose the city. In doing so, it can evaluate the Built-Environment Efficiency (BEE) of the city. Improvement in environmental quality and activities (referred to as "Quality," or "Q") within the enclosed space and reduction in negative environmental impact (referred to as "Load," or "L") on the area beyond the boundary lead to higher BEE values, thus a better rating [8]. The outline and assessment items of CASBEE are shown in Figure 3 and Table 3.

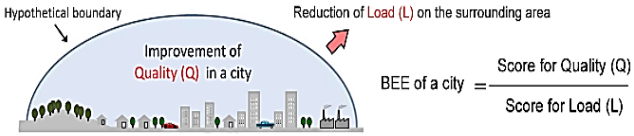

Figure 3. Outline of CASBEE for cities [8]

Table 3. Assessment items of CASBEE city [8]

	Major category	Minor category		Sub-category	
Quality (Q)	Q1 Environmental aspects	Q1.1	Nature conservation	Q1.1.1	Ratio of green and water spaces
		Q1.2	Local environmental quality	Q1.2.1	Air
				Q1.2.2	Water
		Q1.3	Resources recycling	Q1.3.1	Recycling rate of general waste
		Q1.4	CO_2 absorption	Q1.4.1	CO2 absorption by forests
	Q2 Social aspects	Q2.1	Living environment	Q2.1.1	Adequate quality of housing
				Q2.1.2	Traffic safety
				Q2.1.3	Crime prevention
				Q2.1.4	Disaster preparedness
		Q2.2	Social services	Q2.2.1	Adequacy of education services
				Q2.2.2	Adequacy of cultural services
				Q2.2.3	Adequacy of medical services
				Q2.2.4	Adequacy of childcare services
				Q2.2.5	Adequacy of services for the elderly
		Q2.3	Social vitality	Q2.3.1	Rate of population change due to births and deaths
				Q2.3.2	Rate of population change due to migration
	Q3 Economic aspects	Q3.1	Industrial vitality	Q3.1.1	Amount equivalent to gross regional product
		Q3.2	Financial viability	Q3.2.1	Tax revenues
				Q3.2.2	Outstanding local bonds
		Q3.3	Emission trading	Q3.3.1	Contribution inCO2 reduction in other regions
Environmental load (L)	L1 CO_2 emissions from energy sources	L1.1	Industrial sector	-	-
		L1.2	Residential sector	-	-
		L1.3	Commercial sector	-	-
		L1.4	Transportation sector	-	-
	L2 CO_2 emission from non-energy	L2.1	Waste disposal sector and other sectors	-	-

V. URBAN SUSTAINABILITY ASSESSMENT METHODOLOGY IN URBAN HERITAGE AREAS

There is a divergence of interest in various urban sustainability assessment systems according to the basic strategies of the various systems which is the common denominator between them in addition to the piece. There are many indicators that distinguish from other systems where BREEAM system is characterized by a number of indicators such as the definition of the project and the designing as well as the life of the building cycle and planning services after delivery. The optimal use of the various insulation materials have been included under the pollution element reducing the impact of the refrigerant gas, which is considered one of the problems of the United Kingdom, which have not received the same attention in other systems.

As for the system of CASBEE, it has been focusing on many of the indicators including both social services and the addition of social vitality that are not founded in other systems. The CASBEE system features also a very important indicator for the Japanese e.g. disaster preparedness and the piece of threats to earthquakes and hurricanes. The CASBEE system cannot be applied effectively only in regions characterized by natural and demographic and economic similar to Japan characteristics. Whilst LEED system has focused on energy efficiency by increasing the use of renewable energy and efficiency as well as making sure the building for achieving sustainability and reducing the destruction of the ozone layer.

It is noted that a discrepancy between the various strategies constituent for most evaluation systems, and this is what is reflected on the final assessment of sustainability and when obtaining a good evaluation in some systems not necessarily get the same results from other systems. From the above mentioned, it can be said that each system of evaluation of sustainability systems is governed by many of the spatial and temporal variables, in addition to the capabilities and challenges that countries faced.

It can be concluded that the sustainability of the current evaluation systems are trying to achieve and check the best available sustainable practices at the present time and can be accessed through the available potential and resources. In the other words, the evaluation systems that are trying to achieve are a part of the true principles of sustainability where can be considered the best sustainable practices in the currently unsustainable practices in the future because of technological developments during what has been presented in this study addressed.

The most important urban sustainability assessment systems scattered in the world (LEED, BREEAM, CASBEE). In order to take advantage of all systems, the researchers will propose a flexible evaluation system allows to deal with the various features of the study area (El Oued) with confirmation benefit from the features mentioned previous systems and avoid disadvantages. The proposed system has been structured into five basic principles of the strategy includes 12. It relied essentially on systems that have been studied with the exclusion of certain points of the various sub-strategies.

The objective of the proposed system is to indicate a relationship between what posed by different urban sustainability assessment and urban principles underlying the Algeria urban heritage regions as Table 4.

Table 4. The items assessing sustainability in urban architectural heritage areas system

Basic Principles		Goals and strategies	
1	Site Sustainability	1.1	The efficiency of site selection
		1.2	The efficiency of site planning
		1.3	Movement Network
		1.4	Reducing pollution from construction operations
		1.5	Reliance on the previous buildings as a reference for building
2	Energy efficiency	2.1	Use of renewable energies
3	The materials used and their sources	3.1	The use of sustainable building materials with good environmental impact
		3.2	Building Techniques
4	Health and well-being	4.1	Ventilation efficiency and achieve thermal comfort
		4.2	Provide natural lighting

VI. INTRODUCING THE STATE:

A. Geographical and Astronomical Site

The city El Oued is situated in the south-east of the diameter Algerian, bordered (Figure 4):

From the north: Khenchla province.

From the north-east: Tebessa province.

From the north-west: the state of Biskra.

From the south-west: Ourgla province.

From the west: Djelfa.

From the east: the borders of the republic of Tunisia on the border of 260 km.

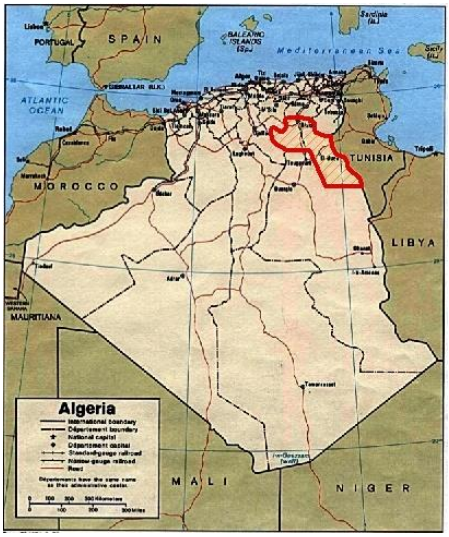

Figure 4. The geographical location of the city El Oued [9]

B. The City Location

El Oued city is located in almost the center of the municipality which is the largest and most active assembly in the state, with an area of 1813.19 hectares by 24.21% of the municipal area and the city is positioned on the north western edge of the great eastern race.

C. Study Case's Site

The neighborhood El A'achach is located next to the national road no. 48, bordered from the north El Quds Street, from the east by the great market and from the west by Etaleb Elarbi Street.

VII. SUSTAINABILITY FEATURES IN THE STUDY AREA

To highlight the most important features of sustainability in the study area, it is found that it should achieve the following principals:

A. Site Sustainability

A.1. The Efficiency of Site Selection

In addition for many historical reasons the location of the city of El Oued is important (Figure 5). There is another reason related to near groundwater from the earth's surface, where the local population took advantage of El Oued area for farming through Al Ghitani. These are the unique solutions of the kind on a global level, where the local population adopted a different philosophy in the irrigation process, instead of raising the water level of orchards which has been ejaculating orchards for water level, and palm absorbs water from aquifers without water.

Figure 5. View of farms surrounding the city El Oued in 1900

A.2. The efficiency of Site Planning

The site planning was not the result of field studies and architectural plans, but were a natural consequence of human interaction with the natural environment and the religious and cultural background in light of experiments and accumulated experience. Consequently resulting in the production of compact urban fabric to achieve optimum utilization of land use and achieve the formation of a unified urban in terms of building materials and buildings heights.

In addition to achieving privacy and gradient in the urban fabric and at all levels began with urban fabric down to the housing units and the inside of the yard where spaces are distributed around the house. The studies have shown that there is a relationship between the absences of the hierarchy of urban spaces in the city and between the increases in crime rates. So the concept of security and safety in residential environments is closely linked to the gradual hierarchy of urban spaces. Therefore, ranging from semi-public spaces into public spaces.

Then semi-private spaces, ending with private spaces, which is for a small group of the population and ranging responsibility for all vacuum in the population. The passage of strangers visitors through a series of progressive areas in privacy, make them feel that they are going to a very special place. The existence of this gradient contributes in finding a transitional areas of semi-public and semi-private spaces, which operate as filters from which to observe strangers, get to know them, and stand in their way if they try to do any anti-environment activities.

A.3. Movement Network

Streets and lanes are considered essential elements in the restructuring of the urban fabric. It is like the arteries that connect between the center and the parties, and we noticed that the streets and lanes in the study area are diversified and consistent with the movement of passers-density in terms of the extension in length and the vastness in width. On the contrary, short and narrow so affected by the job and the degree of specificity of each street and corridor.

A.4. The Main Streets

The main streets are the essential elements and a means of communication between the inside and outside of the study area. They are linking neighboring areas with the main units such as doorways and Rahbat and the market and the mosque. The main streets are characterized by being a public space for the whole population with relatively large dimensions due to the intensity of the movement in it to the presence of some shops. The main streets branches off to corridors, and the most important role is limited to linking between the main streets and closed alleys that why the breadth is less than the first.

Arcade: the branch off from the main streets with low activity and less general and less wide than the previous one which sometimes roofed to provide shade. It rests and protects the walls of houses from the sun's rays, and ensures road linking between the main streets and the closed alleys.

Closed corridors: It is suitable for the population that overlooks at these routes which is closed with residential units distributed in its end and in the edges. The closed corridors are located in the heart of the residential areas separating a wide range of compact houses, and characterized by being of the most private streets with small dimensions and low refractive and aliasing.

For reducing pollution from construction operations, all their operations were dependent on traditional methods, using local building materials, so as not to affect their surroundings and do not result in a material adverse effect on the natural environment e.g. clay, gypsum and wood.

A.5. Reliance on the Previous Buildings as a Reference for Building

We noticed that in the urban fabric, some practices are accepted by the population which are belonging mainly to the respect of the neighborhood, and this is reflected on the building frame where it is considered as the current configuration and reconstruction tools. The most important of these practices are:

• Do not cover the sun and wind on neighbor.
• Do not direct the gutter to pour on the roof or courtyard of a neighbor.
• Do not open a windows facing neighbors window.
• Do not open the doors facing the doors of neighbor.

B. Energy Efficiency

B.1. Use of Renewable Energies

The completion of buildings in El Oued have been taken into account as the effects of the high temperature, where locals tried to adapt to the desert environment using innovative natural energy and engineering solutions made them benefit as much as possible of the natural data. The solar radiation is considered among the most important climatic elements as a direct impact on the built environment in "wad souf" area.

Therefore, the local people considered protection from solar radiation as one of the most important principles in their home building. In order to achieve these principles, it has been relying on traditional compact fabric of buildings to reduce exposure to the sun by reducing the thermal energy leaking into the building and adding the traditional compact fabric of the study area and narrow streets which has reduced direct radiation.

The reflected scattered radiation of the sun due to the convergence of buildings reduces solar radiation on the vertical elements (walls, openings), especially in the summer when the sunlight's path angle is almost vertical. Therefore, some streets were roofed in order to ensure that they are shaded so that it would be a place for the convenience of pedestrians. These streets were marked by their ending side with a relatively large places called squares function as yard which it works to store cold air at night and prevent leaks.

C. The Materials Used and their Sources

C.1. The Use of Sustainable Building Materials with Good Environmental

Man is the son of his environment, the thing that makes him often react with the environment where he lives (urban views reflects that by the used building materials) as each site needs a certain type of building materials to resist the prevailing climatic conditions. In general, the selection and use of building materials in the "wad souf" area requires to be of high heat capacity materials, in order to resist the great heat load imposed by the region. So, locals used building materials available in the local environment which is considered to be good environmental impact (Figure 6). Therefore, stone, gypsum, wood, palm are the most important.

Figure 6. Using natural building materials

C.2. Building Techniques

The use of the dome in El Oued area for several reasons, including:

Economic reasons: they provide locally available gypsum material is a major cause of the spread this type of roofing.

Geometric reasons: the building of the dome in the valley would be an easy process which it does not require complicated techniques or multiple devices and it is needed for building load-bearing walls. Then building a ellipsoidal dome is not required to be hemispherical.

Environmental reasons: it is known that the dome was among architectural solutions especially in desert areas with wind resistant as it prevents rain water gathered, and the hot air inside the building rises to the top of the dome and is replaced by cold air.

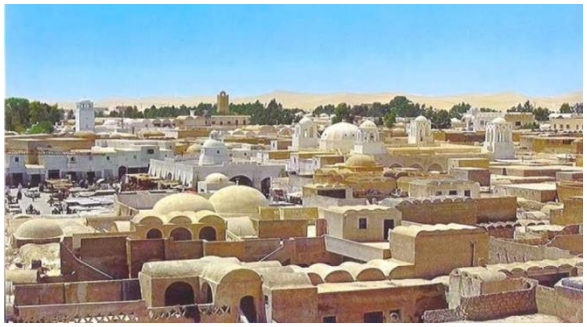

Figure 7. The use of the dome in the local buildings

D. Health and Well-Being

D.1. Ventilation Efficiency and Achieve Thermal Comfort

Local architect thought was based on building a home on the use of the yard (inner courtyard) as a central point to achieve the principle of inward orientation and achieve many of the social and environmental requirements where the yard affects the movement of air, and cold air is stored overnight in the yard vacuum by convection to cool the hot air of the patio so the yard keeps its coolness until late in the day, thereby reducing the thermal stress on the adjacent rooms (Figure 8).

During the day hours the yard is a warehouse of air which is acquired at night. It becomes more like a chimney at higher temperatures after mid-day and forms spaces with high pressure, which cold air is pulled through the windows of narrow and covered streets. In addition to the yard, the roof shape significantly affects on the amount of heat acquisition of ceiling material. Horizontal roofs are more susceptible to the sun while the ceilings in most of the buildings. The "wade souf" characterized as having a dome ceilings, which this kind of roofing is characterized by its work like a convex mirror divisive rays and helps distracting heat influence on the roofs of buildings. Therefore, the shape of the dome reduces the vertical solar radiation, and also decreases the effect of the sun's heat. The circular surface makes some of its sides shaded by following less sun-exposed area, so it is characterized by preventing rainwater collects and leakage.

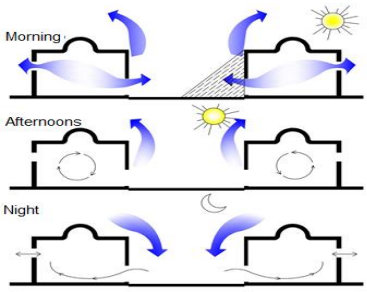

Figure 8. Ventilation efficiency [10]

The walls of the buildings are characterized by width thickness that the ranges are between 25 to 30 cm. This feature has helped to provide a suitable thermal isolation due to the use of gypsum as a building material and the latter provides a time lag that is estimated at 10 hours. The white color reflects the sun's rays effectively, which reduces the thermal loads on the building (Figure 9).

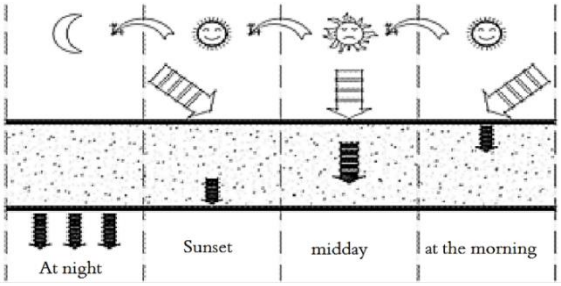

Figure 9. Take advantage of the thickness of the walls to achieve thermal comfort [11]

D.2. Provide Natural Lighting

Buildings in El Oued relied on the sun as their primary source of natural light which on this basis the production premises of fit and local conditions. The size and height of the window allows the passage of light which is proportional to the inner emptiness without damage. In addition to the yard (inner courtyard), it is one of the most important solutions for natural lighting.

VIII. CONCLUSIONS

The local environment and utilization of available resources in the surrounding environment creates architecture and provides convenience for residents to maintain natural resources based on the mentioned analysis for designing and planning of the principles of traditional architecture.

Traditional architectures give us the examples of how principles are simple, and they still carry out the reservoirs authority for the time being as it was hundreds of years ago where these principles stand to confront modern building methods that did not prove to be more validity than traditional solutions.

Contemporary architecture faces many challenges to prove that it is able to accommodate the requirements of sustainable development and preservation of the environment. So, the contemporary architecture must re-explore the principles of traditional architecture and choose what is appropriate for the local environment. The environmental properties effect to develop and mix these principles with modern techniques and use them in our contemporary architecture at the present time and the future. It is declared that, the modern technologies can make the use of the principles of traditional architecture which are easier to achieve the principles of sustainable architecture.

REFERENCES

[1] The Economic and Social Council CNES, "The Preliminary Draft on Sustainable Development", 13th session, May 1999.
[2] O. Attmann, "Green Architecture Advanced Technologies and Materials", Mc Graw Hill, 2009.
[3] International Union for the Conservation of Nature and Natural Resources (IUCN), "Caring for the Earth", Gland, Switzerland, 1991.
[4] R. Goodland, G. Ledoc, "Neoclassical Economics and Principles of Sustainable Development", Ecological Modeling, Vol. 38, 1987.
[5] A. Mohamed, N. Abu Warda, A. Mohaisen, "Sustainable Urban Design Principles in Low Cost Housing", The Islamic University Journal, Series of Natural Studies and Engineering, Vol. 19, No. 1, pp. 1726-6807, 2001.
[6] http://www.usgbc.org/leed, Dec. 2015.
[7] S. Barlow, "Guide to BREEAM", RIBA Publishing, 31 Dec. 2011.
[8] www.ibec.or.jp/CASBEE/english, 2015.
[9] http://www.lib.utexas.edu.
[10] M. Mohiuddin, "Environmental Architecture", Gabes, Beirut, Lebanon, p. 15, 1999.
[11] M.A. Ahmed Issawi, "The Economics of Environmental Design", Ph.D. Thesis in Environmental Planning and Design, Department of architecture, Faculty of Engineering, Cairo University, Egypt, p. 30, 2007.

BIOGRAPHIES

Housseyn Sadd Drissi was born in M'sila, Algeria, 1991. He received the B.Sc. and M.Sc. degrees in the field of Urban Management from University of M'sila, Algeria and preparing his Ph.D. degree in the field of Management of Urban Technologies with specialization in Cities and Environment at University of Larbi Ben M'hidi Oum El Bouaghi, Algeria. His research activities are in urban sustainability, cities and the environment, architectural heritage and desert cities.

Adad Med Cherif received the MPhil (Master of Philosophy) in architecture from Sheffield School of Architecture, England in 1987 and also from University of M'sila, Algeria and the Ph.D. degree in Architecture from University of Constantine, Algeria in 2005. At present he is a Professor in Architecture and Dean of the Faculty of Earth Sciences and Architecture at University Larbi Ben M'hidi Oum El Bouaghi, Algeria. His research activities are desert cities, architectural heritage, habitat and urban sustainability.