

The Art of Vegetation in the Urban Spaces in Sahara

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Abstract-The know-how that old frameworks conjugate in the Algerian Sahara seems to fade over time. The urbanization process has shaped cities, merely to transpose the models of the north of the country, without taking into account the austere climatic conditions of the region. As a result, space professionals seem more concerned by thermal comfort, specifically in outdoor public spaces which are deserted during the hot periods. This is the case of “the square of camels” in Bechar city: legendary space, long elected place of the urbanity by excellence, today at the risk of expiration, mainly because of the sunlight and excessive heat. Then perpetuate the use of this space of relaxation, essential to the environment in which persons live, needs to ensure the bioclimatic comfort. Hence the need to render the nature (a means used by the ancients, to ensure a microclimate in vernacular establishments), that is able to make the public place, appropriate to usages in terms of health, comfort and configuration of the space for a renewed pleasure to live there.

Therefore, this paper attaches to demonstrate the importance of the nature place of, Sahara city and, more particularly, that of the plant as a determinant in the assessment of “the place of camels” in Bechar city.

Keywords- *Urban Space; Sahara; Sunlight; Plant; Sustainability*

I. INTRODUCTION

Yet located in a hot and arid context, the ksour (vernacular settlements in the Algerian Sahara) including that of Bechar, realize, unlike the current town of appropriate public spaces in a notorious way, at any time of the day, whatever the season of year. This achievement was aided by simple and ingenious gestures that describe how ancient societies integrated their establishments in this difficult environment, and to the harsh climate of the Sahara. They have proliferated for centuries, what is sought today, especially in urban public places: “thermal comfort”. Otherwise these places are often deserted.

A. A Presence Despite the Austerity

The regional group said *Saoura* in South West of the Algerian Sahara, is narrowed by the dune1 appearance, sometimes alluvial soils; at times it is shrouded by Hamada² and reg³, with here and elsewhere, sporadic plants. Adapted to the harsh climate and drought, the latter is qualified by E.F. Gauthier of “heroic plants” [1].

It is “beyond the chain of the Saharan atlas (which straddles the Moroccan border), leaving the djebel Amour...” that a “rocky shelf, announces the texture of the topography of the region of South - Western. After complex and raised texture consisting of djebel Bechar, real wall separating the steppe of the Sahara begins the Hamada. [2]”.

The arrangement of these arduous physical parameters to the harsh climate symptomatic of the region, defines this ground receptacle of our investigation “Bechar” town. Marc Côte (1998) said: “this is a unique category, referring firstly to the arid climate, on the other hand to the landlocked within empty expanses [3]”. Notwithstanding these constraints, sites and establishments are erected. It is in relation to these physical characteristics, life forms combine and adapt “The danger of thirst, always present in mind, developed in the Sahara knowledge of hydraulic engineers and drillers. It is imagined that the Sahara is abandoned to itself, wells would be badly required, their very small number compared to the possibilities of the country, any European intervention could expand the list and increase throughput. This is a free contempt of the native. The only aspect of the wells denies this legend... [1]”.

B. The Know-How in Ancient Tissues

Thermal comfort is increasingly sought, but by querying the past, you realize that, the urban and architectural forms yesteryear, solving climate constraints by:

- A choice of site enables the protection of “adverse conditions will be to choose the place in an area where air is pure and good [4]”. See Fig. 1.
- The absolute presence of water (Wadi) and the natural element (Palm), which create a microclimate.

Configuring compact and dense fabric minimizes exposure of surfaces and spaces in the Sun. See Fig. 2.

¹Which geographers call Western ERG. It delimits to the East, the Valley of the Saoura.

²It's fairly compact limestone, of immeasurable importance trays, and which are interrupted from time to time by some wadis.

³It's a sterile and stony land.

Built, forms a relief-backed to protect from the cold winds of winter and summer sun. See Fig. 3.

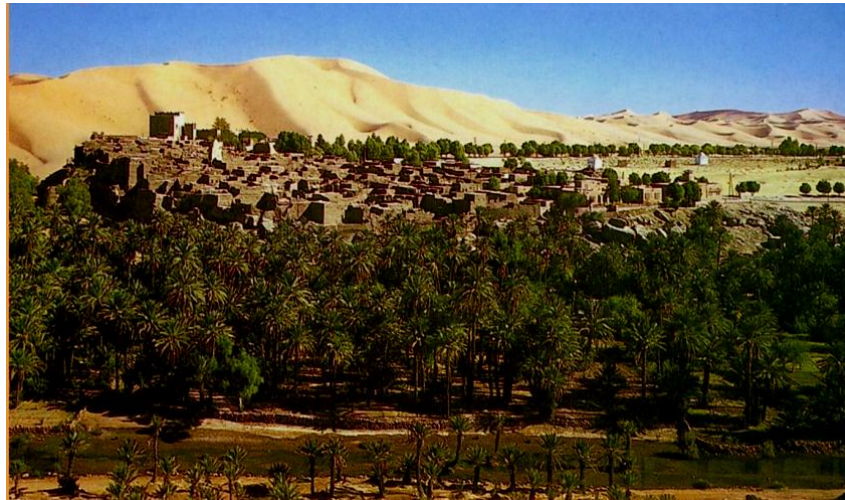


Fig. 1 The relevance of the choice of site in ancient tissues. Ksar of Taghit / Bechar

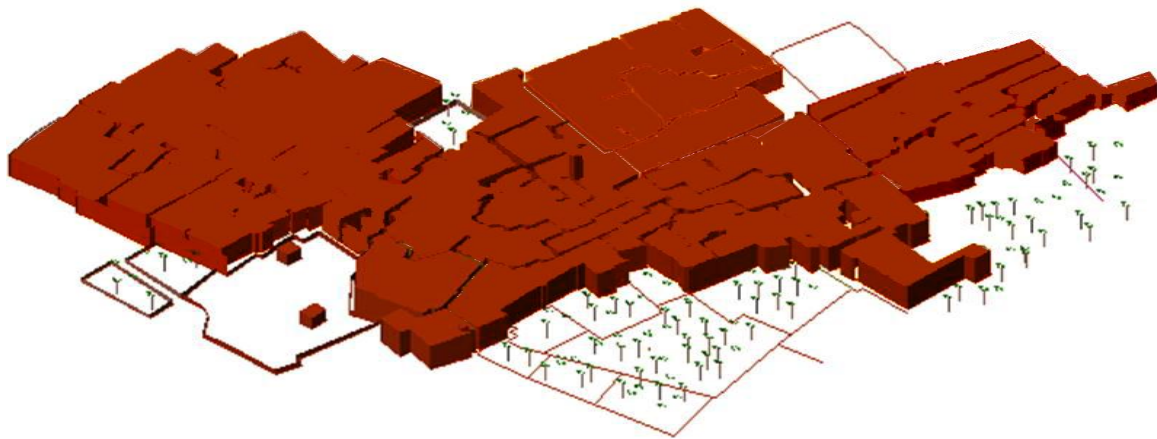


Fig. 2 Compactness and density of traditional fabric, example of the ksar of Kénadsa/Bechar



Fig. 3 Implementation of the Ksar of Taghit justified by the quest for security Source: Denis GRANDET

Streets cramped winding and covered, as long as they were, the shading was any portion provided. “In this region, the climate conditions do not favor discovered streets, which have been replaced by covered alleys, supporting the floor houses [5]”. Frequently, protected walled terraces, these streets protect from the hostility of the climate, people browsing them in black, alternated skylight. See Fig. 4.



Fig. 4 Shadow effect at the level of the alleys, of the vernacular establishment, result of a narrow and twisty configuration. Example: Kenadsa' ks ar

- Set of volumes of the built masses, alternating light and dark in public outside spaces, See Fig. 5. “Terraces offered the vision of a checkerboard of light and shadow, on the walkways. [5]”.
- Knowledge of local materials “in toub tint dark and hot [6]”, of an excellent thermal insulation, see Fig. 6.
- The relevant role played by the palm groves can't be omitted “an island in the sea of Palm trees [5]”, as Fig. 7. To moderate, filter, regenerate and refresh the air. They provided a subtle filtering of climatic factors. Thus the hardness of the climate is mitigated.



Fig. 5 Set of volumes in Kenadsaksar, today in ruins



Fig. 6 Representative photographs of local materials, brick Earth flood/Kenadsa ksar



Fig. 7 Beni Abbès Ksar Source: Denis GRANDET

II. THE KNOW-HOW OF THE ANTIQUITY, ENDANGERED

Since changes of the 20th century have ample questioned the former balance between man and his environment, “may be reluctant to recognize cities in the Sahara, both rural and urban characters are intimately involved [7]”. “In a sense, the Sahara is also a ‘city’ fully integrated to the dynamics of today’s world [8]”. This movement, source of a micro-urbanization, produced cities, between oasis spaces: the ksar and the Palm Grove, and paradoxical urbanization on the shore.

The new constructions, moreover, establish a new order, which goes against that legacy. “Arab-Islamic cities have experienced changes, sum all similar to those of European cities: morphological changes, adaptation to the demands of the modern world that resulted in a marginalization of the historical nucleus, disproportionate extensions ... [9]”. The new spatial production transposes integral models in the North of the country, or even in the Western world, regardless even of the cultural and climate context. Indeed, long, in this Europeanized production, the external environment was considered a zone of passage, to go elsewhere. Being so commonplace in a simple space of transit, often the exterior space is abandoned, at the discretion of the care taken in interior spaces. Yet, the community consumes much of his time outside the home, and this is that she realizes the impact of climate of this context.

The contact with the external environment, extroverts extensions for accommodation, meeting places, cannot really satisfy the requirements of users, who are still linked to the comfort that provides space only if they are maintained. If all factors related to thermal equilibrium are gathered, the conquest of urban outdoor space by urban dwellers (pedestrian streets, public spaces...), materializes.

III. THE QUEST FOR COMFORT

A. Climate Considerations in the Context of Study

If it does not take into account the climate, or the commotion that nature boasts in the Sahara, it will miss the very foundations of the chores, as it has been argued by Godard (1954) [10] and R. Lopez (1964) [11]. It would be specifically illusory, to not speak of climate science relating to the town of Bechar (background to the study), located in the corresponding box to the climate very dry, hot and arid (the Sahara is a hot country, where there is a severe cold).

The period of intense heat in the town of Bechar, covers the period of June till September, ranging between 35 °C and 45 °C. Temperatures are continental, that said: very cold in winter and hot in the summer, what makes only two distinct seasons (Table 1).

TABLE 1 METEOROLOGY DATA/ BECHAR TOWN

	T max (°C)	T min(°C)	T average	Pluviometer mm	speed of the wind m/s	Humidity
January	16	4	10	9	2.5	46
February	19	7	13	7	3.1	40
March	22	10	16	8	3.6	29
April	26	14	20	8	4.6	29
May	29	18	24	5	5.2	26
June	36	23	30	4	4.5	19
July	40	27	34	1	4.2	14
August	39	26	33	2	3.9	17
September	34	22	28	6	3.2	26
October	27	16	21	9	2.4	33
November	21	9	15	13	2.4	43
December	17	5	11	8	2.4	46

The winds are very important in the definition of the climate of the region, since they can both generate rains and cause heat to dry out the soil and vegetation. Those prevailing, evolve Northern (summer and fall) and Southwest (in the spring). Winds of sand occur in as many days, in March and August. Rainfall, the rainy phase times are quite short and persist from November to March. The average rainfall is seen between 100 and 150 mm/year, with by strong irregularities from one year to another and in the same year (URBAT, Bechar).

If in such a context, extreme temperatures can cause bothersome and sometimes fatal effects to men, are provided instead thermal comfort to ensure the occupation and the use of frames and/or free spaces. "Comfort is a subjective sensation that in itself does not exist; it is only by discomfort that it can be appreciated [12]". The urban environment is therefore looking for trees or Palm (symbol of life in the desert) to supply wedges of shadow and retain moisture.

B. Testimony of the PLACE of Camels: Object of Study

A questionnaire has been developed for this research, based on closed, be replenishing many studies mainly questions: [13]. The purpose of this questionnaire, developed with citizen is to understand the reason for avoidance of the place of camels. By way of analyzing the information collected, it did use the software Statistica (Version 5). It appears as follows:

1) Frequency of Attendance at the Place

The highest rates of this graph correspond to a regular attendance of the place, mostly at more than once a day. It's justified by the position of this place in the heart of the city, which configures a forced passage. See Fig. 8.

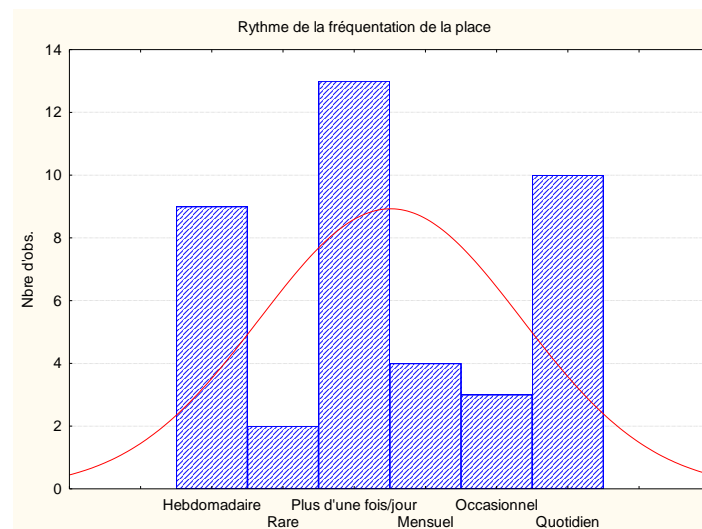


Fig. 8 Representative graph of the rate of attendance at the place

2) Temporality in Attendance

Even if the presence of people is common in these places, it is important at particular times of the day. It's the morning and the afternoon (after hours) so to avoid sunstroke. See Fig. 9.

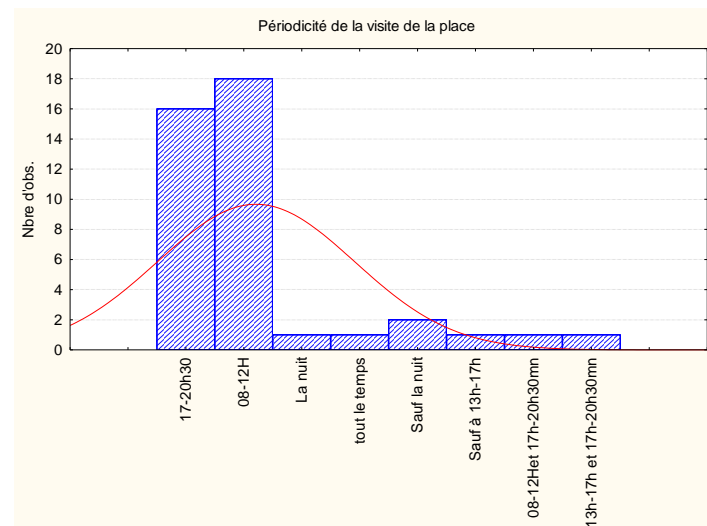


Fig. 9 Moments of attendance of the square graph

3) Duration of the Delay in the Place

This graph shows that individuals did not long remain in the place. There also because that weather conditions do not permit, there are few who remain one hour of time in the place. See Fig. 10.

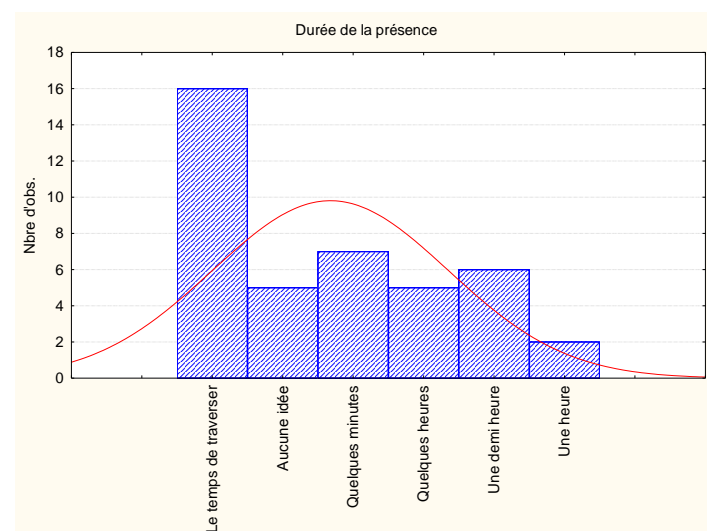


Fig. 10 Representative graph of the length of attendance at the place

4) Reasons for Attendance of the Place

This graph confirms that people in whole pass through this space, fleeing from excessive heat. That the transit is praised, for the employment in the surrounding buildings, or the completion of purchases in the vicinity, or simply for the passage in itself; it takes precedence over the other reasons, which have a very low rate for relaxation. See Fig. 11.

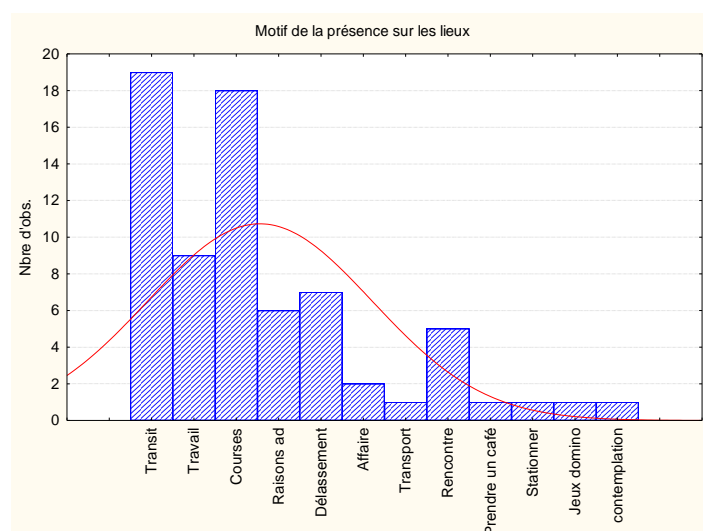


Fig. 11 Representative graph of the roles of the square

5) Perception of Thermal Comfort

92.86% of people claim to experience discomfort in 'the place of camels'. If the 7.14% think that square is thermally comfortable, it is that they attend to the night. See Fig. 12.

The lack of urban comfort in this public space is due to certain parameters, which influence directly the urban climates.

- Increase in the temperature;
- Strong built density;
- Extent of reflective surface;
- The presence of corridors of wind, created by the streets;
- Insufficiency of vegetation and water levels;
- Intense road traffics around the place causing the emission of gases for purpose of greenhouse;
- The use of the concrete reinforced in the construction industry;
- The cover of the roadways made of asphalt.

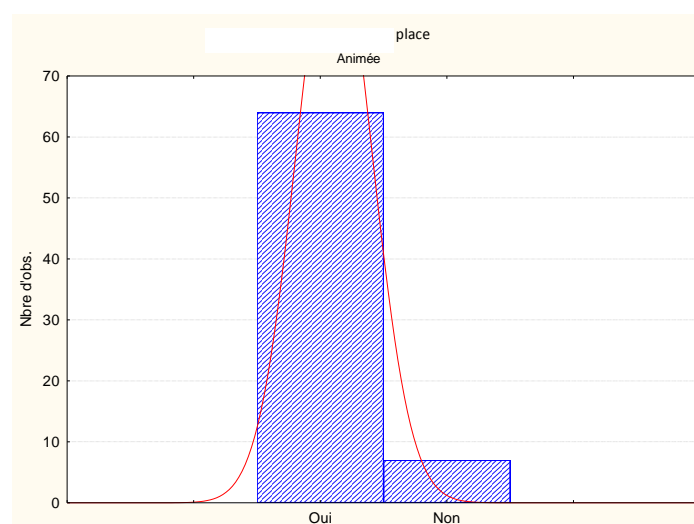


Fig. 12 The perception of thermal comfort in the square

Thus, the climatologically conditions of this Saharan city, while influencing the thermal feeling have consequences on the shape of life and its inhabitants [14], specifically, on the appropriation and the use of open public spaces. From where, need for calling upon the parks, since they influence the life of the men. They have alleviating virtues, improve quality of the framework of life, have an interest ecological and/or landscape, bring the shade and freshness the summer, renew oxygen in air, etc... Indeed, a study made by Bernatzky with Frankfurt (Germany) showed that an urban public garden cause a drop in the temperature of the air of 3 with 3.5 °C and increases the humidity relating of the air by 5 to 10%, ventilates the polluted air and creates fresh air on the level of the centre town.

IV. THE PROGRESS OF THE ROLE OF THE PLANT IN PUBLIC SPACES

In the 1930s, parks, squares and boulevards planted with ornamental trees were public compelling equipment to the beautification of the city. The 1950s have focused instead on social concerns: the city is surrounded by a green belt to contain urban sprawl, and then several databases hobbies are responding to the needs of entertainment and recreation. Towards the 1980s, it is the notion of the landscape that takes precedence over other values. Emphasis is given in this era, to the improvement of the quality and the living environment, green areas are now elected to offer a landscape quality. The 1990s take another twist, from which emerge ecological concerns, including degradation of biodiversity and depletion of the natural heritage. But since 2000, sustainable development has become a key concept that takes into account all previous concerns [15] (See photos in Fig. 13). If these considerations are universal, what would it say so about the contexts whose environment is vulnerable because of sunshine and blazing heat?



Fig. 13 Examples of the progress of the role of the plant in public spaces

V. IF THE PLANT PROVIDED A BETTER QUALITY OF LIFE IN PUBLIC PLACES IN THE SAHARA

If once the green areas (palm groves) are protected from the Sun, control the winds, and purified the air of its sand, cannot say the same for actual cities where firstly vegetation has become blurred and other hand available exploded buildings maximizes walls and outdoor spaces to radiation exposure. What explains the discomfort felt by the population who attends 'the place of camels'. The regulars find it virtually unworkable, during periods of intense heat, which extend over a long period of the year. According to bioclimatic comfort, it is to adopt a set of "principles of architectural design to use the favorable climate, architecture itself, to the satisfaction of the requirements of sunshine and visual comfort" [16]. Adaptation of urban design to climate, for its part must be reflected previously, taking into account the constraints specific to this arid environment, of course incorporating the natural elements in situ "Indeed, it remains that the variety, and even the quality of this landscape remain dependent on those ecosystems (including urban) that underlie." [17].

VI. CONCLUSION

Despite the extent of the omnipotent and supreme aridity, life on this land never ceased to continue. Let's say that in this space to infinities of empty landscapes in the arid space balance, societies struggling for survival, are effected Lords in salami slicing of the Saharan oasis reliefs; in giving exceptionalities both architecturally and hydraulic.

Despite the asceticism of the climate and these changes, the settlement to the Sahara was not, ousted. Instead, in social practice urban spaces of the ksour, lighting and sunlight deeply mark urban spaces, and give them specific environments. If

these components characterize public spaces, it cannot say the same of the present city, where the public square “place camels” a specimen in the Saharan environment can be attended throughout the day due to sunlight and excessive heat, supported by the almost total absence of shade, vegetation, but also because of the distended prospects. Consequently, the practice of this place in particular is altered and corrupted at the discretion of the heat and excessive glare, instead it is deserted.

This is how setting climate, in relation to the comfort and well-being of users, is source of annoyance or consent in the conformation of public spaces, affecting appropriation.

However, the design of public spaces is supposed to improve the adverse conditions and to facilitate the adaptation of the man to the external ambient conditions. It must thus introduce urgently, the tree in the design of public spaces in order to reduce the urban small island of heat, and to promote a microclimate in these places of meeting and sociability.

Their quality lies out of microclimatic matter and in the choice of urban furniture so that public space is comfortable and especially practicable in summer. In summer especially, it is necessary to reduce the risks of heating of mineral surfaces had with the solar radiation by ensuring the shade on the ground or on the walls and of humidification of the air. That can be done with trees of alignments or plants climbing which play the thermal function of envelope. However and for needs for ventilation the vegetable mass should not constitute an opaque screen with the air flow 80% of the effects of cooling in the sites are caused by the shade of the trees of alignment [18]. In addition, a certain number of texts must govern the safeguarding of vegetal spaces. Particular regulations architecture landscapes, must institute public spaces, especially in this difficult context.

Thus, the art of vegetation is able to provide a quality of life in public places in the Sahara. However, a good knowledge of the urban plant and its use enriches the panoply by tools of decision-making aid for the microclimatic control in practice of urban public space.

The common desert plants include:

- Cypress
- Olive
- Acacia
- Artemisia
- Palm
- Oleander
- Date palm
- Thyme

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