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The impact of urban fabric on the detailed climate difference in the city of Ramadi for the year 2020-2021

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ABSTRACT

The microclimate patterns of the urban fabric in the city of Ramadi have varied according to its morphological stages, as it is characterized by its harsh hot and dry climate due to its location within the dry semi-desert areas. Creating a comfortable local climate through the design of organic cities, so the emergence of ancient cities with a compact mass fabric came in response to the hot, dry climatic conditions in summer.

While contemporary came with weaving stage networking scheme which was characterized by openness towards Western designs, which exacerbated the negative impact of the harsh climate in the city.

The research aims to clarify the urban planning stages of the city of Ramadi and reveal the planning reality of the organic housing stores with a compact fabric represented by the neighborhood (Al-Aziziyah and Al-Qattaneh) and the network shops with the planned fabric represented by the neighborhood (Andalusia, Al-Muoalemeen , A-Dubaat, Al-Malaeb, Al-Taamim and 5 kilos) and its impact on the formation of a micro-local climate that varies between its stores Organic housing compared to planned.

The study used local climatic observations to measure the temperature, relative humidity, and wind speed during the day and night for the summer, winter and year 2020-2021 in order to know the positive impact of the organic locality from creating a comfortable micro-climate, and the negative impact of the planned stores on its local climate, which is characterized by the formation of an uncomfortable microclimate.

The study reached the most important results, as the organic locality with a compact mass fabric recorded a decrease in the maximum temperature of the planned sites with mesh fabric at a rate of (4.0) m in summer, with an increase in relative humidity by about (2.7 %) with a lower wind speed of about (0.5 m) Second, during the winter, the organic stores recorded a limited increase in temperatures compared to the planned stores by about (3.5) m compared to the planned neighborhoods with a limited decrease in relative humidity while it reached about (3.7%), and with a lower wind speed also by (5, 0) m/s, for the planned neighborhoods, which allowed the organic locality to maintain relative humidity more than the planned neighborhood, which is characterized by a higher wind speed, which in turn transfers moisture to other neighboring areas, and this is what made the organic locality characterized by a detailed climate more comfortable than the planned network shops Thus, it will lead to

the achievement of the climate efficiency of the organic stores.

As the study reached the adoption of appropriate planning indicators for the city's climate when expanding in the future, whether when directing its streets and establishing a housing unit in a north-northeast manner towards south-southwest at an angle (30) from the geographical north line.

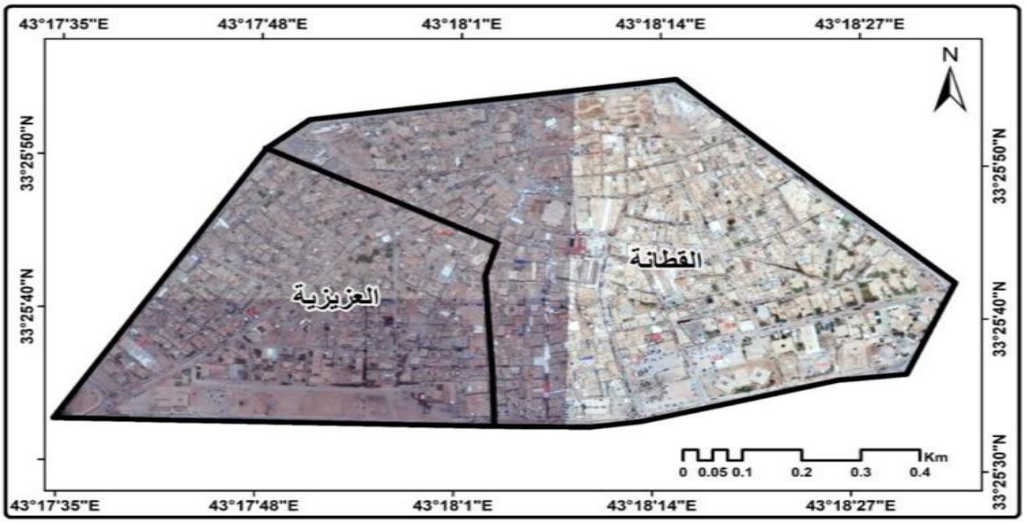
INTRODUCTION

The urban patterns throughout the ages were part of a reflection of the climatic environment that prevails in the place, in which the environment helped guide humans when building a dwelling to provide protection from the prevailing climatic conditions.

In our current era, it is distinguished by simulating modern techniques of construction methods and urban planning, which did not take into account the nature of the local city's climate and the old urban patterns with compact mass fabric and small twisting alleys that are commensurate with the harsh climatic conditions of a hot and dry character. The urban architecture, which negatively affected the image of the city with its traditional urban style, as urban planning is considered one of the organizing arts of the city, so the old architectural style systems add to the urban fabric nice climatic adjustments that approach the comfort indicators of the human being, whether inside housing or in his field of work in the same neighborhood, unlike the textile The planned urban grid, which man has suffered from added climatic problems due to air-conditioning, land uses for transportation, wide street systems, and large open squares.

The research study will be applied to six residential shops in the city of Ramadi that differ in their urban fabric between the old shops with a compact organic fabric such as Al-Aziziyah and Al-Qattanah, and compared to the modern shops with a network of striped fabric, such as the shops of Al-Andalus neighborhood, Al-Muoalemeen, A-Dubaat, Al-Malaeb and Al-Taamim and 5 kilos Map (1) and satellite images (4,3,2,1,5,6).

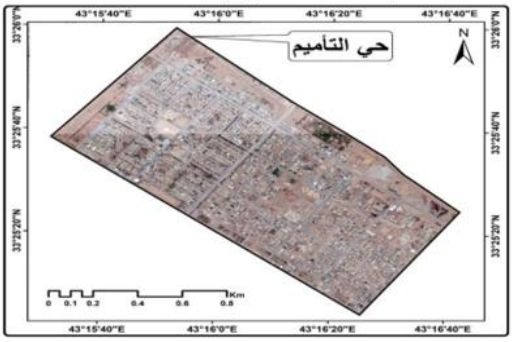
Satellite image (1) Al-Aziziyah and Al-Qattaneh Neighborhoods



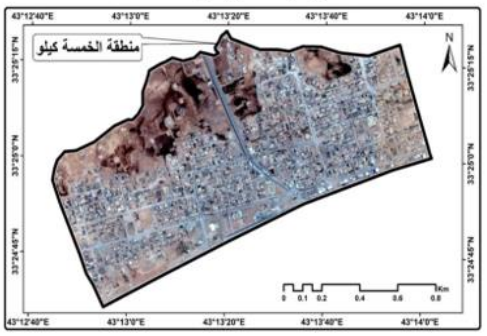
(Satellite photos (2) Al-Andalus and Al-Muoalemeen neighborhoods.

Satellite image (3) A-Dubaat neighborhood (Mohammed Mazloum

Satellite image (4) Al-Tamim locality



Satellite image (5) locality (5) km



Source: Satellite Image of the study area, Ikonos satellite, 6.0 meters accuracy, SID extension, for the year 2017.

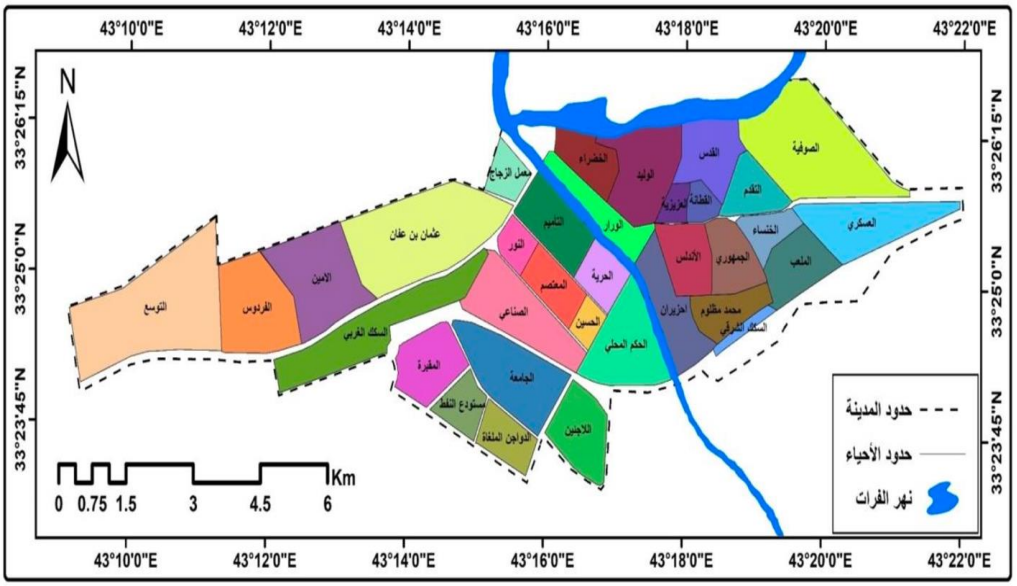
City location:

The site is important to geographers because it means the study of natural phenomena such as the geological structure, surface features, climate and water sources for the area surrounding the city.

The city of Ramadi is located on the right bank of the Euphrates River in the southeastern part of Anbar Governorate, located astronomically between latitudes (33.23) and (33.26) north and longitudes (43.10)° and (43.22)° East, Map (1).

Among the characteristics of the city's geographical location is that it mediates between water surfaces, as the Euphrates River extends to its north, Lake Habbaniyah to its south, and Nazim al-Warar River to the west, while its agricultural back extends to its east and far north, while its desert range extends to its west and southwest.

Map (1)
Al-Ramadi neighborhoods



Source: Anbar Municipality Directorate, the basic design map of the city of Ramadi 2018, Organization Department, cities scale (1: 25,000) based on a program. Arc Map 10.4.1.

Morphological stages of establishment of Ramadi city:

The morphology of urban cities is linked to urban aspects represented in the city's plan, the style of its buildings and their heights, since man enters into their planning and design, represented by the city's location and its natural characteristics.

1- The city planning and development stages can be divided into three basic stages:

1-1- The first phase: The traditional city (before 1940):

This stage is considered the stage of establishment and emergence of the city, as its origin dates back to the beginning of the second half of the nineteenth century, when the Ottoman governor (Medhat Pasha) ordered in 1869 AD, the construction of a fortress near Tel Al-Ramad for the purpose of protecting the land road linking Baghdad and the Levant, if the place of origin of the city Al-Ramadi is on a terrain elevation at 51 meters above sea level. The reason for choosing this location is to ward off the dangers of floods on the city, because its origin was on the shoulders of the Euphrates River, and its area was (21.6) hectares. (1, p. 426)

The urban fabric of the city at this stage is distinguished by two characteristics: the compact building block, and narrow external spaces. The building block of the housing units is connected on three sides and with each other and is open from the middle (the courtyard) and the windows of the rooms overlook this open courtyard, as for the external spaces represented by streets and alleys The crooked narrow, some of them are closed, and the squares are small in area, in addition to this, the quality of the building materials used is characterized by good heat gain and loss, and this had a great effect in

creating a comfortable local climate. (2, p. 487)

1-2- The second phase: 1941-1965:

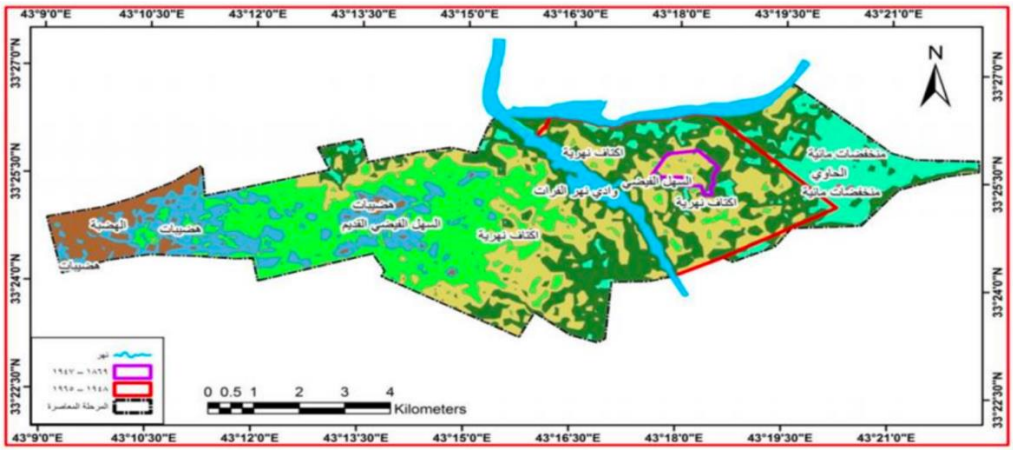
This stage was characterized as a transitional stage between the traditional oriental architectural fabric and the new urban fabric with the growth of the city to enter new variables that affected the architectural fabric, making it different from its traditional architectural fabric for the first stage, by increasing its population and opening new transportation routes linking the city between Baghdad and Damascus, and with the multi-use of the land, increasing human activities and distributing New lands and with the emergence of new building materials, this led to the emergence of new designs for the construction of housing units and the planning of streets for shops and roads, part of which mimics the western designs and its distance from the traditional oriental architectural style, and the other relates to the house design map similar to the old housing map. The city of (329 hectares), housing shops, company houses, and some glass factory houses represented this transitional phase. (3, p. 487)

1-3- The third phase : After 1964:

This stage was characterized by a western architectural character, as the housing units of the shops came with spacious street patterns, with dimensions exceeding 12 meters, and with a grid system perpendicular to the housing units with many spaces, some of which represented public gardens and others with public service functions. Gray areas of them for this modern style of urban fabric.

The area of the city reached about (2758) hectares, and the residential functionality occupied (43.33%) of the area of Ramadi. (4) The map (2) shows us the morphological stages of the city of Ramadi based on the 10.4.1 ARC G.I.

Map (2) The growth of the city through historical stages



Source: The original design of Ramadi City, 2012, based on 10.4.1 ARC G.I.S.

2- Field measurements, instrumentation, and time of observations:

The objective of this on-site study and climatic observations is to show the climatic conditions of some residential neighborhoods in the city of Ramadi in terms of

(temperature, relative humidity, and wind speed) in the outer spaces of residential neighborhoods as follows:

1- The dual-electronic thermohigraph was placed in a white wooden box (Stevenson cage) as shown in the picture (1) to measure temperatures and relative humidity. It represents the average person's perception of climate elements during movement and movement in urban public spaces.

2- Using the manual automatic anemometer to measure wind speed, and the device was placed at a height of (2) meters, in the northwest - southeast direction, because the prevailing winds in the study area are northwest at a rate of (21.7%) of the total wind frequency over City.

3- Meteorological observations were taken to record the maximum temperature, minimum relative humidity and wind speed during the day in the summer after two o'clock in the afternoon, according to the local time of the city of Ramadi.

4- Meteorological observations were taken to record the minimum temperature, maximum relative humidity, and wind speed for the summer after four o'clock in the morning before sunrise, according to the local time of the city of Ramadi.

5- Meteorological observations were taken on selected days between (10-20) of each month, taking into account the weather conditions such as the clearness of the sky and the speed of the normal winds and in areas far from the surrounding influences. The measurements are represented in the main tables (1,3,2) for the study.

Picture (1) shows the on-site monitoring

Source: Field Study.

3- An overview of a comparison between organic and planned neighborhoods:

Through the satellite image (1), it is clear that the old city with a compact mass fabric represented by the neighborhood of (Al-Aziziyah and Al-Qattaneh) within the first morphological stage. The external, as well as the natural extension of the streets and twisted alleys, the public street leading to these alleys is through the entrance or points of connection between the public street and the alleys of the city, thus the compact urban fabric provided us with a comfortable localized climate commensurate with the hot and

dry desert climate, which is to reduce the amount of solar radiation reaching Where the height of the buildings is twice the width of the street, which provides a large proportion of shade, and the buildings are closed from the outside and open from the inside, in addition to the use of traditional building materials represented by stone, plaster and wood, which reduced their thermal gain, and the narrow and meandering of the street, which affected the speed of wind movement and reduced its effectiveness in Dust and dirt transfer.

While observing the satellite image (2) that shows the modern city with the planned grid fabric represented by the neighborhood of (Andalus and Al- Muoalemeen), which is similar to the rest of the neighborhoods of the modern study area in its planning and design within the second and third contemporary morphological stages of the city, which embodies in its planning the open grid system with straight and wide streets With the divisions of housing units in the form of cubes, in addition to the use of modern building materials such as bricks, cement and iron, and thus the urban mesh fabric provided an uncomfortable localized climate that was not commensurate with the hot, dry desert climate, which affected the receipt of a large amount of solar radiation and the openness of buildings from the outside and their closure from The interior as well as the materials used in the construction, which raised the percentage of heat gain for it, and the straightness, length and width of the streets, which made it a theater for high winds and an increase in dusty and dusty wind activities.

4- Spatial Distribution of Climate Elements for Ramadi City:

All the climatic elements of the city of Ramadi are affected by the changes in the morphology of the land, the uses built on it, the building materials used, the height and lowness of buildings and their connection with the urban fabric of the residential neighborhoods of the city, in addition to this, the variation of population density, land uses and traffic density, which helped to form microclimatic patterns to give the detailed character of the city's climate within its prevailing local climate.

Table (1) Averages of maximum and minimum temperatures for the organic and planned stores for the summer and winter observations

summer observation						
Fabric type	organic tissue		striped fabric			
Residential district	Azizia	Qattanah	Andalus	almuealimin	altaamim	(5) km
Maximum temperature (C)	42.0	42.1	46.6	46.4	46.0	46.2
Minimum temperature (C)	28.0	28.1	28.2	27.8	27.3	28.1
winter observation						
Residential district	Azizia	Qattanah	Andalus	almuealimin	altaamim	(5) km
Maximum temperature (C)	24.1	24.1	20.0	20.1	20.8	21.3

Minimum temperature (C)	11.5	11.2	11.1	11.3	9.6	9.9

Table (2) Average, maximum and minimum relative humidity for the organic and planned stores for the summer and winter observations

summer observation						
Fabric type	**organic tissue**		**striped fabric**			
Residential district	**Azizia**	**Qattanah**	**Andalus**	**almuealimin**	**altaamim**	**(5) km**
Maximum relative (%) humidity	**36.1**	**36.7**	**37.8**	**39.6**	**40.1**	**37.5**
Minimum relative (%) humidity	**21.9**	**21.8**	**18.0**	**17.9**	**18.5**	**18.6**
winter observation						
Residential district	**Azizia**	**Qattanah**	**Andalus**	**almuealimin**	**altaamim**	**(5) km**
Maximum relative (%) humidity	**68.1**	**68.0**	**60.1**	**56.6**	**70.3**	**68.5**
Minimum relative (%) humidity	**37.2**	**37.1**	**35.7**	**35.1**	**33.4**	**33.1**

Table (3) Average maximum, minimum and normal wind speeds for the organic and planned stores for the summer and winter observations

summer observation						
Fabric type	**organic tissue**		**striped fabric**			
Residential district	**Azizia**	**Qattanah**	**Andalus**	**almuealimin**	**altaamim**	**(5) km**
Max wind speed (m/s)	**1.2**	**1.3**	**2.1**	**1.7**	**2.3**	**2.2**
Minimum wind speed (m/s)	**1.0**	**1.1**	**1.3**	**1.2**	**1.8**	**1.7**
winter observation						
Residential district	**Azizia**	**Qattanah**	**Andalus**	**almuealimin**	**altaamim**	**(5) km**
Max wind speed (m/s)	**1.9**	**1.9**	**2.5**	**2.7**	**2.8**	**2.9**
Minimum wind speed (m/s)	**0.6**	**0.6**	**0.9**	**1.0**	**1.2**	**1.2**

Source: A field study, the researcher relied on field monitoring of climate elements in residential neighborhoods.

Table (1) Averages of maximum and minimum temperatures for organic stores and planned for the two summer and winter observatories

1-4- Temperature in the summer:

According to the results of field monitoring, and according to Table (2), there is a clear variation in the temperature The greatest among the residential areas with a compact urban fabric compared to the planned network, as the temperatures reached in the organic areas of Azazieh and Qattaneh, which arose at the first morphological stage of the city, about (40.2) and (40.2) m, and they are almost close with a general average of about (40.2) m, And for the same reasons related to the planning of the organic neighborhood similar to the compact mass fabric and the narrow twisting streets, while the shops with networked design such as the neighborhoods of Andalusia, Al-Muoalemeen, and the 5 kilo with residential units separated from each other and the streets are nine wide, recorded the highest temperatures by (45.5) and (45.4) (45.4) and a rate of (0.45), respectively. For the grid architectural system planned for the four stores about (45.4) m, at a rate of (4.2) m, while the average factor of the minimum temperatures of the organic stores was about (02.2) ° C, while the average of the factor of the small temperatures of the planned network stores was about (02.2) m with a difference of (2.0) brick, which will lead to the length of the ratio of the degree of the organic stores to the top of the reason for that ground up.

While the planned network fabric, which is characterized by the openness of its urban spaces, is considered from its wide streets and large squares, which in turn facilitates the escape of the largest amount of terrestrial radiation to the atmosphere, while the organic fabric is from its short and narrow twisted alleys, as well as its outer walls of compact mass fabric, retaining part of its acquired heat and not liberating it to the weather.

1- 4- Temperature in winter:

It was found from the results of field monitoring, according to Table (1), in order to know the detailed climate of the city of Ramadi, as it varies from one place to another, with limited differences, as the maximum temperatures in the organic stores reached about (24.1) and (24.1) m, respectively, while the stores recorded planned by about (20.0), (20.1), (20.8) and (21.3) m, as the difference was clear at a rate of (4.0) m, while this difference decreases at dawn, the organic stores were recorded at (11.5) and (11.2) m, respectively, and recorded The planned stores are at about (11.1), (11.3), (9.6) and (9.9) C, respectively, the reason for the convergence of the minimum temperatures between the organic and planned stores and this is due to the organic stores maintaining their temperatures for a long time with high relative humidity compared to the planned stores.

The reason for the difference in maximum temperatures is the farther we move away from the city center or the organic stores outside it, the space will increase between the planned stores from each other and between the houses themselves, as well as the

intensity of land uses in the city center from other commercial and service functions and the density of traffic surrounding it, which results in an increase in the amount of heat energy emitted Including it compared to other stores with a grid architectural style, and this success is calculated for the organic shops as it is warmer in winter than the planned grid shops.

As for the most important areas in which temperatures have decreased, the nationalization area, being located in an open area bordered to the north by the Euphrates River and to the east by the Nazim Al-Warar Canal, as well as the five-kilo area, and with an increase in the proportion of spaces in it with its location in the west of the city and affected first by the western desert plateau, and most importantly it is located directly on the side facing the winds The northwest, which was prevalent at the time of the measurement and its passage over open areas and over the Euphrates River, also made it record the lowest temperatures in winter.

2- 4- Relative humidity in summer:

Table (2) shows that the maximum relative humidity during the summer in organic stores increases in the center of the city from the old district than in the neighboring areas or in the outskirts of the city with a planned network design. 36.1%) and (36.7%) at dawn, while these values in Al-Andalus, Al-Moalemeen, Al-Tamim and Al-Khamsa stores reached about (37.8%), (39.6%), (40.1%) and (37.5%) respectively at dawn. As for the values of the smallest percentage of humidity recorded at At three in the afternoon, it reached about (21.9%) and (21.8%) in the localities of Azizia and Qattaneh, and at about (18.0%), (17.9%), (18.5%) and (18.6%) in the stores of Andalusia, Al-Moalemeen, Al-Tamim and 5 Kilo , and the interpretation of this is related to With the same reasons for the temperature difference between the organic and planned stores, such as the openness of the urban space of the planned stores, which leads to a rise in the temperature of their streets and the outer walls of their homes due to the effect of the high amount of solar radiation during the day and thus will also affect the high amounts of evaporation in them, as well as the material of covering its streets and sidewalks and its percentage increase compared to organic stores, all of this makes the streets of and walls The urban fabric of the housing units maintains high temperatures, which reflects a greater loss of relative humidity, and this is also due to the high temperatures in the city center and the crowding of buildings with low wind speed and the absence of green plants in them, unlike the planned network shops, especially in the northern and western sides of the city at the locality of Tamim and the five kilometer in addition to that Due to the low thermal rates in them compared to the organic shops at limited rates, while the green plantings of the planned grid shops abound, such as indoor gardens in the homes or some parks in their neighborhoods, and there is also another factor represented in the

wind speed, which is a negative action in reducing the relative humidity in the planned grid shops and the result is an increase in its speed compared to In organic stores.

3- 4- Relative humidity in winter:

Table (2) shows that the general average of the maximum relative humidity in the winter season was in the organic locality with a compact mass tissue represented by (Al-Azizia and Qattanah) by about (68.0%), and the general average of the minimum relative humidity was about (37.1%), while the average relative humidity was The maximum in the striped district with the striped grid texture represented by (Andalusia, Al-Moalemeen,, Al-Tamim and 5 Kilo) is about (63.6%) and the average annual minimum relative humidity is about (33.5%).

The contrast of temperatures between the organic neighborhood with a compact mass texture and the striped one with a grid texture, as the high relative humidity values in the center of the city represented by the organic neighborhood are due to the density of buildings and the lack of wind speed as well as the absence of green areas and trees, and this is what we found through the field study and clearly within the compact pattern, it The convergence of the buildings and their proximity to each other provided a large percentage of shade, which affected the rise in temperature and the increase in relative humidity, and thus this was reflected in the human feeling of comfort, which prompted the ancient Arab scheme to adopt a compact and contiguous style closed from the outside and open from the inside in the architecture. The relative humidity is lower than the general average in the dry desert areas Al-Hara to find a structural design to reduce the impact of a decrease in relative humidity, and from these treatments the buildings are adjacent to the three sides and converge between them, which provided shade in a large proportion, and the design of the windows that overlook the outside are of small size and that look inside of a large size, and all this is for the comfort of the occupants of the housing , unlike the planned neighborhood in which temperatures drop for its wide and straight streets Which made it a theater for wind activity and consequently its inability to retain more amounts of relative humidity, which will lead to its decrease in it, in addition to the covering material for the streets of the asphalt material. The planned neighborhoods are characterized by the low density of buildings and the spaciousness of the spaces. All this led to the reduction of shade, and this is what we resort to the open network system and did not take the scheme takes into account the effects of harsh climatic conditions on human comfort.

4- 4- Wind speed:

According to the Table (3), it is clear that the wind speed during the day decreases in the organic shops represented in the city center or due to the factors of the roughness of

the ground surface that increase in the direction in the organic shops and what is characterized by the narrow width of the streets, the internal alleys and their many torsions and the adjacent building blocks, this led to a decrease in the wind speed in them compared to The planned grid shops and the outskirts of the city, which is represented by an increase in the width, length and straightness of the streets, and the distance from the city center, as well as the distance of the buildings from each other, made the average yearly wind speed increase in them by about (0.6) m/s compared to the organic shops. We mentioned earlier those organic stores retain the largest percentage of indoor humidity

When returning to Table (3), it was found that there is a clear discrepancy in wind speed, which was a collection of the urban fabric pattern of both the old organic shops and the modern network planning systems for the other shops, as the network pattern of the streets of the new shops was characterized by a noticeable increase in wind speed compared to the organic pattern of the streets of the old shops, as the wind speed reached the maximum For the summer season, Al-Andalus, Al-Moalemeen, Al-Tamim and 5 kilo shops were about (2.1), (1.7) and (2.3) (2.2) m/s, respectively, compared to the streets of Al-Aziziyah and Al-Qattanah localities at about (1.2) and (1.3) m/s. About (1.3), (1.2), (1.8) and (1.7) m/s higher than the organic shops, which reached a speed of about (1.0) and (1.1) m/s. The planned shops with grid street systems were characterized by an increase in wind speed and for several reasons, including an increase The length of its straight streets and its width is (12) meters with its sidewalks, and others are more than (20) meters, unlike the internal streets of the organic shops of specific lengths and twisting, and some of them are short and the width of their streets ranges between (3-6) meters and some of them form narrow alleys with the abundance of shadows due to the height of the building blocks a The width of its internal streets, which reduces the amount of solar radiation reaching the floor of the streets, unlike the streets of the grid model, which is characterized by the distance of its housing units from its streets, which makes the residential facades with their streets sunny throughout the day. The alleys serve as channels for the distribution of air and control of its movement, which achieves a change in temperature, which makes the atmosphere tend in a kind of moderation, in addition to the weak effect of dust storms or winds that raise dust and dust due to their low speed, in contrast to the negative impact of the movement of winds and dust storms within the network of open, straight and long planned network streets. Its negative impact on reducing relative humidity through an increase in evaporation processes and the transfer of moisture to neighboring areas.

All of this will be reflected on the climatic efficiency of the urban fabric and its impact on human comfort. Thus, the design of the old compact organic stores came to achieve the greatest degree of climatic efficiency and the formation of a pleasant local

climate suitable for human comfort, unlike the planning of the planned network stores whose design was not suitable for the nature of the dry, hot gray city climate.

5- Urban treatments to reduce the impact of the hot, dry climate:

1- 5- Narrow and crooked streets:

The followers of the compact urban fabric led to the formation of narrow streets and alleys, and it was found through the field study that there was an expansion in some of the main streets in the old neighborhoods with a compact mass, represented by Al-Aziziyah and Al-Qattanah for the purpose of vehicles moving towards the market, but the streets and alleys of residential neighborhoods range between (2-2.5) As shown in the picture (1).

Picture (2), one of the alleys of Azizia

Source: a field study.

The alleys of the organic district were characterized by their narrowness and shortness, the twisting of some of them and the straightness of others, and the height of the buildings is approximately 3-4 times the alleys or the street, and the streets and alleys of the old neighborhoods with a compact mass fabric are narrow, which led to the provision of a large amount of shade during the day, which made the heat gain little In it, as well as the streets and alleys of the organic neighborhoods were characterized by a lot of twisting so that you think at the end of each turn of the alley that you have reached a dead end, and this helped reduce the activity of wind movement and the activity of dust storms within these alleys and thus the largest possible amount of dust will be deposited on the floor of the street, unlike the streets of modern neighborhoods The same striped mesh fabric that is characterized by its straightness, which turns into tunnels for the cold winter winds or the scene of the movement of the winds laden with dust. The narrow and crooked streets have helped to form an attractive atmosphere and the nature of the planning of the organic streets of the locality with the renewal of the air in them and increasing its speed in summer to achieve a comfortable climate for pedestrians during the day, in addition to that the

streets are narrow and meandering It will achieve the greatest shading during the day.

2- 5- Covered Streets:

Covered streets are one of the most important planning methods imposed by the desert climatic conditions of high temperatures and an increase in the number of hours of solar brightness, and although narrow streets provide a large amount of shade during the day, they are not effective in summer in the middle of the day when the angle of incidence of the solar rays is vertical or almost Vertical, and therefore resorting to roofing or covering the streets is one of the best solutions to reduce the impact of the sun's rays on pedestrians during these hours of the day. (5, p. 231). Picture (2)

Picture (2) represents the covered streets in the great market of the city of Ramadi within the organic neighborhood

Source: a field study.

Shading in the streets contributes to reducing the surrounding air temperature by about (4) degrees Celsius, (6, p. 87). These streets in the organic locality in the public markets of the city of Ramadi contain upper openings that allow the entry of solar radiation from them, which in turn works on a temperature difference along the street, causing Pressure disturbance and local differences in pressure rates, which will affect the movement of the gentle air inside these streets, as well as the extension of cold air to the open streets adjacent to it and the warmer ones, which helped to create a moderate air flow along the open streets, and this will be reflected in the formation of a comfortable local climate inside these streets and markets .

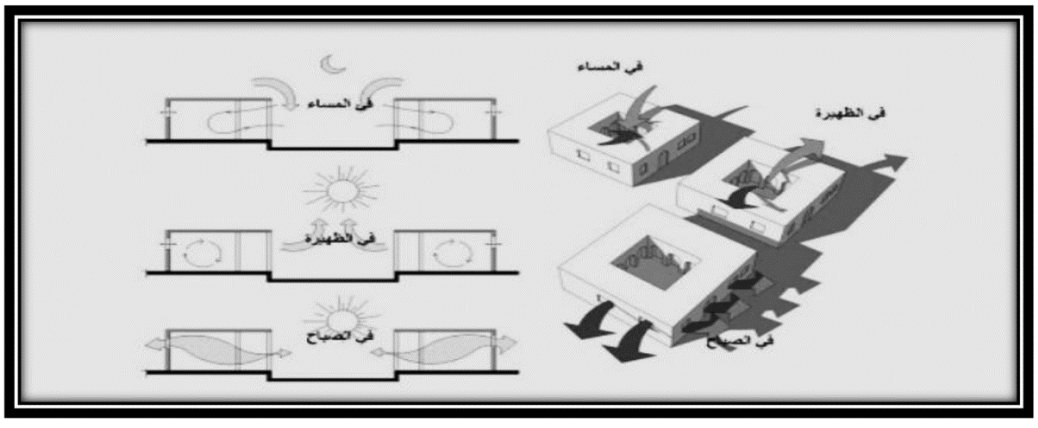
3- 5- The inner courtyard (Al-Hush):

The inner courtyard is either a square or a rectangle surrounded by the rest of the parts of the house from the rooms, stairs and the entrance, and the area is about (3)2 square to reach (10)2 square in large houses, and its floor is paved with white stones and colored marble and interspersed with a small garden and a pond, and it is one of the most suitable designs for our climatic environment The inner courtyard has three

climatic functions: lighting, ventilation and thermoregulation, as the courtyard is the main outlet for the entry of sunlight and air into the spaces of the dwelling, and it softens the cold in winter or heat in summer because the temperature of the inner courtyard is not affected by external currents. (7, p. 105_106)

The inner courtyard (the yard) works by regulating and distributing temperatures on the parts of the house, where the orientation of the buildings in the organic fabric of the old neighborhoods with a compact mass fabric has been addressed by directing the spaces of the housing unit (rooms) inward around the inner courtyard, during the summer the interior facades of the central courtyard absorb approximately (55-60%) of the solar radiation falling on it, and thus the temperatures of the internal destinations of the inner courtyard rise, and the heat is transmitted to the surrounding air through the phenomena of convection and radiation, so the hot air rises to the top and leads to a disruption of atmospheric pressure inside the middle courtyard, while the spaces of the housing unit overlooking the inner courtyard are protected from solar rays This makes the temperature inside these spaces lower than in the inner courtyard, and the cold air that gathers during the night will remain cold in the closed and shaded spaces on the ground floor, and therefore the pressure inside them will be high, on this basis the air will move during the day from the high pressure area in the rooms overlooking the inner courtyard to the low pressure area In the inner courtyard (the yard) and therefore the inner courtyard will be like An air tunnel into which air is drawn, which leads to the formation of a continuous air stream through the spaces of the residential unit, especially when the windows overlooking the alley are open. (8, p. 84) as shown in Figure (1).

Figure (2) Heat transfer during the Day



Source: https://tasmeemblog.wordpress.com.

Results:

1- The organic stores such as Al-Aziziyah and Al-Qattanah recorded a decrease in maximum temperatures compared to the planned stores such as Al-Andalus, Al-Moalemeen, Al-Tamim and 5 Kilometers, with an average temperature approaching

(4.0) degrees Celsius in summer, with a high rate of relative humidity by (3.6%), and with a wind speed recording lower (1.3) meters/second, and these values of the climatic elements of the organic locality are close to achieving the climatic efficiency of our hot, dry cities.

2- The organic shops approached achieving thermal comfort for the human being due to the link between the urban fabric of the compact housing units and their narrow, twisted streets, which was reflected in the increase in shading with weak wind speed and other phenomena such as dust storms, unlike the urban fabric of the planned network shops, the wideness of the streets and the distance of the surrounding residential buildings and the abundance of external spaces Which is a reflection of the lack of shading, and therefore treatments for the effects of high solar radiation have been neglected in summer, and have moved away from achieving thermal comfort under our harsh climatic conditions in summer.

Recommendations:

1- Establishing a climatic center or station inside the city, from which small fixed or mobile stations branch off in various directions from inside and outside the city.

2- Surrounding the city with a green belt that acts as a windbreaker for dusty winds, while planting trees along the main streets to enhance the effectiveness of creating a climate suitable for the city.

3- Adhering to the pattern of integrated planning for residential units and narrow, crooked streets when building new housing complexes.

4- Roofing the streets crowded with people at the markets and the roads leading to the public service facility.

5- Using building materials with high thermal capacity such as stone, plaster and wood instead of materials used such as bricks, cement and iron reinforcement materials.

6- The necessity of carrying out a broad study in which the relevant authorities of planners, architects and climatologists cooperate when making new uses for the city in order to make recommendations that would improve the local climatic characteristics of those new uses.

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