

Climatic design & low carbon city regarding the traditional experiences

Introduction

Climatic design means the adaptation of building with the climate of the location of building or in the other word the compatibility of the layout of building with the climate of that region. Climate includes the temperature of summer and winter and the volume and kind of downfall and the kind of the wind and the volume of moisture and so on in a region.

We can see this clearly in nature and in the creation of animals and plants. The color and the form of animals and plants are adaptable with the characters of each region and they have been created in a manner that could be adaptable with the situation of that place and so they can be survived in a harsh situation.

In the architecture of the past there was the same compatibility with climate as well and actually each region has the climatic design according the climate.

Unfortunately after improving the technology and new inventions in mechanical utilities, designers are depending on the systems of heating and cooling increasingly and they tries to create comfort situation for residence of building only in this way.

Because of lacking attention to the climatic design and depending merely on artificial cooling and heating systems, the buildings are very hot in summer and are so cold in winter and in result they are quietly uncomfortable. Then we try to create comfort situation in buildings only with modern technology and high costs and high air and nose pollution. If these plants corrupt, Living in these buildings will be very difficult.

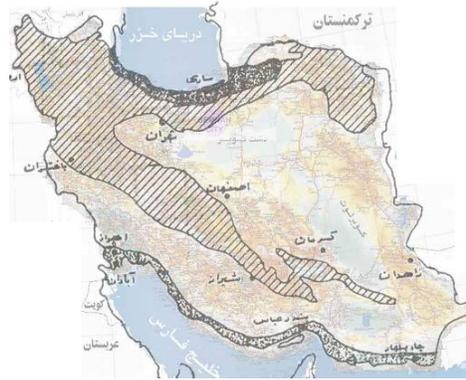
Besides, using fossil fuel in a large volume will cause air pollution and removing the natural and favorite conditions of living. So it will be better that we try again in using the climatic factors and creating junction between human and nature. We should use modern technology when climatic design couldn't response to the needs of comfort lonely.

It is clear that returning to the traditional construction systems is impossible and resent generation can't live like past generation but with reviewing and surveying of traditional experience we can find some rules which lead us to the optimum and efficient using of climate.

1- Four climatic regions in Iran:

We can divide Iran in four climatic regions (picture):

- 1- mild and humid climate (southern coast of Caspian sea)
- 2- cold climate (western mountains)
- 3- hot and dry climate (central deserts)
- 4- hot and humid climate (southern coast of Iran)



- mild & humid region 
- cold region 
- hot & humid region 
- hot & dry region 

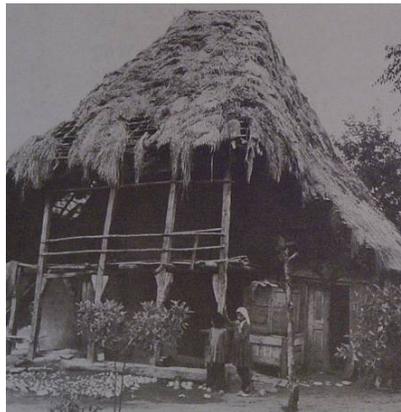
Four climatic divisions in Iran

1-1-mild and humid climate:

This region is rainiest and the most verdant region in Iran. This region is like a strip with a little area and is located between Alborze Mountain and Caspian Sea.

In spite of little width, this region includes two parts.

The first part is the flat region which is covered by farms and there are large cities there. Another area is mountainous part of Alborze Mountain which is covered by forest. The west part is rainier than the east part. The humidity of this region can reach to %80 which is uncomfortable. In summer the temperature is between 25- 30 C degree in days and in nights it will be 20 – 22 C degree, in winter the temperature is always more than zero.



A traditional house in mild & humid region

1-2-Cold mountainous region:

Western mountain of Iran includes cold climate of Iran.

In this region winters are long and cold and summers are mild. In summer rain is few and in winter downfall is much more, in top of mountains there is always snow.

1-3-hot and humid climate:

This climate is in a narrow and long coastal strip which its length is more than 2000 kilometers. This region starts from Khozestan province and ends to Sistan- Balochestan province.

According to the climate this area has long summer and short winter, the moisture of the air is very high but this area has a little green coverage. The maximum of temperature in this region reach to 35 – 40 C degree and its humidity is %70.

The variety of temperature in day and night is little because of the high humidity.

In the coastal area there is narrow area that have breeze but when we are far from this area this winds will be less.

1-4-hot and dry climate:

The largest climatic area in Iran is hot and dry region. Actually Iran in among the countries with hot and dry climate and dry desert have covered the vast area of Iran, most of these areas are located in central and eastern region of Iran.

Little humidity and lack of cloud causes a high variety between day and night and this variety sometimes reach to 30C in desert region.

Cold winter and hot and dry summer are the character of this region.

2- Climatic design in each region:

Here we survey the characteristic of urban texture of each region.

2-1 – climatic design in mild and humid climate:

In that regions that are near the sea, high dampness is a major difficulty. Wet air is heavier than dry air and locates in the below of dry air. So if the urban spaces are surrounded and there isn't any natural ventilation in there, this wet air will be gathered in these spaces and breathing and activity will be so difficult. So we should use ventilation as much as possible to avoid gathering moisture in urban spaces.

Therefore in these areas buildings constructed separately, with vast and open yards and spaces, the fences usually are short to use air ventilation.

The general characters of urban and rural texture in this region are:

- 1- open and expanded rural and urban texture
- 2- yards with short walls
- 3- wide streets
- 4- spread urban spaces
- 5- separate buildings



Rural texture in mild & humid region

2-2 – climatic design in cold region:

The general characters of urban and rural texture are these:

- 1- Urban and rural spaces are surrounded and small
- 2- Compact urban and rural texture and connected buildings

3- The orientation toward sunshine and the topography are the important factors in location and image of village and city

4- narrow streets

Because of very cold weather in most of the year, in these region buildings are connected and have a compact texture to have less surface in touch with cold weather in outside.

Urban spaces are surrounded and small as much as possible to prevent the infiltration of cold wind in these spaces. In addition the radiation of heating from external walls of buildings can partly reduce the coolness of urban spaces.

2-3 – climatic design in hot & dry climate

The flexibility of urban texture and the compatibility of living with natural conditions and also using from these harsh conditions of climate are considerable so much in this region. We can say that one of the most important consequences of our traditional architecture is this compatibility and preparing a suitable situation for living in this hot and dry region.

The most important factors in urban and rural texture are as follows:

1- very compact rural & urban texture

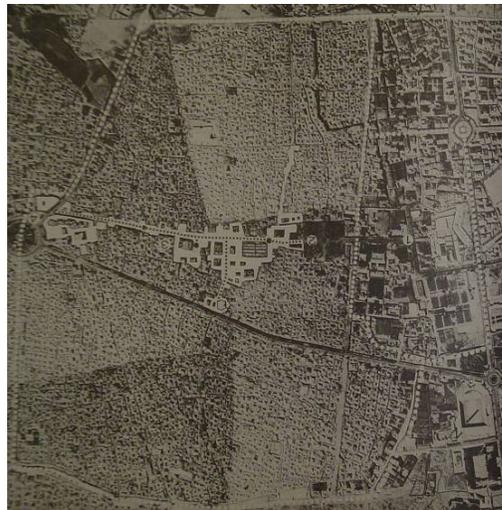
2- surrounded urban spaces

3- narrow and disordered lanes and sometimes covered with arches

4- connected buildings

5- arrangement of buildings according sun and wind

We can compare the cities and villages of hot and dry region with cactus or desert plants. These plants have a thick skin and they are very tight and in result they can create a good environment inside themselves to transmit the plant juice and growing in plant.



Urban texture in hot & dry region

Actually all of the living spaces in this region such as urban spaces, streets, yards have been protected against climatic factors specially winds and they use sun and winds with special contrivances.

The urban texture in these regions is compact and buildings are connected with each other. The lanes are narrow with high walls and are not straight. All of the urban spaces are surrounded because protecting from non-surrounded spaces against bad climatic conditions is impossible. One of the reasons of narrow lanes is preparing a better condition in urban spaces. With creating tall walls along the streets against sunshine and also protecting streets against desert wind are very effective.

It should be said that curved lanes is a good climatic factor in hot and humid region because in straight lanes desert winds can blow easily and annoy people.

2-4 – climatic design in hot & humid region

The best way to fight against the bad climatic condition in this region is creating shadow and using wind. By using shadow people can walk easier. Therefore creating shadow and using air ventilation are two factors in urban texture and shape of building to create comfort for people.

The general characters of urban and rural texture in this area are as follows:

- 1- semi-compact urban texture
- 2- semi-open rural texture
- 3- semi-surrounded urban spaces
- 4- expanding cities and coastal villages along the sea coast and orientation toward the sea

The form of the urban and rural texture is between the open textures in southern sea coast of Caspian Sea and closed texture in the centre of Iran. Hence city or village can have air ventilation as well as the shadow of buildings and plant can reduce the temperature.

So in some places that climatic design isn't respected and there no air ventilation in there and the hot sun shines directly on them are very unsuitable for living and activities are very difficult because of high temperature and dampness.

Conclusion:

With a glance to the character of historic and traditional urban texture of Iran in each quadruplet climates it is clear that our traditional architects knew the role of climate and respected it in their architecture and urbanism. But contemporary architects and urban planners design without regarding to climatic factors and so they constructed spaces which are depended merely on mechanical utilities and spend a lot of fuel and money. Many of new urban spaces can't be used properly because of the lack of respecting the climatic factors and people can present only in a limited time in this spaces. We can provide more usable urban spaces for people for a longer time in a year with a little care in climatic design.

Climate of Iran is dry and hot and its heating can not be tolerated in many days of a year but with a better climatic design we can create more suitable spaces for attending people in them and of course it will be true in design of buildings as well.

We hope that we will notice more and better climatic designs in each climatic region in our architecture and urbanism of Iran according to the experiences of our fathers.



Wind towers in traditional architecture of hot & dry region

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