

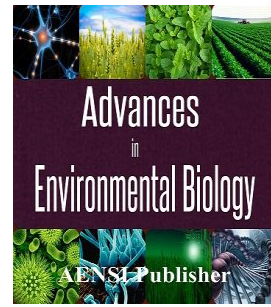


AENSI Journals

Advances in Environmental Biology

ISSN-1995-0756 EISSN-1998-1066

Journal home page: <http://www.aensiweb.com/AEB/>



Study of Thermal Comfort in Hot and Humid Climates: A Case Study of Qeshm

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ARTICLE INFO

Article history:

Received 26 September 2014

Received in revised form 20 November 2014

Accepted 25 December 2014

Available online 2 January 2015

Keywords:

climate, terms of comfort, thermal comfort, air and water, housing, design

ABSTRACT

One of the most important human factors that affect housing characteristics, climatic and weather conditions, so as to assess the impact of feedback on the architectural diversity is inevitable and the importance of climate and its impact on human life is not a secret. The purpose of this paper is to identify and evaluate the thermal comfort indices according to the climate of the island. Also the fact that each region has its own bears the climatic conditions, it is often thought that building a climate identifying a geographic region can be applied to other parts of the same design. Since the human sense of the surroundings through the simultaneous insertion of climatic factors such as temperature, relative humidity and air flow possible. Combination of factors affects humans and their relationship with physical comfort. Based on existing resources in the country, very few laboratory studies to determine the optimal conditions of temperature and humidity comfort are done. The purpose of this paper is to identify and evaluate the thermal comfort indices according to the climate of the Qeshm

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To Cite This Article: Fatemeh Akhlaghiketabi, Monireh Dehghantezerjani and Samira Alizadeh., Study of Thermal Comfort in Hot and Humid Climates: A Case Study of Qeshm. *Adv. Environ. Biol.*, 8(25), 30-34, 2014

INTRODUCTION

Due to the different climate zones and its recognition is essential. Recognition of human activity, such as climate, environment, urban planning, transportation, tourism is most essential (Mohammadi 2006) The importance and necessity of the conditions in designing and manufacturing all of their building, especially buildings that are directly used by humans and all living things are fixed. Due to climatic characteristics and the impact that these factors affect the formation of the two is important. From single buildings or building the ultimate harmony with the climate and climate design, better quality of human thermal comfort. They are healthier and better environmental conditions such building, diversity and daily and seasonal changes in light, temperature and airflow in buildings, varied and pleasant spaces to create the premise. The coordination of climate saving in fuel consumption needed to control the environmental conditions in these buildings. Study the impact of climate on human welfare housing is not a new innovation and historically the fourth century before Christ returns. The design is compatible with the climate. The maintenance of micro housing comfort zone [2] it is well known that the climate is consistent with it. Since man spent much of his life in his own home and the comfort of his home is essential. The building is designed according to the characteristics of regional climate in most cases, this comfort without the use of mechanical devices to bring heat and cold [6].

2 Methods:

Geographic area studied in this research Qeshm is the beginning of some climatic elements such as temperature, humidity and precipitation are analyzed, to determine the characteristics of the environment, climate change should be related to the weather conditions of the conventional methods used in this field, studies have been done on the basis of Tables and thus the study of climate building elements and thermal needs of the climate of the island, recommended ways to meet these needs.

3. The geographical location of the Qeshm island:

Qeshm Island in the shape of a dolphin and the Persian Gulf is the Strait and along the coast, southern Iran. The shortest distance between the island and the mainland is only 4.2 km. This island, the largest free trade

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zone in the Persian Gulf and aspires to become a major center of economic activity and tourism. Qeshm island in the eastern region with an area of 5 square kilometers, at the intersection of geographical coordinates, ° 56 and '16' east longitude and °36 and '57' north latitude has been chosen as the main base of Qeshm and Free Zone Industrial Business the importance of the city has increased

- Air temperature and high humidity all year round
- Low and erratic rainfall annually, averaging about 180 mm
- Subtle changes in temperature day and night
- High temperature difference between annual and seasonal temperature low
- Moderate winds, heavy periods with constant air flow without moving

Due to low rainfall and the loss of about seven months of the year, the ground was dry and simply reflects the sun's rays and increases the air temperature and the comfort zone will be disrupted. So for seven months of the year, many human activities are carried out, resulting in a very hot and sweating profusely in order to evaporate the sweat and body cooling air flow is necessary continuous

4. Principles of research:

4.1 The effect of wind and moisture comfort:

In most parts of the world, there are areas that have similar climates and the similarity of climatic conditions prevailing regional specific tasks reveals significant differences which is important in architecture and architectural design should consider them. Therefore, the design of each region and each of these must be extracted base on these data provide the stability necessary to plan and design that is compatible with the climate. The relationship between environmental factors such as air temperature, relative humidity, and annual rainfall intensity and the intensity and angle of sunlight are the major factors [11] wind speed and air temperature in the heat exchanger to transfer, are dependent on each other. Continuous flow of air inside indoors in dealing with the human body caused by the evaporation of sweat from the heat and moisture and freshness to the skin surface creates significant [11] The lack of air flow, temperature and humidity increases and creates the environment for residents and suffocating heat and humidity indoors than outside space will increase. The direction and placement of the determinant plays a major role. Wind, the temperature controls. Not lower, it is observed that the need for a slight decrease of 60% relative humidity, approximately five months of the year, the average moisture content of a thermal convection. Generally, in the months of April, June, July, August, September and October due to high humidity, dust, the air flow necessary for proper air circulation in February, but in May, November, December and January to little by land, air, heat transfer is slow; to obtain thermal comfort zone displacement is badly needed. In addition, the angle of the sun plays an important role in determining the comfort zone.

5. Comfort Zone:

The conditions for thermal comfort thermal conditions set for at least 80 percent of the people are good. If we assume a constant rate of flow of air and sunlight to ignore the premise that people have in the shadows and in the interior, most people at 21 to 26 ° C and a relative humidity of 30 to 60 percent of physically comfortable. The body's response to climate empirical phenomenon and the culture and geography is different.

For example, in Germany 21 ° C and a relative humidity of 50% is desirable. While in the tropics, at 23 to 29 ° C and a relative humidity of 30 to 70 percent is desirable [1].

6. The climate is hot and humid climate design:

The climate is cold and the average temperature in the coldest month of the year is more than 18 ° C. In this region, two main groups can be diagnosed at an adequate rainfalls continuously during the year And in the other a marked dry season, which will have a direct impact on plant life. Precipitation in the driest month is at least 6 inches. There is a dry season in winter. Rainfalls at least one month is less than 6 cm. Factors such as humidity, wind, and temperature. The architectural style of the buildings in the city is effective in areas with warm climates buildings can be built in wind direction, they opened the windows to air conditioning in urban areas will be considered [7].

6.1 The main objectives of the climate generally include:

Reducing energy consumption in buildings

Utilization of solar energy

Taking advantage of the humidity

Pollution Prevention

Protect the building from the sun

Enjoying good condition outside air

Protection of buildings against precipitation (Qobadian, Mahdavi 1993)

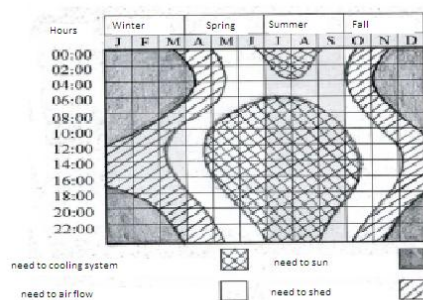


Fig. 1: Calendar for sun and shade on the island.

7. The terms of comfort for the hot and humid climate:

What is the ceiling is flat roof must be accessible it is considered that the slope so steep and irregular rains, the water is drained quickly. The roof must come out of the side walls to the size of the junction of the roof and walls to deal with irregular rains with winds are treated. Openings shall be designed to allow maximum air flow used wind and deal directly with residents. Better monitoring of windows provided shade from direct entry into residential spaces prevents light [10].

The effect of solar radiation on the temperature inside a building, the characteristics of the materials used in the exterior walls depends on the type of material used has a great impact on the provision of their comfort zone residents. Outside air temperature is warming the outer surface of the outer walls of the building. Swing at the inner surfaces of the outer surface of the wall depends on the capacity and heat resistance materials and the increased capacity and thermal resistance of the wall, the inner surface temperature fluctuates less and the time to reach the inner surfaces of the minimum and maximum temperatures, higher than the outside air to be delayed at night the heat stored in the building materials with high thermal capacity and decreases the rate of heat release is inside out and for areas of their daily air temperature is high, such as arid and desert, would be appropriate. But to a large temperature difference between the hot and humid climates that do not doors and windows must be open to the flow of warm air into the room to give it out in such circumstances the exterior walls should have good thermal capacity [12].

The internal situation in the rest of the building is constructed the walls of the living room that is used for days of heavy materials and walls Bedrooms and other parts of the night used to be made of light materials. Still air is the best thermal insulator and the general style of building materials including thin layers of air holes and is associated with high heat resistance [10].

(1) Table of comfort.

Group humidity	Temperature over 20 degrees in the day	Temperature over 20 degrees at night	Temperature between 15 to 20 day	Temperature between 15 and 20 at night	Temperature less than 20 days	Temperature below 20 at night
Relative humidity less than 30%	26-33	17-27	23-30	14-22	21-30	12-21
%50-30	25-31	17-24	22-30	22-12	20-27	12-20
%70-50	28-23	17-23	21-28	14-21	19-26	12-19
More than 70%	22-27	17-21	20-25	14-20	18-24	12-18

8. The use of indicators to evaluate the thermal comfort:

To evaluate the thermal comfort and design right from the signs used in the two categories in the table shown below (this index are indicators of moisture that H is displayed and Aridity index with A shown a)

(2) The table of variables in the model Qeshm Mahoney island.

Index	Heat the day	Heat of the Night	Rain	Humidity	Temperature fluctuation
A1 thermal capacity necessary	-	-	-	3-2-1	More than 10
A2 free space to sleep	Hot	Hot and Appropriate	-	2-1	-
A3 protection against cold	Cold		-	2-1	More than 10
H1 airflow is essential	Hot	-	-	-	Less than 10
H2 optimal airflow	Appropriate	-	-	4	-
H3 protection against rain	-	-	Over 200 ml	4	-

(3) the index table.

A3	A2	A1	H3	H2	H1	Index
-	-	2	-	3	7	Qeshm

If the average temperature is above the level of comfort: Hot (H)

If the average temperature is about comfort, only: Appropriate (O)

If the average temperature is below the level of comfort: Cold (C)

(4) The rest of the day and night in Qeshm:

Temperature	December	January	January	February	March	April	May	June	July	August	September	October
Day	Comfort	Comfort	Warm Comfort	Very warm	Humid	Very hot	Very hot	Very hot	Very hot	Humid	Very warm	Warm Comfort
Night	Very cool	Very cool	Comfort cool	Comfort	Warm Comfort	Very warm	Humid	Humid	Very warm	Warm Comfort	Comfort	Very cool

(5) The heat Qeshm.

Qeshm	December	January	January	February	March	April	May	June	July	August	September	October
Day	Comfort	Comfort	Comfort	Warm	Warm	Warm	Warm	Warm	Warm	Warm	Warm	Comfort
Night	Cold	Cold	Comfort	Comfort	Warm	Warm	Warm	Warm	Warm	Warm	Comfort	Cold

(6) The 15-year average temperature, humidity and rainfall on Qeshm.

October	September	August	July	June	May	April	March	February	January	January	December	Month
23.3	28.3	32.4	34.8	34.7	36.6	36.6	35.8	30.3	26.7	24.2	22.5	The mean maximum temperature
12.6	16.9	21.7	26.8	28.9	27.9	25.9	22.4	18.5	4.15	12.7	10.3	The average minimum temperature
80	78	82	81	81	80	80	79	82	83	85	82	Average maximum moisture
43	40	44	51	54	51	44	41	44	48	48	44	Average minimum humidity
28	5	4	0.5	1	1	-	3	8	33	42.3	50.2	Rainfall

9. Evaluation of bio Klomayy:

The indoor temperature, regardless of the performance of the existing heating or domestic heating systems, is subject to climatic conditions. The effect of climatic conditions in the indoor air temperature, the type and scale of structural characteristics depend on the external walls. To investigate the effect of climate on human comfort indoors and physical characteristics of the building and in accordance with the tables provided by Mahoney offers standard architecture that delivers comfort conditions [4].

9-1- windows dimensions:

The weakest part of the external walls of windows in relation to prevention of internal and external heat is transferred.

Mia was the setting window of 20 to 40% of the wall in the fall. If the windows behind the wooden gate or movable network of thermal insulation are installed, the amount of heat transferred from the windows to reach minimum.

9-2- Roofing:

The roof of a building component most impact on climatic factors. In temperate climates, the roof is the main cause of indoor air warming is caused by the type of roofing. In the vernacular architecture of roofs is often made of mud brick. These materials are made in the warm season of the sun's heat penetration into the building block.

9.3 Internal and external wall:

The use of heavy construction equipment in the external walls of buildings to reduce heat transfer to the interior will air out. Heavy construction equipment at the time that the heat absorbed by the material depends, you are looking at.

9-4- length and orientation of the building:

Long buildings of Qeshm city along the east - west and north and south is long shots. Qeshm to a warm and humid climate for most months of the year the weather is hot the buildings should be oriented in an east-west spread to the southern facade, resulting in the appearance of the winter sun, have higher levels and eastern and western facades that receive sunlight only during the summer, fall. In the cold season, ie December to relax on Qeshm there and keep building from sunlight, wind is strong enough. In April, Qeshm day and night, day and night are comfortable with temperature fluctuations and heat capacity is appropriate. The hot season begins in May and October discomfort due to high temperatures prevails and the use of cooling devices is inevitable. November in Qeshm is still warm and the need for mechanical cooling.

Conclusion:

The Qeshm is approximately 45% of the annual heat requirement belongs to the gas cooler and 20% of the rest of the year there and in 10% of cases by creating Curran comfort conditions and air flow is established. The climate is hot and humid on Qeshm, the minimum temperature during the day and high humidity caused by the traditional architecture of the city, in particular the typology and its complications through the region close to the comfort zone. Due to the characteristics of the Qeshm climate and the impact that these properties can have in shaping the structure of the two is important: On the one hand, by Regional Coordinator buildings, or buildings in the climate of the human thermal comfort for better quality and coordinate the construction of climate saves fuel consumption is needed to control the environmental conditions of these buildings. It constructed buildings are covered in this section are the best heat protection creating shade and prevents the direct sunlight and indoor spaces and by guiding them into the sea breeze provides some comfort zone. These areas will be considered in designing buildings to the north - south and the sea breeze colostomy and living rooms and dining rooms which are mostly used in this section or in the form of the building with covered porch in front and a courtyard in the middle of the main areas to the south and north and services, warehouses and other buildings in the East and West.

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