

Temperature Control for Residential Buildings in India by Effective Use of Building Materials

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ABSTRACT

Materials are the fabric of any building and they go a long way to determine the level of comfort and this is true for all the climatic regions of India. In order to design buildings that will meet the thermal comfort needs of the clients, the choice of the materials and their usage for individual building components like Wall, roof, window, door and floor etc must be understood in order to manage the thermal environment of the building. Improper use of building materials in this climate can be of detrimental to the buildings comfort. Solar radiation from the sun is the main energy source that heats up a building fabric, in order to achieve a thermal comfort for buildings it must be brought to check, by the use of one or combination. This study shows that, a combination of all these materials, within a building fabric allows for a thermally balanced building environment, putting in mind several other factors.

Keywords: Temperature Control, Residential Buildings, Comfort, Building Materials

1. INTRODUCTION

There are three fundamental or basic needs of every man which is food, clothing and shelter. The basic function of housing is to provide shelter from harsh climatic conditions (sun and rain, heat and cold), external aggressions (protection from animals and attacks from humans) privacy and storage of possession. Hence, housing is meant to protect man against harsh climatic conditions such as temperature; the centre focus of this paper.

The climate is a determinant of how much solar radiation gets to the earth surface and the temperature that is existent within that particular geographical location; this in turn determines the level of thermal comfort examined in these regions. The effects of climatic variables on the elements of climate, has lead to the existence of the various climatic regions of India. These climatic regions as responded also by the demand of different materials that can be used within the region to ensure for thermal comfort. The climatic regions of India can be divided into the following under listed categories with each of them, possessing peculiar characteristics.

A house cannot be built without a fundamental knowledge of the building materials and the determinant factors that lead to the choice of using that material. This thesis aims to look into the proper use of materials of different properties in buildings, in order to achieve thermal comfort.

2. METHODOLOGY

In order to carry out an effective study, the following objectives were highlighted, which includes:



Figure 2.1: Showing different climatic zones in India

The climatic regions of the world can be divided into the following under listed categories with each of them, possessing peculiar characteristics, which are simple summarized below:

- **Tropical:** Hot and wet all year, with all months have average temperatures above 18°Celsius.
- **Mediterranean:** Mild winters, dry hot summers
- **Arid:** Dry, hot all year, with deficient precipitation during most of the year.

- **Temperate:** Climates with cold winters. They are cold winters and mild summers.
- **Polar Climates:** Extremely cold winters and summers. They are very cold and dry all year.
- **Mountains:** Very cold all year.

3. RESULTS AND DISCUSSION

3.1 The Basic Concept of Thermal Comfort

This paper aims to focus on the design of building with in the tropical climatic region characterized majorly with high temperature. Climatic data gives us a more or less accurate idea of the external conditions of buildings. An analysis is usually carried out to ascertain how these external conditions compare with the required conditions. It is essential in this respect to define the limits within which people are likely to feel comfortable. Knowledge of these limits will be used to determine the degree of discomfort and the conditions such as the humidity and the temperature range, which are experienced simultaneously with uncomfortable or hot temperatures. The subjective nature of comfort must be stressed. It is not possible to achieve conditions in which everybody will be comfortable. The best comfort conditions are called optimum thermal conditions. Under these conditions about 50 to 75% of people feel comfortable.

3.2 Thermal Balance on Human Body

The body gets energy from digestion of food through metabolism, that is the processes involved in converting food stuff into living matter and energy.

The Indian Climate has a varied climate. Four climate zones can be distinguished as one move from the Southern part to the northern part and Eastern part to Western part of the India.

Table: 3.1 Shows maximum & Minimum Temperature in India

Zone	Air Temperature		Annual Rainfall (mm)	Wind (km)
	Max Day Degree Celsius	Min Night Degree Celsius		
Eastern	35	10	2100	18
Western	34	18	740.50	10
Southern	30	17	884.90	12
Northern	33	19	1857.20	10

4. CONCLUSIONS

- Understand the climate of India and the role of temperature as a determinant factor of climate.
- Factors that affects the thermal comfort of an environment.
- The basic building materials and their thermal properties.
- Determined the best materials to be used for the various building elements, in terms of resistance to temperature for comfort living.

5. REFERENCES

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