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Contribution of old buildings in reducing carbon emission

Abstract

Climate change and global warming is challenge to all the countries with at most priority. Attention has been shifted to carbon emission and its challenges faced by deforestation, Manufacturing of goods, increase in transportation, generation of electricity, increase in population, Construction industries on top most list. It is important to eliminate the excess carbon from the climate by carbon sinks, such as planting trees, maintaining natural resources like soil, oceans and mainly to convince the companies to reduce the carbon footprint or erase their carbon footprint to make it carbon neutrality. "Paris Agreement" has set goal to the countries to limit the increase of carbon emission and greengouse gas house emission. Countries like USA, China, India are aiming towards Net- Zero emission by 2050. This paper identifies the passive techniques in old buildings, its contribution of lesser carbon emission, climatic responsive materials and sustainability.

Paper aims to highlights the Planning aspects, orientation, materials used and techniques implemented in the building with sustainable approach.

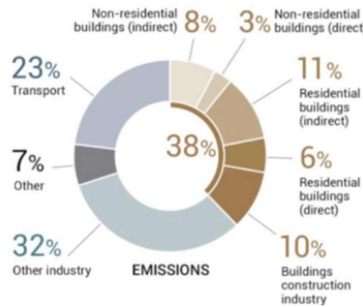
Keywords :

*Sustainability, Carbon emission, Materials and Techniques,
Carbon sink, passive techniques.*



1.Introduction:

Due to increase in CO₂ emission atmosphere of earth is getting warmer every passing year.



Source: Contribution of residential building sector on energy consumption and carbon emission (IEA World Energy Statistic and Balances, 2020)

Attaining carbon neutrality (CN) in the residential building sector is very much necessary with multiple approaches like combining passive cooling strategies, efficient energy use, and the use of renewable energy sources, life cycle of the building, climatic condition and many.

2. Objectives

Main objective of the paper is to understand low carbon emission in residential building in Hot and Dry climatic region of Norther Part of Karnataka. Identifying different way of Construction, Materials used in the vernacular Architecture based on its location, climatic condition will help to analyse the contribution of carbon emission of the building.

3. Methodology

Survey is been conducted and selected few buildings based on the style of architecture, Materials used and visual analysis. After the conduction of interview, one residential

building is finalised with more than 100 years (Vernacular) old for the study purpose and tried to understand different aspect of construction based on the climatic condition and region.

Collected information on different materials used, reason behind the planning and its implementation.

4. Case Example

Vijayapura is located in Norther part of Karnataka having hot and dry climate with highly influenced by its Vernacular Architecture. Vijayapura is ruled by Adilshahi and can find Islamic Architecture at itd peak in all the building typologies (from residential to Commercial).

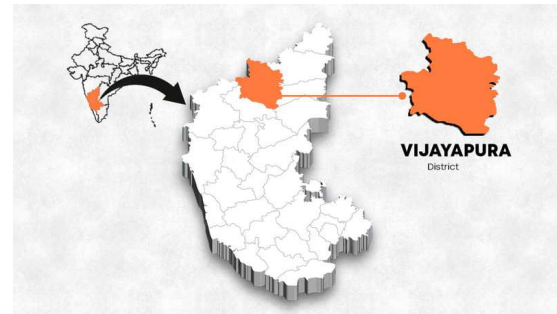


Fig 1 : Shows Vijayapura Map



Fig 2 : Shows Vernacular House



House is located in Vijayapura ,
Constructed more than 100 years ago.
Building is Constructed in British Era with
Few british Architectural elements .



Fig 3 : Shows Stone as a Material

Major Material used is a Basalt stone (Natural stone) for the construction as it is Locally Available material, Durable, High Strength and Resistance to High Temperature . As it withstand the temperature, it is best for hot climate and makes indoor cool by retaining the heat, and Emission of carbon is lower compared to the brick.

Stone is resistance to weather including rain, snow, wind and adjust according to fluctuation in climatic condition holds consistence indoor temperature and makes building stronger.



Fig 4 : Shows Lime Mortar and thick wall

Lime Mortar used as a Plaster for the Older buildings which helps to allow moisture to evaporate and keeps wall dry. It acts as a thermal insulation and porous in nature keeps building warm.

Thick wall acts as a Heat Insulation absorb harsh sun radiation and keeps indoor temperature low and contribute to energy efficiency. It also helps in reduction of noise from outdoor. Thick wall provides better thermal mass leads to high energy efficiency.



Fig 4 : Shows Natural Stone Flooring



Natural Stones have been used for flooring which absorb heat and keep the floor and indoor cool.

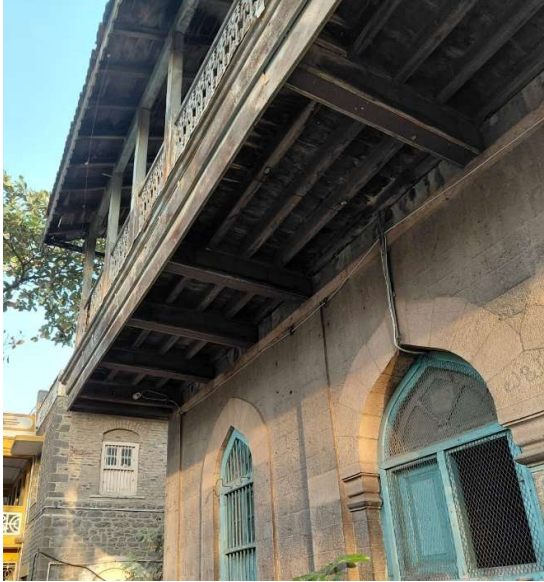


Fig 5 : Shows Projected Balcony

Building has Projected Balcony with Wooden as a Major Material which acts as a additional space and shading device for the below floor. Wood has strength , Lightweight nature and also easy to process and maintainance free.



Fig 6 : Shows High Ceiling and small Windows

Building has High Ceiling and smaller windows creats maximizing space , reduce heat absorption in hot or warmer climate keeps indoor cool.



Fig 7 : Shows Gable Roof and recessed window

Building is having Gable roof with Mangalore tiles as a forming triangular shaped wall below. It helps in better air moment , and easy maintainance. Mangalore tiles will absorb the heat from roof and keeps indoor cooler .

Recessed windows gives shadow effects. It regulates the indoor tempertature by reducing direct sunlight specially in hot climate. Life span of the window is more and asthetically pleasant.





Fig 8 : Shows Courtyard

Courtyard in hot and dry climate is typical necessary architectural element. It helps in cross ventilation and improves

Natural lighting and also provides outdoor activity area.. It allows cool air to pass gives cooling effect and connects indoor to outdoor .

5. Conclusion

This paper highlights global warming and CO₂ emission by Residential building. Case example elaborate about the planning aspect of the building (High Ceiling, Gabel roof, Courtyard) helps in reducing heat indoor and A/c , Coolers can be avoided in this climate also. Materials like, Stone, Wood will help to absorb more heat and make indoor cool. Thick wall, Lime Plasters will act as a thermal insulation and reduce heat from exterior to interior. These are few elemetns makes building naturally cool and emission of Carbon is less or Negligible.

6. Web references

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