International Journal of Academic Research and Development
ISSN: 2455-4197
Impact Factor: RJIF 5.22
www.academicsjournal.com
Volume 3; Issue 2; March 2018; Page No. 1556-1558

Old buildings are green buildings

Pavaraj M[1], Kumar Akhilesh[2], GA Bakavathiappan[3], S Baskaran[4]
[1] Assistant Plant Protection Officer, CIB & RC, Faridabad, Haryana, India
[2] Consultant Toxicology, CIB & RC, Faridabad, Haryana, India
[3] Associate Professor, SBK College, Aruppukottai, Tamil Nadu, India
[4] Professor, Department of Zoology, Ayya Nadar Janki Ammal College, Sivakasi, Tamil Nadu, India

Abstract
A study was made on the temperature inside old buildings and new buildings with and without trees. The study revealed that in old buildings the temperature was low when compared with new buildings. Among the new buildings, the buildings without trees showed high temperature when compared the new buildings with trees. The study established that old buildings are green buildings and in the new buildings trees help to reduce the temperature inside house.

Keywords: green buildings, new buildings, climate change, global warming

Introduction

Climate change is one of the most important global environmental challenges facing humanity with implications for food production, natural ecosystems, freshwater supply, health, etc. The impact would be particularly served in the tropical areas, which mainly consists of developing countries, including India. National Mission on Sustainable Habitat aims to promoting energy efficiency as a core component of urban planning; the plan calls for; extending the existing Energy conservation Building code (Fulekar and Kale, 2010) [6]. Nowadays the energy crisis is one of the most important problems of the world. Because of this, design of green buildings is the most important challenge to reduce of energy consumption in buildings. Now there is a movement for Green Buildings which conserve electricity. It is interesting to note that in earlier period people constructed house which are very cool when compared to ambient temperature. This results in conserving electricity (Ahmad *et al.*, 2009) [1]. Global climate change has become more apparent over the last few decades. Most climate experts agree that the humans, at least in part, become the root cause for this development. The experts are calling for immediate and far-reaching action to fight global warming and its remedial measures. One of the most important tasks is to reduce greenhouse gas emissions. An increasing concentration level in the atmosphere is said to be the main reason for the raising temperatures. For instance, the CO_2 concentration in most industrialized countries has increased by more than 20% in the last 60 years. (Nelson and Rakau, 2010) [9].

Buildings over their life cycle account for a large share of global greenhouse gas emissions. The European Commission reports that buildings are responsible for the largest share of the EU's final energy consumption (42%) and for about 35% of all greenhouse gas emissions. Most European countries have also tightened environmental regulation for new buildings and refurbishments of old buildings. In recent report by the United Nations Environment Programme (UNEP) finds faults with the property industry for being too slow in addressing its increasing environmental foot-print. The Intergovernmental Panel on Climate Change (IPCC) reports estimates that by 2020 the primary energy use for the buildings sector will double from 103 EJ (1990) to 208 EJ (1 EJ or exajoule is equivalent 1,018 joules). The corresponding rise in carbon dioxide emissions from the building sector will go up from 1,900 million tonnes of carbon dioxide (MtC) to 2,700 MtC. The population increase, rapid urbanization, and the extensive building that both engender are going to continue. As a result, energy use for lighting, domestic appliances, and air-conditioning will rise. Containing and reducing the environmental foot-print of the building sector is by no means an impossible task. Environmentally driven emerging technologies can improve energy efficiency and reduce energy consumption in residential and commercial sectors. More than one-third of energy is consumed in buildings worldwide, accounting for about 15 percent of global greenhouse gas emissions. In cities, buildings can account for up to 80 percent of CO_2 emissions. The built environment is therefore a critical part of the climate change problem – and solution. Most existing buildings were not designed for energy efficiency, but by retrofitting with up-to-date products, technologies and systems, a typical building can realize significant energy savings. Improving the energy efficiency of buildings is a priority for reducing both greenhouse gas emissions and energy costs. Hence, in the present study, the temperature inside old buildings and new buildings with and without trees was undertaken.

Materials and Methods

In the present study three different houses in Sivakasi residential areas like, old house, new house without tree and new house with tree were selected and measured the temperature and relative humidity using Digital Hygro thermometer (J4111H Mextech). The temperature was recorded from inside and outside of the houses during 12.00 pm – 1.00 pm for 10 days.

Results and Discussion

In the present study the temperature within the old and new buildings with and without trees was studied (Table 1). The temperature within the old house was very low when compared to the new houses with and without trees. So the old buildings in Sivakasi town are comparatively cooler, than reducing the electricity consumption for fans and lights. They have wooden ceiling with greater height than the new houses. The results in low temperature. The mean difference in temperature between inside and outside the old house is 4.45^0 C, which is comparatively higher than the new houses with tree (2.37) and without trees (2.56), and the old buildings are cooler. Buildings complying with high energy-efficiency and other environmental standards decrease CO_2 emissions and are often referred to as "green buildings" (Auer *et al.,* 2008 and European Commission 2007a) [2, 5]**.** Chan *et al*. (2003) [3] stated that homes are built to suit their intended use, the local climate and the natural environment. The healthy indoor environments of a green building can increase well-being of its occupants. Energy efficiency is a key component of green buildings.

Among the new houses, temperature was found to be low in the houses with trees whereas in the houses without trees, high temperature was observed. A well-placed tree, shrub, or vine can deliver effective shade, act as a windbreak, and reduce your energy bills. Carefully positioned trees can save up to 25% of the energy a typical household uses for energy. Research shows that summer daytime air temperatures can be 3° to 6° cooler in tree-shaded neighborhoods than in treeless areas (Wilson *et al*., 2003) [10]**.** Cooling of air temperature due to the effect of trees has been well documented in the past through various studies. A tree can be regarded as a natural "evaporative cooler" using up to 100 gallons of water a day (Kramer and Kozlowski, 1960) [8]. This rate of evapotranspiration translates into a cooling potential of 230,000 kcal/day. This cooling effect, observed in a study by Geiger, is the primary cause of 5^{0}C differences in net peak noontime temperatures observed between forests and open terrain, and a 3^{0}C difference found in noontime air temperatures over irrigated millet fields as compared to bare ground (Geiger, 1957) [7]. As the percentage of land taken up by structures and paving an increase in dense urban areas, so too does the ambient temperature. This "urban heat island effect" can be reduced by the presence of trees in several ways. The canopy of a grove of trees shades the ground and structures while the natural release of water vapor from trees can help cool the surrounding air. By blocking the wind, tree foliage reduces the infiltration of air into homes. Most of the heat gain inside a house comes from sunlight (or solar energy) hitting the roof and streaming through the windows. Energy conservation measures that block the sun before it strikes the roof or windows are the most effective ones to implement. Trees and other plants that provide shade are the most effective long-term measures for reducing your home's energy consumption for heating and cooling (Christopher, 2006) [4].

Mature trees and shrubs can have a dramatic effect on utility bills, according to the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy. For example, an energy-saving landscaping design can cut heating bills by about one-third during cold-weather months. The potential savings during warm-weather months are equally dramatic: A well-planned landscape can reduce an unshaded home's summer air conditioning costs by 15 to 50 percent, depending on how tight the structure is and how well it's insulated. The study revealed that in old buildings the temperature was low when compared with new buildings. Among the new buildings, the buildings without trees show high temperature when compared the new buildings with trees. The study established that old buildings are considered as green buildings whereas in the new buildings trees play a prominent role to reduce the temperature within the house. Trees are a good investment. Studies by real estate agents and professional foresters estimate that trees raise a home's resale value seven to 20 percent. Thus, by planting trees, homeowners can help fight against global warming.

Table 1: Comparison of temperature and relative humidity in three different houses

Date		Old house			New house (with tree)			New house (without tree)		
		Temperature ^{0} C	**RH (%)**	**Difference**	**Temperature ^{0} C**	**RH (%)**	**Difference**	**Temperature ^{0} C**	**RH (%)**	**Difference**
13.07.2010	outside	43.3	27	9.9^0 C	38.8	36	2.9^0 C	39.4	37	2.4^0 C
	Inside	33.4	48	21%	35.9	39	3%	37	39	2%
14.07.2010	outside	40.6	40	7.4^0 C	36.6	41	3.4^0 C	39.4	36	2.1^0 C
	Inside	33.2	50	10%	33.2	48	7%	37.3	40	4 %
15.07.2010	outside	38.7	34	4.8^0 C	37.1	39	2.4^0 C	47.4	22	5.1^0 C
	Inside	33.9	47	13%	34.7	46	7%	42.3	27	5%
17.07.2010	outside	35.1	42	2^0 C	34.6	46	1.4^0 C	36.1	40	1.6^0 C
	Inside	33.1	48	6%	33.2	49	3%	34.5	44	4%
18.07.2010	outside	36.4	48	2.7^0 C	34	48	1.2^0 C	34.7	49	1.7^0 C
	Inside	33.7	60	12%	32.8	54	6%	33	53	4%
19.07.2010	outside	32.4	60	1.5^0 C	31.9	66	0.2^0 C	32.8	62	0.7^0 C
	Inside	30.9	63	3%	31.7	66		32.1	62	
21.07.2010	outside	36.4	43	5^0 C	35.8	43	3^0 C	38.6	37	2.4^0 C
	Inside	31.4	56	13%	32.8	56	13%	35.0	46	9%
22.07.2010	outside	35.8	41	3.5^0 C	35.8	41	3.5^0 C	38.8	36	3.2^0 C
	Inside	32.3	49	8%	32.3	49	8%	35.6	46	10%

23.07.2010	outside	36.7	33	2.4^{0} C 5%	36.7	33	2.4^{0} C 5%	41.2	24	3.0^{0} C 8%
	Inside	34.3	38		34.3	38		38.2	32	
26.07.2010	outside	38.5	29	3.3^{0} C 10%	38.5	29	3.3^{0} C 10%	40.6	26	3.4^{0} C 7%
	Inside	35.2	39		35.2	39		37.2	33	
$\bar{X}$		33.04	41.42	4.45	33.95	47.7	2.37	36.22	42.2	2.56
SD		1.34	10.28	2.65	1.64	9.06	1.10	2.90	10.41	1.21

Acknowledgement

The authors express the profound thanks to the Management and Head of the Department of Zoology. Ayya Nadar Janaki Ammal College (Autonomous) Sivakasi for providing facilities to carry out this work.

References

1. Ahamed T, Mahyar G, Mojtaba K, Jamshid M. Effect of radiator positions on heat distribution in the building using numerical model. World Academy of Science, Engineering and Technology. 2009; 58:1006-1009.
2. Auer J, Heymann E, Tobias J. Building a cleaner planet: The construction industry will benefit from climate change. DB Research. Current Issues. Frankfurt, 2008.
3. Chan WR, Price PN, Sohn MD, Gadgil AJ. Analysis of US. Residential Houses Air Leakage Database, 2003, LBNL report 53367.
4. Christopher SJ. Tree Placement on Home Grounds. G6900. Columbia, Missouri: University of Missouri, 2006, http://extension.missouri.edu/explore/agguides/hort/g06900.htm
5. European Commission. A lead market initiative for Europe. Brussels, Belgium, 2007a.
6. Fulekar MH, Kale RK. Impact of climate change: Indian Scenario. University News. 2010; 48(24):15-23.
7. Geiger R. The Climate near the Ground. Fourth Edition. Harvard University Press, Cambridge, 1957.
8. Kramer PJ, Kozlowski T. Physiology of Trees. McGraw Hill Publishers, 1960, pp. 35.
9. Nelson A, Rakau O. Green buildings A niche becomes mainstream, Energy and climate change, 2010, 1-24.
10. Wilson A, Thorne J, John M. Consumer Guide to Home Energy Savings, 8th Edition. Washington, DC, ACEEE, 2003.