March - April 2020
ISSN: 0193-4120 Page No. 5137 - 5142

Construction of Multistoreyed Buildings in India with Environmental Perspective

Dr. Rajkumar R[1], Kavya L[2], Vishvaa R S[3], Kamaleswari T[4]

[1] Associate Professor (Senior Grade), [corresponding author]
[2] Undergraduate students
[1,2] Department of Civil Engineering, SSN College of Engineering, Chennai, India.
[1]rajkumarr@ssn.edu.in

Article Info
Volume 83
Page Number: 5137 - 5142
Publication Issue:
March - April 2020

Article History
***Article Received**: 24 July 2019*
***Revised**: 12 September 2019*
***Accepted**: 15 February 2020*
***Publication**: 27 March 2020*

Abstract

Economic development and anthropogenic activities directed towards satisfying humans ever increasing desires have led to over exploitation of the natural resource base and generation of contaminants and hazardous waste. The construction of Multistoreyed building either for residential or for commercial purposes without proper care of environmental protection and energy consumption is a negative approach to the objective planning of sustainable development. These Multistoreyed buildings and their energy consumption has created so much pressure on the environment.

Keywords; *land prices, indoor pollutants, nitrogen oxide, deforestation, solid waste, energy consumption.*

I. INTRODUCTION

Man has demonstrated ability to build tremendous structures. The construction of a remarkable feat, but the Multistoreyed or High rise Structures has struck a popular chord by default rather than by design. It is presumed to compensate for high Land cost and thus maintain economic balance .In reality it induces ever mounting land prices that the urban dweller is familiar with the consequences of intolerable congestion.

Cultural Effect: The residents of a multi-storey building cannot preserve their ethnic culture. The culture of these apartments and shopping complex tend to mix among each other. Also if persons of different nationals and different states are resident of these apartments, then mixing of language, religion, tradition, behaviour, dressing style and other factors which are day to day activity takes place. If the multistorey building has come up in ethnic minority areas, then the culture of surrounding areas also tend to change and culture of ethnic minority is affected by these developments.

Health and Safety: As discussed above, factors which affect the health of people are air pollution, water pollution, noise pollution, indoor air quality deterioration and solid waste management. Whereas for safety consideration, the multistorey building must have fire safety and crime safety measures so that resident of these buildings feels a sense of security.

Psychological effects of multistoreyed buildings: Most of the times , people staying in multi-storeyed apartments become poor tempered due to the effect of compact and congested environment. People also become alcoholic and they have a fear for crowd. They become reserved and self-centred. Due to this, lot of suicide cases have been reported.

Published by: The Mattingley Publishing Co., Inc.

March - April 2020
ISSN: 0193-4120 Page No. 5137 - 5142

Aesthetic and Human Interest: If a good architecture is incorporated in the Multistoreyed building, then aesthetic and scenic view of the area is increased and even tourists come and see the architecture of these buildings. Also if surrounding of these building is developed along with beautiful lawns and gardens, then beauty of these buildings is increased and it gives a scenic sense.

Socio Economic Impact: It has been rightly said that man is a social animal. Therefore social environment plays an important role in the life of a man. Construction of Multistoreyed buildings has affected the social environment. It has resulted in the development of slums. The lifestyle of people living in flats is getting changed and they do not even care about the health and hygiene of those people who are staying in small houses by the side of their skyline buildings.

Economic factor: As we know that construction of Multistoreyed building increases the cost of surrounding land to an extent which is unaffordable for an average man. This leads to generation of slums. These slums are horizontal and create massive ecological imbalance. Most of slum colonies are devoid of metalled road, public water supply, sewerage and other civic amenities. Due to these problems, ponding of water takes place in slums which leads to the outbreak of various diseases among people. For example Mumbai has the highest number of slums which covers almost 6% of the Mumbai city.

Social factor: People staying in multi-storeyed buildings always remain inside their flats. They hardly know what is going around them and this often leads to criminal activities. Also it is unsafe for children and older people as they face the trouble of failure of lifts due to frequent power cuts.

Human factor: This is rather difficult to quantify and assess since the stresses caused by high density living and fast paced life cannot be measured.

Table 1: Potential environmental impacts resulting from the construction stage

Construction phase	Construction practice	Potential environmental
Preconstruction	Site inventory vehicular traffic	Short term and nominal dust,
	Test pits	Tree root injury, sediment
	Temporary controls storm	Short term and nominal
	Erosion and sediment dust	Vegetation, water quality negligible if
Site work	Clearing and demolition	Short term
	Clearing	Decrease in the areas of protective
	Demolition	Increased dust, noise, solid wastes
Temporary facilities		
	Shops and storage sheds	Increased surface areas impervious to
	Accessed roads and parking lots	Generation of dust on unpaved areas
	Utility trenches and backfills	Increased visual impacts, soil
	Sanitary facilities	Increased visual impacts, solid
	Concrete batch plants	Increased visual impacts, disposal
Earth workLong term		
	Excavation	Stripping, soil stockpiling and site
	Grading	Increased erosion and sedimentation
	Trenching	Soil compaction
Site drainage		
	Foundation drainage	Decrease in the volume of
Permanent facilities		
	Transmission lines and heavy	Long term
	Parking lots	Storm water run – off, petroleum
	Water pumps for lifting of water	Noise, visual impacts
	Dish antenna	Visual impacts

Published by: The Mattingley Publishing Co., Inc.

March - April 2020
ISSN: 0193-4120 Page No. 5137 - 5142

	Solid waste handling	Visual impacts, odours, bacteria,
Project closeout		
	Removal of temporary offices	Short term
	Demolition	Noises, solid waste, dust
	Relocation	Storm water run-off, traffic
Site restoration		
	Finish grading	Sediment, dust soil compaction
	Top soiling	Erosion sediment
	Cleaning	Water quality, oils, phosphates and

Indoor Air Quality: It is also an important factor to be paid attention in a multi-storeyed building. Many times the air that we breathe indoors is more polluted than the air outside. CO and NO are produced by the various volatile organics emitted from house hold cleaning products. Many pollutants such as cigarette smoke or radon gas if emitted outdoors have plenty of dilution air so that people tend not to be exposed to hazardous levels of contamination. Chlorofluro carbon from air conditioning can create breathlessness, eye sight problems and restlessness.

Other indoor pollutants in multi-storeyed buildings are as follows

- Asbestos and other fibrous aerosols (Acoustic insulation, decoration, vinyl floor and cement produce).
- Formaldehyde (Particle board, panelling, plywood, carpets, ceiling tile and other construction material).
- Inhalable particulate matter (smoking, fire places)
- Diffusion from soil, ground water, brick, building material, concrete and tiles.

Noise Pollution: Noise pollution is nothing but generation of unwanted sound. These sounds are very common in apartment culture. In case of advanced level of living standards, people are using radio television, tape recorders, mike etc, very frequently. The operation of these instruments has little concern about the annoyance caused to neighbours not even the sick and ailing. Infrasound produced in manmade environment either by working machines, air conditioning operation may cause blood vessels to contract, our skin to become pale and damage our nervous system. Air conditioners are a constant source of at least 40 to 50 % decibels which also creates noise pollution and irritates the people in these buildings.

Water Pollution: As we approach the end of the century problems, both water quantity and water quality are returning to forefront. The traditional confidence in the quality of drinking water has been seriously taken as we find potential carcinogens in ground water. The people of multi-storeyed buildings have to face the problems of water supply. Due to the construction of tall buildings, the population density has increased abruptly. Large amount of water should be supplied to those densely populated areas which imparts extra burden on water treatment and distribution system. In order to supply huge amount of water to such areas, high discharge distribution pipe and high power meters and pumps are needed. Since the height of multi-storey buildings ranges to even 400 m, very big head is required to be maintained in the distribution pipes so that water can reach at the top most floor. Sudden drawdown in the ground water table is the result of such activities which leads to damage of environment in many ways. Due to Lowering of Ground water table, many plants do not get sufficient water in their root zone. Cities are facing acute water scarcity as more multi-storey buildings come up. Due to high density living, lots of waste water is generated which comes from kitchen, bath and laundry floor, drain waste and sanitary sewage.

Published by: The Mattingley Publishing Co., Inc.

The disposal of such large quantities of sewage causes pollution of rivers.

Air Pollution: Pure air is vital for life on the earth. It is vital for man, animal, and vegetation alike. A normal healthy person can live about five weeks without food and five days without water but only five minutes without air and this proves the importance of air in our life. Dust and sulphur dioxide are two major pollutants resulting from vehicular activities. Dust affects the people living in lower stories whereas sulphur dioxide and nitrogen dioxide affect people living in upper stories. Sulphur dioxide enters in our body along with the air we breathe. It attacks the lungs and other parts of the respiratory system. Carbon monoxide emission is also caused by vehicular activities. Hourly atmospheric concentration of carbon monoxide often reflect city driving pattern. As more number of people stay in a multi-storey building much vehicular activity will be there and this causes pollution. Carbon monoxide and lead a product of petrol driven vehicle interferes with blood ability to carry oxygen to the cells of the body. With the blood stream carrying less oxygen, the brain function is affected and the heart rate increases in an attempt to offset the oxygen deficit. Oxides of nitrogen are also one of the major air pollutants. Almost all nitrogen oxide emissions are in the form of Nitrogen oxide which has no known adverse health effect at concentration s found in the atmosphere. Nitrous oxide can oxidize to Nitrogen dioxide which in turn may react with hydrocarbons in the presence of sun light to from photochemical smog condition. The lack of horizontal dispersion and presence of direct sunlight provide suitable environment for formation of smog. The multi-storey buildings reduce the horizontal dispersion which leads to the formation of smog in the presence of sunshine. Even solid waste and sewerage of a densely populated area is also a source of air pollution.

Solid waste Generation: Waste generation encompasses those activated in which materials are identified as no longer being of value and are either thrown away or gathered together for disposal . Most of the time, it has been seen that multi-storeyed buildings are erected after demolishing old structures. The demolition of old structures itself results in a large quantity of solid wastes. Digging of foundation also gives large amount of solid wastes. Further such wastes in the form of iron rods, wooden cuttings, brick bats ad so many other wastes. These wastes are often classified as rubbish. The quantities produced are difficult to estimate and variable in composition but it may include dirt, stones, concrete, bricks, and plaster, plumbing, heating and electrical parts. It has been observed that the characteristics of the population influence the quantity and quality of solid wastes generated. For example the quantities of yard wastes generated on a per capita basis are considerably greater in many of the wealthier neighbourhoods than in either parts of town, usually the residents of multi-storeyed building belong to post population, and they generate much more solid wastes than others.

At the collection sites of solid waste generated by the people residing in the multi-storey building become ideal breeding places for disease causing organisms under warm and moist conditions. The generation of these harmful wastes and their transmission is not only health related concern but also have aesthetic impact.

Ecological Disturbance: Right from the very first brick of foundation is laid to the completion of the Multistorey building ecology is disturbed in many ways. Deforestation and land levelling is the first step of construction. Cement , steel, stone and wood are the major building materials used in every Multistorey building, different kind of energy is increasingly exhausted in industries like cement steep hills, forests and destroying the natural ecosystem for making cement , coal, a scarce fossil fuel resource for generating energy in steel industry. Further the energy intensive and pollutant mechanisms used in transporting these resources to

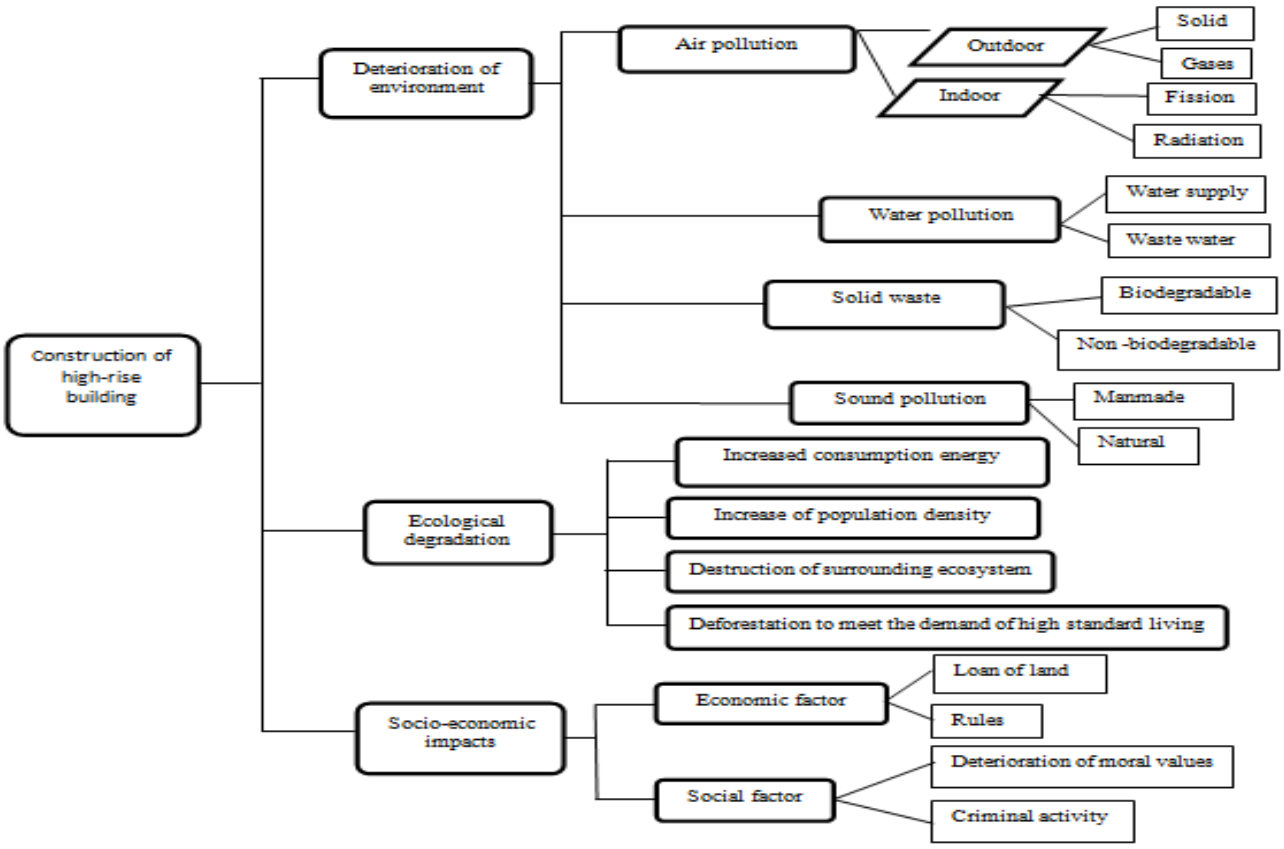
Published by: The Mattingley Publishing Co., Inc.

March - April 2020
ISSN: 0193-4120 Page No. 5137 - 5142

the production places are few examples illustrating the cost of development. Complete ecosystems contain a sufficiently diverse set of living and non living components to be entirely self-sustaining. Millions of trees are chopped down every year for erection of multistoreyed buildings which spoil the whole ecosystem of that place. Some times for developing a plot indiscriminate filling up of banks and ponds are done. Pond in itself is an ecosystem. Filling of ponds leads to drainage problem. As the construction work starts an inflation of labour class leads to further destruction of shrubs and grasses.

The skyline of Indian towns is changing with a chain of Multistoreyed buildings multiplying at a mind boggling speed, Sun setting can hardly be seen as squares of light start appearing in enormous structures all looking the same. From Delhi to Cochin Indian cities have started to practise the multistoreyed culture. Even Kerala, where once only cottages existed through the coconut grooves is now going for multistoreyed apartments. Calcutta, the city of Palaces had gradually turned into concrete jungles with the erection of Multistorey Buildings. In many cases, watery land and ponds are filled indiscriminately in gross violation of municipal rules.

In The Chennai Metropolitan area new buildings come up at the rate of 500 per year, according to C.H. GopinathRao, renowned architect and former chairman of Institution of Engineers, Tamil Nadu. In Kerala cities are facing the problem of water scarcity as more Multistorey buildings come up. Private agencies which sponsor flats construct huge water tank to which water is diverted from the municipal water supply system. The resultant water scarcity experienced by single storeyed houses already existing in such areas has led to public protests. The Construction of Multi-storeyed buildings is practised because the cost of the land is extravagant and continuing this process without restraint only adds fuel to the flames of urban congestion , blight and disintegration. This is briefly explained in the following flowchart:



Published by: The Mattingley Publishing Co., Inc.

March - April 2020
ISSN: 0193-4120 Page No. 5137 - 5142

II. CONCLUSION

The strategy of carrying out a Multistorey review is intended as an aid to decision makers that is developers, planners, engineers and architects. Though such persons have tended to be sceptical of such an effort as costly and time consuming, in the long run it may actually save time and resources through an accounting of planning gaps not initially perceived thus the impact of multi-storeyed buildings are not always positive due to lot of hidden disadvantages it has from environmental point .These buildings are neither sustainable and not have so much advantage that people should opt it for their residential, commercial purposes. This paper makes small attempt to highlight the impact of multi-storeyed building. A full accounting of impacts is needed to check the sustainability of these projects.

REFERENCES

[1] Bruel. P.V. and clessen, H.P., 'Infrasonic measurements ", Techinical Review. No .3, 1973 , pp 23-24

[2] Canter. L,N., Environmental Impact Assessment", McGraw Hill Book Company, New York, 1977, PP38-40

[3] Heinke, G.W. "Population and Economic Growth", Environmental Science and Engineering , Pretice Hall Inc, Englewood, 1989, PP- 32-40

[4] Joglekar, M.N. ,"Sustainable development Planning", Journal of Indian Architect and Builders, Dec 1992, PP67-71

[5] Rucheiman.L, , "Impact Review of High Rise Buildings", Journal of Urban Planning and Development , July, 1977, pp 83-87

[6] Soma Basu, "Delhi Bursting at the seams", Survey of the environment, 1995, The Hindu.

Published by: The Mattingley Publishing Co., Inc.