An Assessment of Environmental Impacts of Real Estate Development in Urban Areas

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Abstract- *Real estate development is on rise across urban India. Existing cities are expanding and new urban centers are being developed. But this development is taking place adversely affecting the environment, and it is a common belief among the developers that such developments do not have any significant impact on environment. The paper aims to rectify this common belief. The methodology involves rating of environmental impacts due to real estate development through risk rating matrix. The data were collected through questionnaire survey among the stakeholder related to real estate development. It was revealed that impact on resources, increase in pollution and impact on local populations are the major environmental impacts due to real estate development.*

I. URBANIZATION AND GROWTH

The planning commission of India has defined the term 'real estate' as land, including the air above it and the ground below it, and any buildings or structures on it. The term includes building structures like residential buildings, commercial buildings, malls, theatres, hotels, restaurants, retail outlets and industrial buildings.

India is a developing country and still majority of its population lives in rural areas. There is significant amount of migration from rural areas to urban cities in search of better job opportunities and better life. Apart from rural to urban migration, increase in population is also a major reason of increase in urban areas. Population of India is still increasing, according to census report 2011. With changing lifestyle and thinking, there has also been increase in nuclear families, which increases the demand of urban residential space.

In such a scenario urban expansion of existing cities and development of new urban centers is bound to take place. According to CREDAI, the Indian real estate sector may reach around US$180 billion by 2020. The real estate development sector is also a major employer and contributes to the economy of the country.

II. Environmental impacts

Whenever environmental pollution is discussed, industrial pollution becomes the center of the discussion. Real estate development is not considered, as it is believed to be one of the least polluting sectors. But that is not true. Real Estate development has significant direct and indirect impacts on the environment. For both construction and post construction phase, various resources like land, building materials, water and energy are required. Infrastructure for connectivity, transportation and waste management are required. Buildings are one of the major contributors to climate change.

In this view, it is important to assess the environmental impacts due to real estate development in order to promote sustainability

III. Methodology

The methodology adopted involves development of risk matrix. The data for the analysis was collected through questionnaire survey. The survey was conducted through stakeholders related to Real Estate Development sector, which includes developers, contractors, government officials and environmental consultants.

The respondents were asked to rank the environmental issues in terms of level of consequence and level of frequency separately. For every environmental issue, summation of the scores given by different respondents for level of consequence and level of frequency was carried out. Then by dividing the total score by total number of respondent an average score was generated.

The environmental issues inquired were categorized as follows

1. Impact on construction workers
2. Impact on local population
3. Impact on local flora and fauna
4. Impact on natural drainage system
5. Impact on soil
6. Impact on ground and surface water
7. Impact on natural resources
8. Impact on infrastructure
9. Impact on air and climate

Level of Consequence	Description
1	Insignificant
2	Minor
3	Moderate
4	Major
5	Catastrophic

Level of Frequency	Description
1	Never
2	Rarely
3	Likely
4	Mostly
5	Always

The scores for level of consequence and level of frequency were marked as explained in above tables.

Based on the total score given by the respondents for each environmental issue, a risk matrix was created.The equation used for generating the significant rating of risk includes

$R = F \times S$

Where
R denotes the significance rating of an environmental issue in real estate development;
F denotes the frequency of occurrence; and S denotes the severity of environmental issue.

IV. Result and discussion

The table below shows the average of the scores given by respondents for each environmental issue. Separate scores were given for level of consequence and level of frequency. RII has been generated as per equation explained above. Based on RII, priority has been assigned to various environmental issues.

Issues	Level of consequence	Level of frequency	RII	Priority
Impact on construction workers	3.2	3.3	10.6	6
Impact on local population	3.3	3.9	12.87	2
Impact on local flora and fauna	3.1	3.6	11.16	5
Impact on natural drainage system	2.0	2.7	5.4	9
Impact on soil	2.2	3.0	6.6	8
Impact on ground and surface water	3.5	3.2	11.2	4
Impact on natural resources	3.6	3.9	14.04	1
Impact on infrastructure	2.3	3.2	7.36	7
Impact on air and climate	2.9	4.0	11.6	3

From the above table, it is clear that the major environmental impacts related to real estate development are resource extraction, impact on local population and impact on air and climate.

Impact on natural resources was identified as the most important impact. Impact on natural resources includes extraction of natural minerals and timbers for building materials. There are certain building products that are manufactured through polluting manufacturing processes and increase in their demand increases the pollution associated with them. Also the embodied energy of certain building materials is high.

Impact on local population includes loss of agricultural land for farmers and; loss of opens paces used by urban developers for playing, parking and other recreational activities.Due to commercial development like malls, theaters, shopping complexes, banks there is increase in traffic, noise and air pollution affecting the local residents of the area. Due to decrease in percolation area for rainwater runoff, problems ofwater logging and flooding occurs which results in inaccessibility, inconveniency and unhygienic conditions affecting the local residents of the area.

Impact on air and climate includes impact due to increase in air pollution due to increase in vehicular emission and traffic, air pollution due to polluting manufacturing processes related to construction sector and increase in green house gas emission affecting climate.

V. CONCLUSION

The study investigated the environmental impacts due to real estate development in India. The result demonstrated, the impact on resources, impact on local population and impact on air and climate as the major environmental impacts due to real estate development.

The results of this research can be an influential assessment tool to assist construction practitioners to improve the environmental performance of real estate development. The outcome of the research will help the organizers and planners to prepare proper sustainability plans to achieve sustainable development.

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