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Need for Sustainability and Green Practices in Large Developments

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ABSTRACT: Large Scale Developments have been an integral part of development of Indian Civilizations. However, growth of these 'Large-scale Developments' have begun to take toll on the natural resources and ecology which have existed without any foreign disturbances. With mankind's development 'spree', it has nearly become impossible to not damage a portion of land without counteracting sufficient resources in return. Thus, a need has arisen for making these developments self-sustainable and ecologically sound. This paper discusses the need of 'Sustainability' and 'Green Construction' in individual buildings and large developments; how these terms are different from each other; how they affect a development; what are the Green Rating Systems which are used in India for curtailing the same; what are their weightages and how they can positively affect the damage that the construction malpractices in the country have put up.

Keywords: Sustainability, Large Scale Developments, Green Construction

I. INTRODUCTION

The urban population of India is growing at a much faster rate than the overall rate of population growth. Many people are moving to cities because of the available opportunities and the availability of infrastructure facilities. The economic growth of India has also brought in foreign investments and hence is increasing opportunities for locals. (Gandhi) This has led to the growth of Large-Scale Urban Developments in the country at a remarkable scale: retrofitting in an existing built-up area, redevelopment of urban built-up environment (Development) which would include Institutions of large scales and formation of new cities. However, competing with the world has led to ignorance of actual sustainability and liveable conditions as a perspective for future. Also, malpractices in the construction of individual buildings and developments has led to damage of the environment due to catastrophic blows on the limited amount of resources that India has now. Therefore, it has become a necessity for establishment a sustainable lifestyle of upcoming urban bodies in 21st Century and to find nuances in the ones already built for making them sustainable and liveable.

II. NEED

The growing urbanization, economic growth and rising consumption pattern have led to a significant increase in the per capita consumption of natural resources and thus the ever widening gap in the supply of electricity, potable water and many other things. Construction on a site leads to the disruption of existing ecological cycles and demand for various resources like water, energy, etc. and thus have a detrimental effect on their surroundings. Therefore, a need has arisen for making the development self-sustaining and energy efficient; so as to reduce the overall load on the direct supply which comprises of precious non-replenishing resources. (Council)

According to the 12th Five Year Plan, released by the Planning Commission of the Government of India, nearly 285 million people were living in urban agglomerations. This number increased to almost 380 million in the year 2011 and by 2030, almost 600 million people will be living in urban areas. Increasing population coupled with continued urbanization is likely to result in the emergence of about 60-70 cities with population of more than a million by 2030 (Council)

Therefore, a need has risen for making developments as individual units combining all the necessary infrastructure self-sustaining and energy efficient; so as to reduce the overall load on the direct supply which comprises of precious non-replenishing resources. A development is self-sustainable when it can sustain itself without external support.

This ideally means it doesn't have to take up supplies from the grid and the generation of waste could be treated and used in the site. It still takes up power from the grid initially, however, it is able to generate the same amount of energy and more in a certain period of time. The efficient use of the same energy is required so as to keep up with the demands created within the site; the prime goal being taking up the least possible amount of energy.

Also, an Environmental Performance Assessment is required for a systematic comparison with other developments and building practices which focuses on:

- Changes to Ecology and Natural Resources
- Changes to Environment at Local, Regional and Global Scale.

So, it is required to:

- Pay heed to the design practices and guidelines that are followed to plan these developments.
- Make them in such a way that they promote sustainable development with lesser impact on environment.

III. WHAT IS SUSTAINABLE DESIGN?

Sustainable Design refers to the design of a 'physical object' being self-sufficient in terms of the built environment and services to comply with the principles of social, economic and ecological sustainability. (McLennan) This ideally means it doesn't have to take up supplies from the grid and the generation of waste could be treated and used in the site. It still takes up power from the grid initially, however, is able to generate the same amount of energy and more in a certain period of time.

What skills are required for a sustainable building?

- Defining Sustainability
- Defining sustainable and green buildings
- Local interpretations of sustainable buildings
- Different criteria for making a building sustainable
- Life cycle of a building and how it is sustainable

Sustainable architecture is architecture that seeks to minimize the negative environmental impact on developments by efficiency and moderation in the use of materials, energy, and development space and the ecosystem at large. Sustainable architecture uses a conscious approach to energy and ecological conservation in the design of the built environment. Energy Efficiency over the entire life cycle of a building is the most important goal of sustainable architecture. Architects use many different passive and active techniques to reduce the energy needs of buildings and increase their ability to capture or generate their own energy. One of the keys to exploit local environmental resources and influence energy-related factors such as daylight, solar heat gains and ventilation is the use of site analysis.

Individual buildings in a development need to be made sustainable as far as possible keeping in mind the economic feasibility of the development. Sustainability at a development level can be achieved

Fig. 1. Importance of Sustainability.

when we keep the entirety of the development and practice in accordance to the same. This would not only allow the economic feasibility in curtailing infrastructure, but will also help in maintenance of the same. Also, the overall development will allow in an overall sense of equality amongst people with regards to infrastructure, which can in turn generate a healthier social lifestyle.

IV. WHAT IS GREEN CONSTRUCTION?

Green Construction refers to both a 'structure' and 'the using of processes' that are environmentally responsible and resource-efficient throughout a building's life cycle: from siting to designing, construction, operation, maintenance, renovation and demolition. In other words, green building design involves finding the balance between homebuilding and the sustainable environment. This requires close cooperation of the design team, the architects, the engineers, and the client at all project stages. The Green Building practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. (Agency).

Although new technologies are constantly being developed to complement current practices in creating greener structures, the common objective of green buildings is to reduce the overall impact of the

built environment on human health and the natural environment by:

- Efficiently using energy, water, and other resources
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- Protecting occupant health and improving employee productivity
- Reducing waste, pollution and environmental degradation

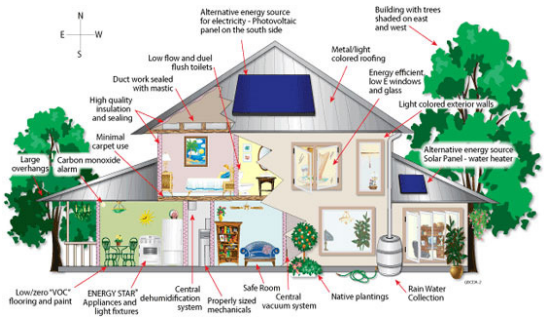

Fig. 2. A typical Example of Green Building.

Globally buildings are responsible for a huge share of consumption of energy, electricity, water and materials. The building sector has the greatest potential to deliver significant cuts in emissions at little or no cost. Buildings account for 18% of global emissions today, or the equivalent of 9 billion tonnes of CO_2 annually. If new technologies in construction are not adopted during this time of rapid growth, emissions could double by 2050, according to the United Nations Environment Program.

Green building practices aim to reduce the environmental impact of building. Since construction almost always degrades a building site, not building at all is preferable to green building, in terms of reducing environmental impact. The second rule is that every building should be as small as possible. The third rule is not to contribute to sprawl, even if the most energy-efficient, environmentally sound methods are used in design and construction.

While the practices or technologies employed in green building are constantly evolving and may differ from region to region, fundamental principles persist from which the method is derived: siting and structure design efficiency, energy efficiency, water efficiency, materials efficiency, indoor environmental quality enhancement, operations and maintenance optimization and waste and toxics reduction. The essence of green building is an optimization of one or more of these principles. Also, with the proper synergistic design, individual green building technologies may work together to produce a greater cumulative effect.

Green Rating Systems prevalent in India (Shailesh)

1. IGBC-LEED
2. BEE
3. GRIHA & GRIHA-LD

Indian Green Building Council (IGBC)

The Leadership in Energy & Environmental Design (LEED) is the rating system developed for certifying Green Buildings. LEED is developed by the U.S. Green Building Council (USGBC), the organization promoting sustainability through Green Buildings. LEED is a framework for assessing building performance against set criteria and standard points of references. The benchmarks for the LEED Green Building Rating System were developed in year 2000 and are currently available for new and existing constructions.

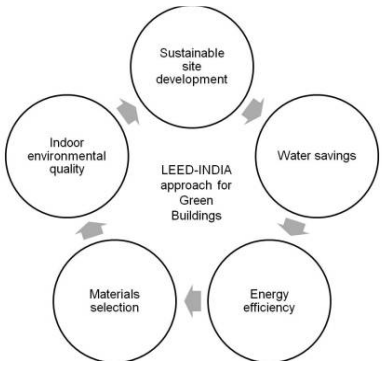

Fig. 3. What comes under LEED-India?

Confederation of Indian Industry (CII) formed the Indian Green Building Council (IGBC) in year 2001. IGBC is the non-profit research institution having its offices in CII-Sohrabji Godrej Green Business Centre, which is itself a LEED certified Green building. Indian Green Building Council (IGBC) has licensed the LEED Green Building Standard from the USGBC. IGBC facilitates Indian green structures to become one of the green buildings.

IGBC has developed the following green building rating systems for different types of building in line and conformity with US Green Building Council. Till date, following Green Building rating systems are available under IGBC:

- LEED India for New Construction
- LEED India for Core and Shell
- IGBC Green Homes
- IGBC Green Factory Building
- IGBC Green SEZ
- IGBC Green Townships

Bureau of Energy Efficiency (BEE)

BEE developed its own rating system for the buildings based on a 1 to 5 star scale. More stars mean more energy efficiency. BEE has developed the Energy Performance Index (EPI). The unit of Kilo watt hours per square meter per year is considered for Indians were aware of Green Building concepts from the beginning. Conventional homes with baked red colour roof tiles and clay made walls is a really good example of energy efficient structures that are used to keep cool during summers and warm during the winters. Most of rural India is still attached to this building technology with naturally available materials like clay, wood, jute ropes, etc. Today we have advanced technologies that create smarter systems to control inside temperature, lighting systems, power and water supply and waste generation. Green buildings might be a bit heavy on the purse but are good for the environment. In this rapidly changing world, we should adopt the technology that helps us to save precious natural resources leading us to true sustainable development.

Green Rating for Integrated Habitat Assessment (GRIHA)

Green Rating for Integrated Habitat Assessment (GRIHA) is India's own rating system jointly developed by TERI and the Ministry of New and Renewable Energy, Government of India. It is a green building design evaluation system where buildings are rated in a three-tier process. The process initiates with the online submission of documents as per the prescribed criteria followed by on site visit and evaluation of the building by a team of professionals and experts from GRIHA Secretariat. GRIHA rating system consists of 34 criteria categorised in four different sections. Some of them are–

1. Site selection and site planning,
2. Conservation and efficient utilization of resources,
3. Building operation and maintenance, and
4. Innovation.

Commonwealth Games Village, New Delhi, Fortis Hospital, New Delhi, CESE (Centre for Environmental Sciences & Engineering) Building, IIT Kanpur, Suzlon One Earth, Pune and many other buildings has received GRIHA rating

GRIHA for Large Development (Council)

The GRIHA Council, in association with The Energy and Resources Institute (TERI) and the Ministry of New and Renewable Energy (MNRE), has launched the Green Rating for Integrated Habitat Assessment (GRIHA) in order to address and promote green buildings in India. However, a need was felt to create a framework to assess the environmental performance rating the building and especially targets air conditioned and non-air conditioned office buildings. The Reserve Bank of India's buildings in Delhi and Bhubaneshwar, the CII Sohrabji Godrej Green Business Centre and many other buildings have received BEE 5 star ratings.

of larger developments, the singular units which together make up cities – neighbourhood/townships – and with this focus; GRIHA Council along with TERI has developed a rating system for large developments titled – GRIHA LD (Large Developments). The intent of GRIHA LD is to provide a consolidated framework for assessment of environmental impacts of large scale developments. All projects with total site area greater than or equal to 50 hectares (125 acres) may apply for a GRIHA LD rating system.

1. Reduction of detrimental impacts of the projects on the surroundings
2. Attempt to achieve self-sufficiency in aspects like energy, water, etc.

GRIHA-LD Manual refers to the overall impact on environment, energy, life, society, connectivity and their impact on the immediate and local surroundings as well. The points addressed in this are:

1. Site Planning
2. Energy
3. Water and Waste Water Management
4. Solid Waste Management
5. Transport
6. Social

V. Green Practices as a future of Sustainability

So, the up and running question in the current scenario, is why green construction is required for the sustainability of a development. And why the techniques used in a region not enough to actually cater to all the needs required in a development. For understanding this, we must understand what are the so-called Green Construction Practices in a region?

The answer to the latter is comparatively simpler. Green Construction Practices are the practice to make a project more energy-efficient and sustainable. This refers to the use of materials and practices which will be best suited for a region; meaning that the vernacular practices in a region are the best suited Green Practices one can achieve for a building depending on their use.

A building can be made energy efficient with a variety of practices, which includes both vernacular and futuristic architecture likewise. An understanding needs to be established that green practices are not severing the cultural and vernacular threads, but rather trying to bridge the gap between a golden past with a planned future.

The construction malpractices that have now been thriving for decades in the threads of the society has led to beliefs of falsifying intentions of a few which hampers the integrity quotient of new practices.

- Poor designing of the existing buildings in the name of making them Green
- Scoring points blindly with the given assessment criteria
- The loopholes in the said criteria which lead to the falsification of practice at a wholesome level
- Inaccessibility of expertise on the issues amongst general mass
- Decisions taken without prior consideration of the effects which would impact the development as a whole.

However, the proper practice of Green Construction and Sustainable Development can have tremendous potential. When executed properly, the Green Construction practices have given revolutionary designs which have set landmarks in the ranks of Developments. Thus, a proper designing of Sustainable practice would require the use of the practices that are best suited for the project on the given site, and how the site's resources can be used, without exploitation of the resources as a whole. Construction malpractices kept in check and people can be made aware of how the sustainable construction will give them the opportunity to not only save the environment, but also allow them to live a healthier and economically feasible lifestyle.

The world depends on the limited resources which it has. Upcoming revolutions are not yet enough to curtail all the depletion of resources due to the rise in global population and affordability per capita. Thus, Sustainable Design and Green Practices are required to be understood and made use of. This would provide the opportunity to stabilize between sustainable practices and provide a better future for the country and the world as a whole.

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