RAKSHAK FOUNDATION

THE REAL STATE OF THE 'REAL ESTATE' IN INDIA

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Preface

I, Prakhar Srivastava, am a third year, mechanical engineering student, B.Tech-IIT, BHU. I am a resident of Gorakhpur district in Uttar Pradesh, India.

Rakshak Foundation is a non-profit organisation based in Santa Clara, California, USA which researches on various public policies and issues and spreads awareness among the people. Volunteers from all across the globe come up to bring the perspective of Rakshak foundation on various issues which attract attention of the decision making bodies in US and India. It selects ignited minds from all across the country and provides them a platform to express and discuss their ideas and interpretation of various topics. Rakshak creates awareness about social, civic and legal issues at various levels of administration among the people.

The project I got was "to research on the effects of the real estate boom and the development of massive new projects around industrial centers on air, water, green spaces and the society." Now, with the increasing pressure on all our resources, it is clear that sustainable development is the only way out to our concerns. Moreover, most people of India are not rich enough to afford a better, comfortable yet socio-friendly habitat since it is much expensive. Therefore, it was quite a challenge for me to devise a method which makes everyone satisfied- the rich, the poor and the Mother Nature.

Moreover, seeing the relevance of the project in today's scenario, I took the project without hesitation. Therefore, even the slightest results and minuscule contribution will leave me satisfied.

Prakhar K. Srivastava

Rakshak Foundation

Acknowledgement

This project would not have been completed in its present form without the amazing support of some people.

I would begin by thanking my mentor, Mr. Rakesh Ranjan, Director (Housing and Urban Affairs), Planning Commission, who took out some precious time despite his busy schedule and guided me at every step of the project that made me to achieve my goals much easily. He analysed my recommendations and told the goods and flaws in them.

I would like to thank Rakshak Foundation for providing a great platform to make me aware of the public policies and other such issues in a very unconventional, yet super effective method. I would like to extend my heartfelt regards to the co-ordinators- Mr Rohit Agarwal, Mr Kunal Sharma and Mr Braj Kishore for constantly and continuously checking on me and preventing me from going erroneous. Besides, they have also been a great company.

At last, I would like to thank my friends, here at Rakshak Foundation, who made the experience much more enlightening by constantly raising questions and pointing out my rights and wrongs without inhibitions. There contribution was immense towards my project and enjoyable experience.

Prakhar K. Srivastava

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Executive Summary:

Overview:

- The project is to research on the effect of current real estate boom and upcoming massive new development projects/ High rise buildings on environment and people and to come up with a possible model and effective solution for the presently existing problems.

Scope:

- Research on the effect of the following developments on environment and people.
- Know about the various factors leading to Real estate boom and examples of how some of the projects affect the society.
- Discuss the various rules and policies made by the government and the initiatives taken by various NGO's in this regard.
- Come up with a model solution to the problems caused by these project to the environment and local people.
- Also come up with cost affective housing solutions for the economically weaker sections which are sustainable at the same time.

Problems:

- Ill effects of the real estate boom, the development of massive projects and high rise buildings in air, water and the green effects.
- Other socio-economic problems faced by the local residents who cannot afford housing in such residences.
- Affordable housing shortage faced by the EWS and other poor villagers that flock towards cities in search of jobs since very few real estate company focuses on these people.

Goals:

- Study the Indian real estate market with the statistics, the factors causing real estate boom and the impact of such projects on environment and people.
- Come up with a model solution to the various socio-economic problems associated with such projects.
- And to provide recommendations such that all the sections of the society is benefitted with the real estate boom.

Key findings:

- Market value of real estate and its role in Indian GDP.
- Factors leading to the real estate boom and the effects of this on an individual, the society and the environment.
- Problems faced by the common people such as decreasing urban free space, increasing congestion etc.
- Various Government policies and laws that have affected or will affect the development of massive projects.
- Possible solutions that can be offered to do away with the environmental problems related to these projects such as developing 'green buildings'.
- Various ways in which affordable and sustainable housing can be developed of which the people are either ignorant or have a paranoid opinion.

All our efforts to defeat poverty and pursue sustainable development will be in vain if environmental degradation and natural resource depletion continue unabated.

Kofi Annan, UN Secretary-General

1. Introduction to the real estate

1.1 Background Information:

Half a century before, almost ninety percent of the Indian population used to live in the villages. Villages were thought to be the real face of India and Agriculture the prime economy. Fifty years from then, still seventy percent of our people live in villages. Clearly, the rate of urbanisation has been very slow and unsteady. The growth of Indian cities had always been unplanned and unorganised. However, the huge influx of money after liberalisation and the technological spurt has rejuvenated Indian cities.

Current situation:

With a staggering population hovering a little over 1.2 billion, India, the second most populous country, after China is in a process of becoming a real estate focal point.

Like every other thing in India, the real estate has completely revamped its course since the advent of globalization. This revolution is not only confined to the metro cities but has paved its way to the Tier2 and the Tier3 cities also. And the pace has not become stagnant neither has it gone slow, it has and is continually speeding up.

The demand for new office space in India has risen significantly from 3.9 million sq. ft in 1998 to 16 million sq ft in 2004-05 and is projected to reach its height at 160mn sq. ft by 2014 which is a growth of 900% within the span of 10yrs. What is

worth noting, is the fact that this growth has been estimated taking into account of the economic recession and the current 'Euro zone crisis'.

Prominent real estate developers have circumscribed every metropolitan & big cities of our country not only for rapid construction and sale of commercial properties in India but are largely involved in re-sale, renting and leasing of the same. Commercial properties in India mainly consist of multiplexes, shopping malls, branded retail outlets as well as IT spaces etc. All big developers and builders like DLF, Parsvnath, Omaxe, MGF, Ansals API, Godrej and India bulls etc. are making huge profits from commercial properties in India.

What should be the nature of real estate boom?

Figure 1

www1.indstate.edu/facilities/sustainability/

The Venn representation shows that real estate growth should be sustainable and it shows what it means to be sustainable. the idea of sustainability, or ecological design, is to ensure that our actions and decisions today do not inhibit the opportunities of future generations.This term can be used to describe an energy and ecologically conscious approach to the design of the built environment.

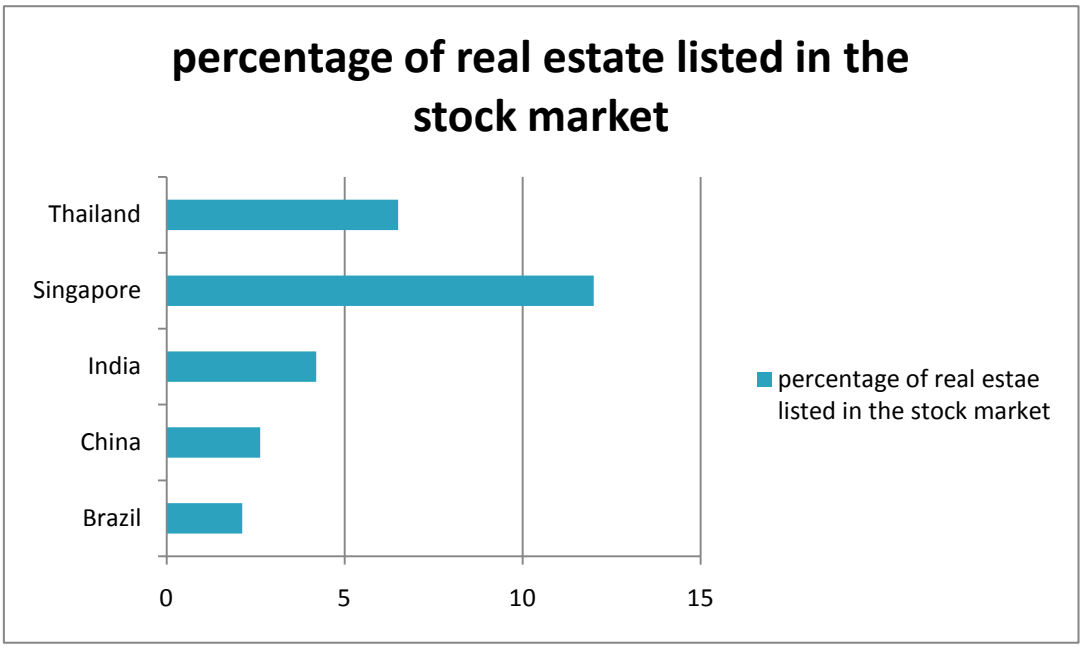
So say the statistics.

On a global standard, Indian real estate market stands out low in contrast to the global norm. The market capitalization of real estate is 4.2% which is very less compared to the worldly average of 15%.This might be because India opened its gate to globalisation very late in 1992 when most countries were already enjoying its benefits.

However, many big developers like DLF and HDIL are coming up with IPO's worth billions due to the ever increasing demands. The suspicion of many trade pundits stating that the demand is depreciating due to inflation and recession is now denied. The real estate is booming with a growth rate of 35 per cent. The realty sector is estimated to be worth US$ 15 billion and anticipated to grow at the rate of 30 per cent annually over the next decade, attracting foreign investments worth US$ 30 billion, with a number of IT parks and residential townships being constructed across-India. Moreover, the market capitalization is anticipated to double from current listings of worth Rs. 80,343 crore to 1.7 trillion.

Also, worth noting is the point that for every rupee spent on the real estate, 78 paisa goes to the Indian GDP. The real estate has its significant linkages with other major sectors of our economy and more than 250 associated industries. A unit increase in this sector has a multiplier effect and the capacity to generate income as high as four to five times. If the economy grows at a rate of 10% and the infrastructure sector grows at 15%, it can generate more than 3 million jobs within a decade which might be a panacea to all our problems.

Figure 2



Factors fuelling the Real Estate market in India

Historically, the Indian real estate sector was highly unorganised and characterised by various factors that inhibited organised dealing, uniform law across the states was absent, interest rates were higher and there were no financing banks.

However, after the advent of liberal policies issued by the government, real estate has been on a continous rise. Many factors are together responsible for real estate boom. They can be listed as:

1) **Residential**: The growth in the residential demand is largely due to the following reasons.
   a) Rapid growth of the middle class income families.
   b) Increase in overall population of the country.
   c) Increasing aspiration levels of the people.
   d) Easier house loans are available at cheaper rates.
   e) Fiscal incentives by the government such as exemption in tax if home loan has been taken.

f) Higher disposable incomes

g) And of course, the old Indian mindset to save money in which ever form possible. Real estate is best form of investment according to a majority of Indians for the old qoute reads that "the best investment on earth is earth".

2) <u>Office spaces</u>:

a) India is now considered as the most attractive place for BPO and IT sector owing to its vast pool of cheap and efficient labour.Many companies like Goldman Sachs and other telecom companies are building offices in India.

b) Best example of the direct effect of the boom in IT to the boom in realty is our cyber city-Hyderabad. Few years after it was known to be India's silicon valley,demand for residential and office buildings grew exponentially.

3) <u>Retail sector</u>:

a) Entry of global brands such as Reliance, Benette & Coleman etc. In retail has changed the dimensions of organised retail sector.

b) If the ongoing bill in the parliament in context of the permission of 100% FDI in retail sector is passed, it will be no less than a new economic revolution. Apprehensions regarding risk to economic independence might be true,but retail sector will certainly be benefitted by it,no doubt.

c) India was ranked as second most attractive destination for the retail companies seeing its vast amount of consumption and the demographic factors by AT Kearney.

d) The increasing affluence has led to a direct increase in consumerism. Therefore, more and more and bigger and bigger malls are being constructed.

4)<u>Hospitality Industry:</u>

a)With the Indian economy growing at a exceedingly rate of 7-8% p.a., nothing including the hotel industry remains unaffected. Investments in the hotel industry is going to be worth $20 billion within the span of next five years.

b) Tourism is one of the greater sources of economy for any country. And the hospitality industry is the medium of gaining those monetary benefits. 2004 recorded the highest 3 million tourists which by 2020 is expected to reach at 8 million.

c) Boom in the hospitality industry is also attributed to the increase in Foreign Direct Investment (FDI).

1.2 Main Problems and their impact on society:

1.2.1 High rise buildings:

- Hi-tech controls add intelligence to 'inanimate' buildings
- Water - another vital resource for the occupants, which gets consumed continuously during building construction and operation
- Several building processes and occupant functions generate large amounts of waste
- Buildings are thus one of the major pollutants that affect urban air quality and contribute to climate change
- The high rise buildings are more prone to the earthquakes and fires etc. Moreover, the population within the high rise is much more and it is difficult to escape under such circumstances. Therefore, strict safety norms have to be maintained which effects in increasing cost of construction.
- Renovation in high rise is much costlier.
- Apart from the problems faced by the residents of the building, there are few more problems which are suffered by general public, majority of which cannot afford to live a luxurious life in a planned township or other high rise buildings. These are:

    i) The high rise buildings generate more population pressure on a specific amount of land than a normal housing due to high population density. This leads to more waste generation, overcrowding, traffic jams etc. and causes environmental degradation.

ii) The local people suffer a lot because already their basic amenities are not fulfilled and these buildings compel them further to live amidst severe lack of resources.

Elaborate description of few problems:

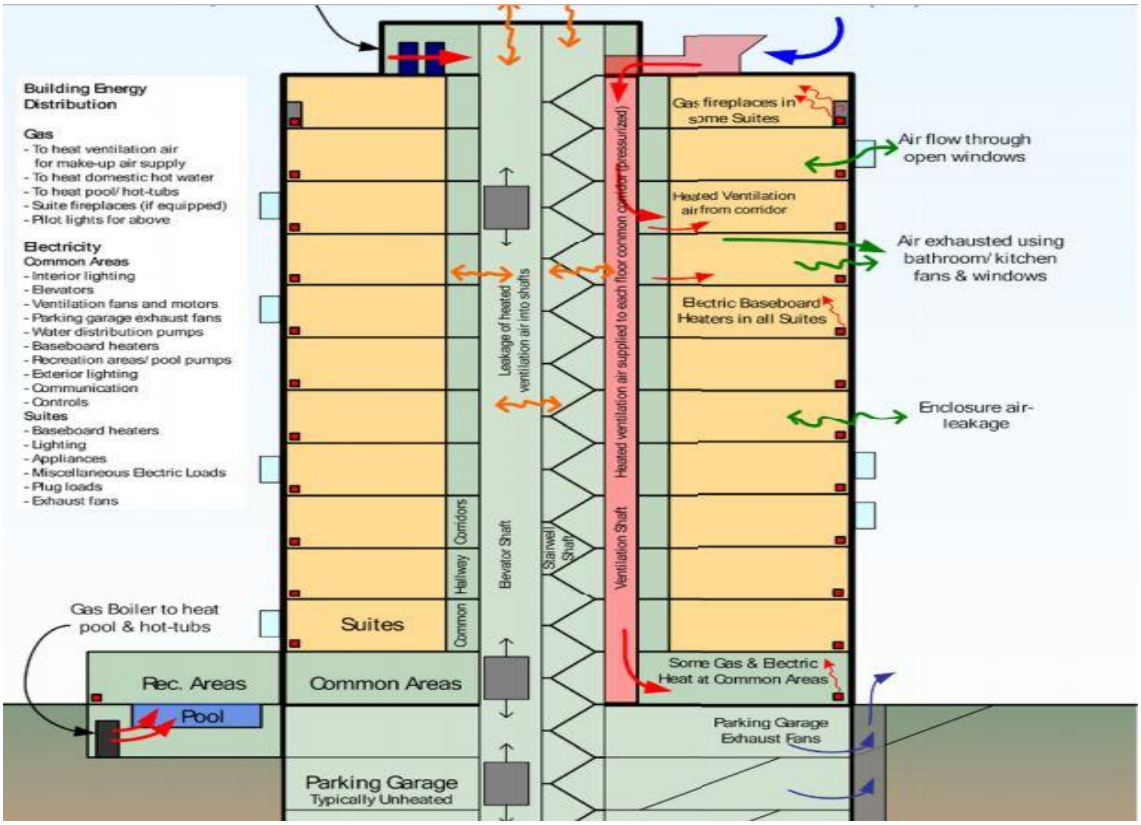
- **HIGH ENERGY CONSUMPTION:** Almost 40% of the total energy consumed by the world is by the realty sector. Therefore, high energy consumption is the biggest problem posed by these buildings. Following is the picture showing global energy consumption by various sectors.

Figure 3

World energy use per sector[51]				
	2000	2008	2000	2008
	TWh		%*	
Industry	21,733	27,273	26.5	27.8
Transport	22,563	26,742	27.5	27.3
Residential and service	30,555	35,319	37.3	36.0
Non-energy use	7,119	8,688	8.7	8.9
Total*	81,970	98,022	100	100
Source: IEA 2010, Total is calculated from the given sectors Numbers are the end use of energy Total world energy supply (2008) 143,851 TWh				

High energy consumption is chiefly due to elevators, high power water pumps and HVAC System being installed in almost all new buildings etc. A fig. substantiating the point is shown below.[i]

Figure 4



- **MORE PRONE TO DISASTERS:** The multiple floors of a high-rise building create the cumulative effect of requiring great numbers of persons to travel great vertical distances on stairs in order to evacuate the building. In the evacuation of the World Trade Centre high-rise office towers following the terrorist bombing in 1993, the tens of thousands of building occupants successfully and safely traversed some five million person-flights of stairs.

Moreover, in case of earth quakes high rise buildings are the greatest risk and to prevent which lot of material utilisation is required. Also, cities like Delhi come under earthquake prone areas and hence better secure proof buildings are desired.

- **OVERCROWDING**: At nearly all times, local population density increases sharply after the construction of High rise residential buildings. This leads to an

increase in pressure on the neighbourhood resources and on the nearby society. Therefore, construction of a high rise is often opposed by the nearby population.

- **PSYCHOLOGICAL ISSUES:** High rise buildings have a deep negative impact both at the individual and collective level. By limiting living space and outdoor areas that have traditionally played a vital role in joint large families, high rise encourages smaller and nucleated families. In this way it hampers our cultural roots. Moreover, the evidence, on balance, suggests that high rises do cause strain or mental health issues, at least for some residents. More typically, studies report some form of strain associated with high-rise living. In a study with essentially random assignment,

  British military families in walk-ups (3-4 storeys) had about three times the rate of neurosis as those who lived in detached houses (Fanning, 1967). A study that compared walk-ups and houses found trends in the same direction, but not significant differences. The residents are frequently exposed to constant stresses in the form of pollutant emissions and electro smog.

  High-rise buildings are sometimes described as microcosms; that is no doubt meant in a positive sense, but the reality is different. The people in a high-rise building are totally cut off from the world around them, from wind and weather, from temperature, from smells, sounds and moods. They live in an artificial world. At the same time, however, the high-rise buildings also have a negative effect on the world around them, for they not uncommonly generate air turbulence and downdrafts in their immediate vicinity; they can be a source of unpleasant reflections and some adjacent areas remain permanently in the shade.

- **SPECIAL EFFECTS:** Apart from some basic effects, the high rise also exhibits some 'special effects.' They are:

  i) Stack effect: It is the movement of air into and out of buildings, chimneys, flue gas stacks, or other containers, and is driven by buoyancy. It prevents proper ventilation and increases with height.

ii) Shear Lag effect: The framed tube building suffers from shear lag effects which cause non linear distribution of axial stresses along the face of the building.

iii) Veering effect: Sometimes, the sudden changes in wind and other climatic factors negatively affect the high rise buildings. This is Veering effect.

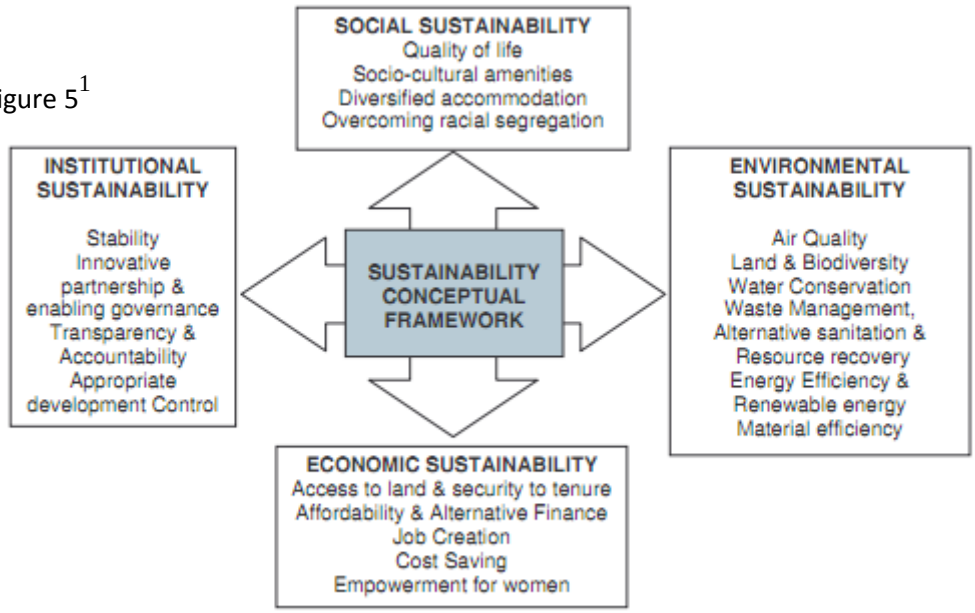
1.2.2 Development of massive new projects (residential and commercial)

- Big townships, commercial establishments and SEZ's are often responsible for large scale exodus of poor slum dwellers or farmers. They are very often not provided proper rehabilitation and compensation and their future is blurred.

  Source: Anahita Mukherjee (TOI)

- The government allocates a huge amount of money in the name of incentive to the already opulent industrialists. However, little is being done to restart the public schemes hanged in the middle due to insufficient funds. Subsidies on food, petroleum etc. either are decreased or have not seen a considerable increase.
- The area in which many townships are established is too much as compared to the country's average. For e.g. a resident of Lavasa will live in a sixteen times spacious living than an average citizen of India. This is good as long as we also ensure that all sections of our society have enough space to lead their life with safety and satisfaction. But, such inequality can only lead to failure.

Figure 5[1]



Adapted by author from South African Govt. and Housing sources

1.3 Regarding the energy efficiency of the High rise Buildings/other commercial establishments.

- **Energy Conservation Building Code (ECBC)**

The Energy Conservation Building Code (ECBC) is a document that specifies the energy performance requirements for all commercial buildings that are to be constructed in India. The ECBC was developed by an Expert Committee, set up by India's Bureau of Energy Efficiency (BEE), with support and guidance from United States Agency for International Development (USAID) and significant inputs from various architects, consultants, educational institutions and other government organizations. The Energy Conservation Building Code (ECBC) was launched by Ministry of Power, Government of India in 2007, as a first step towards promoting energy efficiency in the building sector. It is estimated that the nationwide mandatory enforcement of the Code will yield considerable annual energy savings.

This, coupled with the fast growing building sector, is likely to result in a big leap towards achieving nation's energy efficiency goals.

The code is mandatory for commercial buildings or building complexes that have a connected load of 500 kW or greater or a contract demand of 600 kVA or greater. The code is also applicable to all buildings with a conditioned floor area of 1,000 sq. m. (10,000 ft2) or greater.

This code provides minimum design requirement for :

(a) Building envelopes, except for unconditioned storage spaces or warehouses,

(b) Mechanical systems and equipment, including heating, ventilating, and air conditioning,

(c) Service hot water heating,

(d) Interior and exterior lighting, and

(e) Electrical power and motors.

The provisions of this code do not apply to:

(a) Buildings that do not use either electricity or fossil fuel,

(b) Equipment and portions of building systems that use energy primarily for manufacturing processes, and

(c) Multi-family buildings of three or fewer stories above grade, and single-family building.

Simulation Tool developed by ECBC: **ECOnirman** Whole Building Performance tool, a web-based building energy simulation tool for checking conformance with the ECBC using the Whole Building Performance method. It enables building developers and designers to test their building design using the energy simulation protocol established in Appendix B of the code. **ECOnirman** Whole Building Performance tool also predicts the performance of the building in terms of its annual energy consumption normalized to the building area. Being a web-based energy simulation tool, it can be made available to users over the Internet with minimal software requirements and building science or simulation expertise. The tool runs the Standard Design (baseline parameters from the ECBC prescriptive

requirements) and the Proposed Design (user specified inputs that allow the user to modify the ECBC prescriptive requirements) versions of the building and compares the Energy Performance Intensity (EPI) from the simulation results. A report that may be submitted to demonstrate conformance with the ECBC, can be generated. Key features of the tool are:

•Facilitates the users in assessing if a building meets the conformance requirements, keeping in view the five climatic zones in India as specified in the ECBC

•Generates a building's conformance report that compiles the data provided by the user and also indicates if the systems and sub-systems of the building are conforming or not conforming with the code requirements

•Stores multiple building projects under a single user profile.

•Stores the information in a central database for future reference, review, edit, and analysis purposes

•Keeps the information secured and confidential

•Is available in public domain for easy access to the users.

TERI – GRIHA rating system(TERI-The Energy and Resources Institute, GRIHA-Green Rating for Integrated Habitat Assessment)

Thirty Four Criteria of the Rating System under 4 Categories

I. Site Selection and Site Planning
II. Building Planning and Construction
III. Building Operations and Maintenance
IV. Innovations

List of criteria	Points	Remarks
Criteria 1: Site Selection	1	Partly mandatory

Criteria 2: Preserve and protect landscape during construction /compensatory depository forestation.	5	Partly mandatory
Criteria 3: Soil conservation (post construction)	4	
Criteria 4: Design to include existing site features	2	Mandatory
Criteria 5: Reduce hard paving on site	2	Partly mandatory
Criteria 6: Enhance outdoor lighting system efficiency	3	
Criteria 7: Plan utilities efficiently and optimize on site circulation efficiency	3	
Criteria 8: Provide, at least, minimum level of sanitation/safety facilities for construction workers	2	Mandatory
Criteria 9: Reduce air pollution during construction	2	Mandatory
Criteria 10: Reduce landscape water requirement	3	
Criteria 11: Reduce building water use	2	
Criteria 12: Efficient water use during construction	1	
Criteria 13: Optimize building design to reduce conventional energy demand	6	Mandatory
Criteria 14: Optimize energy performance of building within specified comfort	12	
Criteria 15: Utilization of fly ash in building structure	6	
Criteria 16: Reduce volume, weight and time of construction by adopting efficient technology (e.g. pre-	4	

cast systems, ready-mix concrete, etc.)		
Criteria 17: Use low-energy material in interiors	4	
Criteria 18: Renewable energy utilization	5	Partly mandatory
Criteria 19: Renewable energy based hot-water system	3	
Criteria 20: Waste water treatment	2	
Criteria 21: Water recycle and reuse (including rainwater)	5	
Criteria 22: Reduction in waste during construction	2	
Criteria 23: Efficient waste segregation	2	
Criteria 24: Storage and disposal of waste	2	
Criteria 25: Resource recovery from waste	2	
Criteria 26: Use of low - VOC paints/ adhesives/ sealants.	4	
Criteria 27: Minimize ozone depleting substances	3	Mandatory
Criteria 28: Ensure water quality	2	Mandatory
Criteria 29: Acceptable outdoor and indoor noise levels	2	
Criteria 30: Tobacco and smoke control	1	
Criteria 31: Universal Accessibility	1	
Criteria 32: Energy audit and validation		Mandatory
Criteria 33: Operations and maintenance protocol for	2	Mandatory

electrical and mechanical equipment		
Total score	100	
Criteria 34: Innovation (Beyond 100)	4	
Total score	104	

1.4 UNDERSTANDING 'GREEN BUILDINGS'.[ii]

Buildings are one of the major pollutants that affect urban air quality and contribute to climate change. Hence, the need to design a green building, the essence of which would be to address all these issues in an integrated and scientific manner. It is true that it costs a little more to design and construct a green building. However, it is also a proven fact that it costs less to operate a green building that has tremendous environmental benefits and provides a better place for the occupants to live and work in. Thus, the challenge of a green building is to achieve all its benefits at an affordable cost. A green building depletes as little of the natural resources during its construction and operation.

It maximizes the use of efficient building materials and construction practices; optimizes the use of on-site sources and sinks by bio-climatic architectural practices; uses minimum energy to power itself; uses efficient equipment to meet its lighting, air-conditioning, and other needs; maximizes the use of renewable sources of energy; uses efficient waste and water management practices; and provides comfortable and hygienic indoor working conditions. It is evolved through a design process that requires all concerned –the architect and landscape designer and the air conditioning, electrical, plumbing, and energy consultants – to work as a team to address all aspects of building and system planning, design, construction, and operation. They critically evaluate the impacts of each design

decision on the environment and arrive at viable design solutions to minimize the negative impacts and enhance the positive impacts on the environment.

AIMS OF A GREEN BUILDING[iii]

- Minimize the demand on non-renewable resources
- Maximize the utilization efficiency of these resources, when in use
- Maximize the reuse, recycling, and utilization of renewable resources
- Maximize the use of efficient building materials and construction practices
- Optimize the use of on-site sources and sinks by bio-climatic architectural practices

GREEN BUILDINGS IN INDIA:

- **IIT,Kanpur building-Rated a 5 star green building by 'TERI'**

  First FIVE STAR GRIHA rating to Centre for Environmental Sciences And Engineering Building

  The building has incorporated many green features following TERI-GRIHA recommendations. Some special features of this building are as follows:

  · The building is fully compliant with the ECBC (Energy Conservation Building Code).

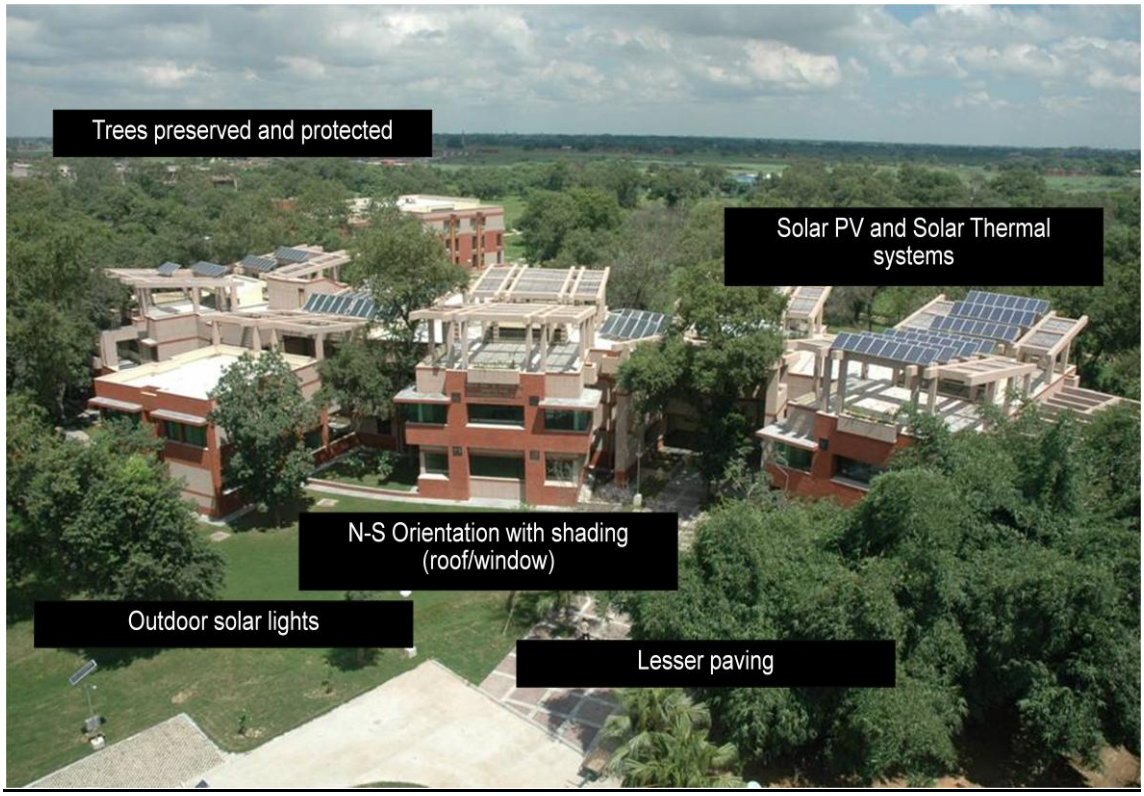
  · Sustainable site planning has been integrated to maintain favorable micro climate.

  · The architectural design has been optimized as per climate and sun path analysis.

  · Energy efficient artificial lighting design and daylight integration.

  · Energy efficient air conditioning design with controls integrated to reduce annual energy consumption.

  · Passive strategies such as an earth air tunnel incorporated in the HVAC design to reduce the cooling load.



CONFEDERATION OF INDIAN INDUSTRY SOHRABJI GODREJ GREEN BUSINESS CENTER (CII-GODREJ GBC)

- First structure outside the United States to receive the prestigious "platinum" LEED rating from the U.S. Green Building Council (USGBC)
- Building special also because its construction combine ancient practices with modern architecture, reaffirming the applicability of traditional architectural knowledge to today's notions of sustainability

The Building

- The building occupies an area around 20,000 sq.ft.
- It has auditoriums, seminar halls, offices, meeting rooms and a cafeteria.
- Circulation scheme encourages interaction among the people.
- Introverted courtyard — inside, yet outside —a traditional gathering place for intellectual encounters and cultural functions
- Courtyard also ideally suited for light and climate control in hot regions

- All enclosed spaces are coupled with smaller open courts encircling this larger courtyard.

ITC green centre (platinum rated building), gurgaon [iv]

•Complete building and systems approach to design and construction.

•Employs building techniques that minimize environmental impacts.

N TUNE WITH NATURE: ITC Green Centre in Gurgaon where U.S. Secretary of State Hillary Clinton attended a conference on global climate change. Green buildings are fast catching up in India. File photo The Hindu

buildings.

•Contributes to the health and productivity of its occupants.

ITC'S OBJECTIVES:

•Creating green building awareness.

•Educating and developing construction industry.

•Commitment to environment.

•Changing way of doing things.

•Commitment beyond the market.

_Gurgaon is located between latitude 28.37N and Longitude 77.04E.

_ITC Green Centre is located in Institutional Area at sector-32, Gurgaon.

_Gurgaon is directly connected to Delhi via NH-8.

_The plot area is approximately 2 acres (100mts x 80mts i.e. 8,000 sq. mts).

•The site is accessible by a sub-arterial road of sector-32 with a right of way of 12 mts.

•Vacant plots on both the sides.

Green building brings together a vast array of practices, techniques, and skills to reduce and ultimately eliminate the impacts of buildings on the environment and human health. This is all about the green building concept which is a modern day necessity and its importance is best described in the next few words.

"**We must start to think about an architecture that makes environmental sense, or someday we will indeed be forced to make our houses by hand. Architects must embrace new buildings with windows that open and close, rooms arrayed around courtyards, designed to take advantage of natural air and natural light. They should use natural materials that take less energy to make and transport to building sites. Houses with porches are "entertainment systems" that build community.**"

-David Brussat of the Providence Journal

1.5 Urban Open space in India[v]

Due to undergoing urbanisation trend worldwide, distance between city inhabitants and nature is increasing. Urban greenery/forestry is one of the ways to bridge this gap between people and nature. High population density is one of the reasons for underdevelopment of urban greenery sector. From the global perspective, although there are wide variations both in coverage as well as per capita availability of green spaces, cities renowned for their urban green spaces often has 20 to 40 % coverage of total geographical area and 25 to 100 sq. m.urban green spaces per capita. Most of the Indian cities are far behind in quality as well as quantity of urban forests than their counterpart in Europe and America. Most of the Indian cities, with the exceptions of Gandhinagar and Chandigarh, are far behind in per capita urban forest availability in comparison to European/Australian/American cities e.g. Average green cover is about 19 % for 22 largest Dutch cities (about 228sq. m.per capita); estimated per capita green space availability in Canberra, Australia and Greater Paris region is 80 m sq.

New Delhi, the capital city of India, has grown to be one of the greenest capitals in the world due to the consistent emphasis to grow more trees and strict monitoring of tree cutting permissions. This has been possible despite the infrastructure projects, which have come up due to the demands of the Commonwealth Games 2010. At present, about 20 % of Delhi's geographical area is under green cover, making per capita green space availability to around 22 sq. m..Besides Department of Environment and Forests of National Capital Territory (NCT) Delhi, there are many agencies working for "Green Capital" mission e.g. Municipal Corporation of Delhi (MCD), New Delhi Municipal Council (NDMC) and Delhi Development Authority (DDA). Recently, the Parks & Garden society has been set up to coordinate the greening activities in Delhi. The city has some well-maintained parks and gardens like Lodhi Garden, Mughal Garden, Deer Park, Buddha Jayanti Smarak Park, Indraprastha Park and The Garden of Five Senses.
Department of Environment and Forests of NCT, Delhi has been mainly responsible for increasing the green cover of the city from 30 sq. km. to 300 sq. km. During last 10 years, despite of acute biotic pressure. Gandhinagar and Chandigarh are the

cities, which have been established after India's independence, with integration of urban greenery in their City Master plans. Total area of the Gandhinagar capital project of Gujarat state is around 57 sq. km. By the year 2005, tree cover of the city was 57.13% of the total geographical area amounting 32.56 sq. km.. Population of the city was around 0.2 million in 2001, resulting in per capita green space availability to more than 160 sq. m.. Population of the city is nearing 0.3 million in 2011. Exact figures of 2011 census are yet to come for different Indian cities, for sake of uniformity; population census figures of 2001 have been adopted in the paper for assessment of per capita availability of urban green space in different cities. Remote sensing satellite imageries were utilized by Gujarat state government for assessing changes in tree cover of the city between 1979 and 2005. However, varieties of tree species in the city are on a lower side in comparison to Bangalore and Chandigarh. Semi arid climatic condition, perhaps, is the major reason for this situation.

Benefits of Urban open space and why they should be preserved[vi]

Ecological Benefits:

- Green spaces provide habitat for a variety of birds, fish, animals, insects, and other organisms, while also providing corridors and greenways to link habitats.
- They prevent soil erosion and absorb rainwater, thereby improving drainage.
- Trees have been shown to absorb pollutants; as few as 20 trees can offset the pollution from a car driven 60 miles per day.
- The urban heat island effect occurs often in urbanized areas, where buildings, asphalt, and concrete absorb solar radiation and then reemit it as heat, causing the air temperature of the city to rise.
- Plants have been shown to reduce the urban heat island effect, directly by shading heat absorbing surfaces, and indirectly through evapo-transpirational (ET) cooling.

- In studies, vegetation has been shown to lower wall surface temperatures by 17′C, which led to a reduced air conditioner use by an average of 50% (McPherson, 1994).

- Green spaces can also reduce noise pollution, by dense screens of trees and shrubs, and can even cleanse partially-treated wastewater.

- Finally, green space and its inhabitants are good indicators of overall ecological health of the ecosystem. This is an important measure in judging the ecological sustainability of the community.

Social Benefits:

- Provides recreational use: a place to play, meditate, gather, or rest.

- Green spaces give a sense of social place, allow one to gain social recognition, enhance feelings of family kinship and solidarity, allow one to teach and lead others, provide opportunity to reflect on personal and social values, promote spiritual growth, and in general allow users to feel free, independent, and more in control than is possible in a more structured home and work environment.

- Green spaces introduce the natural into the urban environment.

- Green spaces provide a refreshing contrast to the harsh shape, colour, and texture of buildings, and stimulate the senses with their simple colour, sound, smell, and motions (Dorward, 1990; Miller, 1997).

- Green spaces foster a connection between community residents and the natural environment that surrounds them, thus allowing for a more liveable city. This is essential in order for a community to be sustainable.

Environmental Benefits:

1. Reduces liquid waste and water consumption (low-flow plumbing, rainwater collection, drought-resistant landscaping etc.)

2. Reduces solid waste (household garbage limits etc.)
3. Provides local recycling and composting centres.
4. Is a community facilities constructed in environmentally sound ways.
5. Community gardens provide chemical-free food production and gardening.

Social value of Green Spaces:

- In all walks of life, green space draws people outside and fosters social contact.
- Provides open green spaces where people can congregate and opportunities for positive social interaction and supportive friendly environments.
- Studies have found that residents living near green common spaces "had more social activities and more visitors, knew more about their neighbours, reported their neighbours were more concerned with helping and supporting one another and had stronger feelings of belonging" (Environmental News Network).
- Green spaces promote safer neighbourhoods. When residents have more vested interests in a place, their participation in community vigilance increases, and they will watch to make sure it's not being misused, damaged, etc. The better maintained a residence or public space is, the safer it is going to be.
- Natural areas promote liveability and vitality of communities. Recreational opportunities, good air and water quality and scenic beauty will attract new residents, families and tourism.
- Green spaces will attract middle class residents to move into areas of the city that may be lower income without practicing gentrification.
- What would you rather be surrounded by: concrete or plant life? Easy, right? Plants.
- Green spaces attract businesses, create jobs and raise property value.

- It also strengthens social bonds in places where those kinds of ties are so badly needed.

> Every human has a fundamental right to an environment of quality that permits a life of dignity and well-being
> United Nations Conference on the Human Environment, Stockholm

Preservation Of open spaces[vii]

In their efforts to preserve open lands, state and local governments, as well as land trusts and conservation organizations, must figure out how much land to target for preservation, whether that land should be in private or public ownership, where open space should be located, and what types of open space farms, forests, wetlands, parks, etc.—are the most desirable. Many public opinion surveys suggest that people value open space, and recent voting on bond issues and referenda supports this view. However, only economic analyses relying on well established statistical techniques, reliable and extensive data, and well-framed research methodologies can provide evidence about the dollar value of these important nonmarket goods. Such estimates will be important in policy debates over the public versus private value of open space land in the future.

It is very difficult to generalize results from the wide range of studies that have been conducted. Each study deals with a particular open space area or set of areas that are unique to a particular region and time period. And each study is measuring a set of services provided by the open space to a particular group of households. Estimated values vary widely across the studies and sometimes even within the studies. For example, hedonic models estimated on data from adjacent counties can turn up vastly different results. Thus, one conclusion that we draw from the extant literature is that open space values are case study–specific. Policymakers looking for a specific monetary value to attach to a particular open space project may find it difficult to use the existing research for that purpose.

1.6 Housing crisis in India- Creating Affordable Homes.

'Any vision of sustainable development fit for the 21st century must recognise that eradicating poverty and achieving social justice is inextricably linked to ensuring ecological stability and renewal - '
A Safe and Just Space for Humanity', Oxfam (2012)

During recent years the housing problem has greatly captured the public's attention. Sociologists, governmental authorities, developers, lawyers and bureaucrats have been arguing on whether governmental actions are the only way out to the problems.

The proponents believe that only government can take the urban poor out of this problem since the real estate developers are profit-minded. This means the private sector will only touch the areas where it sees profit. These developers utilise all their resources to soar the housing prices, making it seemingly impossible for the urban poor to afford home. Secondly and most importantly, the government, as the policy maker, is the governing power of a society meanwhile the official means of ensuring social well being. Henceforth, under no circumstances except with the government's authorities can the majority of civilians secure a property.

However, government single handedly cannot do much of the job. Firstly, the government lacks in enough funds for erecting houses for a quarter million people. Secondly, the role of the government has to be complemented by its industrialists and other citizens. Greater transparency in distributing subsidies and allocation of funds is required. The master plan of working has to be prepared by the government.[viii]

Satish Gavai, Vice president, Maharashtra Housing and Area Development Authority (Mhada) notes " Maharashtra CM was to come up with a housing plan. This was part of an initiative that this government is taking — to earmark 20-25% of every development plan for residences, for affordable and low cost housing. Inclusive housing is the concept. If that happens, for every housing scheme that is put up, 20-25% would necessarily have to be earmarked for affordable and low cost housing."

He further believes that poor people are the least equipped to maintain houses. He has observed how, in the high income group category housing, many occupants want the tiles changed, the partitions modified. A lot of changes are made even before the family has moved in. Thus, the rich guy need not be given much as anyway he is going to make changes to that place. On the other hand, the poor man has to live with the facilities you provide to him. So we must give them better than ordinary quality of construction. Now that comes at a substantial cost. It adds about 15-20% to the cost of the tenement.

The category-wise housing shortage was estimated as follows:

Category	Housing shortage in Mn. as on 2007
EWS	21.78
LIG	2.89
MIG	0.04
HIG	
Total	24.71

Source: Ministry of Housing and Urban Poverty Alleviation
Note: EWS – Economically Weaker Section, LIG – Lower Income Group, HIG – High Income Group

The table above depicts the housing shortage in India and it can be see that the shortage for the Economically Weaker Section (EWS) is almost eight times than all other group housing shortages combined.

What is affordable housing?

The general idea that people bear in the mind while discussing about affordable homes is a home which just suffices the basic living conditions and seeing the limited money there is no scope of aesthetics or strength. However affordable homes should be more than that. A truly affordable house does not compromise on the quality of construction and does the proper provisioning of the socio-economic infrastructure. This is only possible by incorporating better technologies, implementing proper government policies etc.

Issues related to affordable Housing in India

- Increasing land price due to increased demand especially in the urban areas.
- Stringent land regulation and acquisition laws.

- Increasing cost of construction materials.
- Double taxation system – high transaction cost.

There are few recommendations in this regard which shall be discussed in the concerned section.

1.7 Goals and Objectives:

- Study the real estate market in India and understand the statistical data.
- Research on the factors leading to booming real estate and several real estate projects coming into existence.
- Study the impact of high rise buildings on the availability of fresh water, air and green spaces.
- Understand the benefits of open land and the environmental impact of reduced free lands and due to increased establishment of commercial buildings as well as huge housing projects too.
- Discuss the take of various professors and environmental experts.
- Read and understand Government laws for estate and what is being actually real followed.
    - Develop a model on how to reduce the effect of such real estate boom on the cost of living of people in big cities.
    - Come up with recommendations for mitigating the harmful ecological, social and economic effects of the buildings and real estate boom and also make some plans for affordable housing for urban poor.

2. Methodology: Following were the various ways through which I tried to gather information and data.

2.1. Literature Survey:

I studied and referred to many reports, books and journals and I am writing here about the content sources that affected my project strongly. I went through the following research papers and reports:

- **'The Perfect Slum'** by Sytse De Maat, Architect, Switzerland.-The paper pretty much made me aware of the problem of proper Urban planning in Indian cities and what is stopping us to improve the worsening conditions.
- **'High Rise Buildings and how they affect country's progression'** by Dr. Akram Zarouf, Professor, Ains sham University, Egypt. It helped me realise the positive side of the high rise buildings along with the dangers they bring along. Also, the various ways, how we can handle disasters in such situations.
- **'General Building Requirements'**- A Report by the GOI on the design rules that are needed to be followed while designing High rise buildings.
- **Planning of high rise buildings**- A report by 'Siemens' on how to design building so as to mitigate any casualties that might occur under the event of any disasters such as fires or earthquake etc.
- **The consequences of living in high rise buildings**-Robert Gifford, Professor, Univ. Of Columbia wrote the paper about the various ill effects of High rise on the people living in the buildings. This made me realize about the various problems that people living in high rise have to face. Therefore, it was not only the people outside these buildings who suffered but the residents of the buildings also suffered to some extent.
- **The Steering Committee report (set up by the Planning Commission) on Urbanisation:** It gave me the insights regarding the big role that can be played by the Urban Local Bodies in affecting the society by their master plans. However, these Master plans are often unrealistic and highly difficult to achieve which makes the matter worse. The ULB's should come up with better planning that can be achieved and that must be achieved. Also, it was necessary to

understand that the autonomy of ULB's is equally important for the development of cities.

- '**Energy-Efficient Buildings in India'** written by Mrs. Mili Majumdar. The book helped me to know more about solar passive architecture and hence the various ways through which we can save energy in high rise buildings and prepare sustainable habitats.

- **Energy Consumption in Mid and High Rise Residential Buildings in British Columbia**, paper written by Graham Finch, MASc, Eric Burnett, PhD & Warren Knowles, P.Eng. This paper provided a better and clear understanding of the energy consumption profile in high rise buildings. The figures given in the report were elaborative and vivid.

- **Green Buildings**- Theses written by DR. P.S. CHANI, Assistant Professor, Department Of Architecture and Planning, IIT ROORKEE. The theses was especially helpful in the detailed study of 'Green Buildings' and its various features along with case studies of 'Green Buildings' around the world.

- **Congress on Urban Green Spaces (CUGS) report on Urbanisation:**

  The report describes the various effects of urbanisation on the urban open spaces and the various reasons why they should be conserved. It provided with the necessary statistical data and therefore proper information was obtained.

- **Bodine Street Garden (Bodinestreetgarden.org):** The site was particularly helpful in understanding the various kinds of benefits that urban free spaces have on the urban lifestyle and ecosystem. This article classified the various kinds of benefits these free spaces have.

- **The Value of Open Space: Evidence from Studies of Nonmarket Benefits-** By Virginia McConnell and Margaret Walls. This report made me aware of the effects that massive development projects have on the urban spaces. The study also revealed the monetary value of the open spaces using various techniques. In this paper, they reviewed the now quite extensive economics literature on

the value of open space. Because many of the services provided by open space-recreation, aesthetics, ecosystem services, and so forth-are not directly traded in private markets, estimating the benefits they provide can be difficult.

- **ESTIMATION OF URBAN HOUSING SHORTAGE:** REPORT OF THE TECHNICAL GROUP [11TH FIVE YEAR PLAN: 2007-12] .The report provided the data concerning the urban housing shortages coming up due to various reasons like poverty, poor infrastructure, non-holistic approach of the real estate companies etc. The study gave some shocking results revealing the super crisis existing for housing among the Economically Weaker Sections (EWS). Close to 21 million housing shortage existed for these people among the EWS for the year 2007.

- **AFFORDABLE HOUSING- Market Scenario in India:** Report by Mr. Ashish Jindal, Regional Director, Knight & Frank India Pvt. Ltd. The report mentioned clearly the required information to gain proper perception about the prevailing housing problems, the demand supply scenario, opportunities related to Urban Housing and the various issues and suggestions in this regard.

2.2. Field Visits

1. Mr. Girish Sethi, Director (TERI, Industrial Energy Efficiency): Mr. Girish Sethi, gave me a very brief account of the energy consumption profile in the high rise buildings, and gave me few data of which (with his consent) I included in my project. He told me the various ways in which we can reduce the energy consumption in the high rise buildings and the possible technologies that are thought of in the near future to be incorporated in these buildings. He also told about the architectural changes that are needed to be done in this regard. Then he told about the role of urban local bodies in planning cities and how major role does it play in people's lifestyle**.** These insights made me to come up with a better suggestive solution.

2. Mr. Niteesh, Associate Fellow, Centre of Research and Building Sciences: Mr. Niteesh told me about the concept of 'Green Buildings' and also about the ECBC rules. He told me the various sites on the internet from where I can get some better statistical data. He gave me few case studies to go through. He also told me about 'GRIHA' which is basically the criteria for rating these building (on how environmental compliant they are) on a scale of five. He also told me about the worldwide organisations which work in this field like LEED (Leadership in Energy and Environment Design) etc. He asked me to go through the a book '**Energy-Efficient Buildings In India'** written by Mrs. Mili Majumdar to know more about solar passive architecture. At last, he mailed me one of his presentations regarding 'Green Buildings'. He also told that I can mail him whenever I want some help in this regard. This discussion was particularly fruitful because Mr. Niteesh told that he might help me throughout the project.

3. Mr. Sarvesh Mishra, Vice Chairman, Gorakhpur Development Authority: Mr. Sarvesh Mishra gave me a detailed account of the ongoing schemes by the government to provide shelter to people living below poverty line. He gave me a document containing the necessary data regarding the number of houses built, the cost incurred and the status quo of these schemes. He also gave an idea of the prevailing conditions in the houses and it was pleasant to listen that this scheme has been quite successful and at par with time.

I came to know about the government spending under the scheme of 'Kashiram awaas yojana' launched by the erstwhile UP government, cost of one house and the number of houses built under this scheme in Gorakhpur. He also told me about the current living conditions of the people residing in these houses. He provided a better picture regarding the sanitation etc.

2.3 Meetings and Interviews

My mentor advised me to proceed in a manner such that my research work might benefit the weakest member of the society. He made me aware of the fact that

Indian real estate boom is not a 'boom' in the holistic sense. He further told me that it is because the urban poor are unaffected by it and are not benefitted by this kind of urban development. I realised that most of the private developers are money driven and they don't see any profit in building homes for the weaker sections. Therefore, methods should be devised by the government and the technical minds to provide effective and affordable housing solutions to these people.

Date	**Name**	**Designation**	**Institution**	**Topic of Discussion**
11th june,2012	Mr. Girish Sethi	Director (Energy Efficiency Division)	The Energy and Resources Institute (TERI)	Energy Consumption Profile Of High Rise Buildings.
11th june,2012	Mr. Niteesh	Associate fellow	Centre Of Research and Building Sciences	Concept Of 'Green Buildings'-scope and Limitations.
26th June.	Mr. Prabhat Kumar	Architect	Self	Cost affective housing solutions and 'Solar Passive Architecture'
9th July,2012	Mr. Sarvesh Mishra	Vice Chairman	Gorakhpur Development Authority	Government Housing Schemes-Current status and problems faced.

3. Current NGO and Govt. Efforts:

3.1 The role of the NGO's

- **Rain water harvesting implementation network**: This NGO has made significant contribution in raising the water level beneath the ground by rain water harvesting at many places. It also raises funds for making the harvesting systems. The high rise buildings consume more water per capita than an average person. Thus, the implementation of Rainwater harvesting System in such residences becomes more important. Towards this the NGO has done quite a lot.
- **The Energy and Resources Institute (TERI), India:** Ranked 20 amongst the world's leading think tanks on environment, TERI is a premier Non-Governmental Organisation that has made significant amount of contribution in our effort of conserving environment and its resources. In its effort to significantly reduce the ill-effects of High rise buildings and massive housing projects, it has raised few guidelines as per which it rates a building. A higher starred building means it is more environmentally compatible. It also comes up with newer technologies which can be incorporated in these projects to reduce the harmful effects of these buildings on environment.
- **Laurie baker foundation:** This Indian NGO makes better, sustainable housing affordable for the poor sections of the society. The architecture and the technology devised by the foundation are world class. Thus, this is a model for cost effective proper housing which is emulated by many other developers. Based in Delhi, the NGO has already provided many people an affordable and sustainable housing.
- **Shelter Associates:** Shelter Associates is a Non Government Organization (NGO) working in Maharashtra, India. Based in Pune. The organization comprises architects, social workers, GIS experts and community workers. Shelter works with the urban poor, particularly women, in informal settlements to facilitate and provide technical support for community-managed housing (Slum Rehabilitation) and infrastructure projects. To address the problems, Shelter Associates/Baandhani has been working over the last few

years to develop the use of slum surveys and Geographical Information Systems (GIS) for collating information about slums for inclusive urban planning. Since early 2000, Shelter Associates/Baandhani has worked on projects in Pune, Sangli and Khuldabad that aim to introduce slum surveys and GIS as tools for integrating low-income settlements into urban planning and development.

- **JICA Partnership Programme (JPP) activity in India:** JICA partnership Programme (JPP) is an initiative under which Japanese NGOs, universities, local governments and public interest corporations are encouraged to provide better services, facilities and welfare to support sustainable livelihood to deprived communities in India. Since Indian Non-governmental organizations (NGOs) play an increasingly a vital role in delivering development programmes to grassroots level, JPP supports collaborative projects between Japanese organizations and Indian NGOs, working at the grassroots level.
- **Centre for Urban and Regional Excellence (CURE):** CURE believes that every household should have access to sustainable livelihoods. CURE seeks to reduce urban poverty by building decent and sustainable livelihood pathways, especially for women and young people that are linked to the city's core economies. CURE has adopted comprehensive livelihood projects that address the complete range of livelihood interventions required to sustainably enhance incomes. Interventions include providing access to skills and employment, micro enterprise and entrepreneurship development, assets, credit, and market links, and management skills in areas such as personal finance. New livelihood pathways are determined through value chain studies and livelihoods mapping that harmonize with the city economy.[ix]

3.2 Govt. Efforts

- The Indian government has laid down strict guidelines that are needed to be taken care of while building massive projects and high rise buildings. Some of the projects which are not environmentally or architecturally compliant with government rules and policies are not permitted to be erected.-

- The Ministry of Environment and Forests recently had a clash in the Supreme Court with the builders of the township-'Lavasa'. Lavasa got its certification to be developed, however the incidence showed that the government is no more mum in such affairs and will even challenge the big investors whom the people think that government keeps under their cover.
- The Maharashtra State Government has decided to make available incentives in the form of rationalization in property tax /electricity tariff and reduction in State taxes including VAT and Octroi on buildings adhering to green technology norms. To achieve this, Maharashtra Government proposes to amend the Development Control Rules for the introduction of green building regulations initially in Mumbai Metropolitan City and later in tier II cities of the State. Under the proposed regulations, it will be mandatory for new buildings to use green technologies for recycling dry waste and drainage water, vermin-culture for treatment of wet waste, solar energy and above all rainwater harvesting. [x]
- The Ministry Of Power, GoI launched ECBC in May 2007.
- Under the 12th Five year Plan, the main focus of government is on urbanisation which is going to be the decisive factor to India's development in the next few years. The Planning Commission of India has prepared a steering committee that prepares report on such issues. The report argues that more autonomy should be given to the Urban Local Bodies. This will enable them to prepare better, futuristic and yet attainable master plans which determines the lifestyle of its citizens.

- Launching various housing schemes under the Jawaharlal National Urban Renewal Mission (JnNURM). Another housing scheme for the urban poor is the Rajiv Gandhi Awas Yojana which extends support to the JnNURM. Over 15 lakh houses are under construction for the urban poor. One such scheme was launched by the Delhi government in which a mega housing scheme under which 15,000 low-cost flats was allotted to the urban poor at a subsidised cost of Rs. 75,000.

- The Ministry of Housing and Urban Poverty Alleviation (MH&UPA), Government of India has designed an Interest Subsidy Scheme as an additional instrument for addressing the housing needs of the EWS/LIG segments in urban areas. The Scheme envisages the provision of interest subsidy to EWS and LIG segments to enable them to buy or construct houses.
- Another housing scheme launched by the erstwhile state government was the 'Kashiram Shahari Garib Awas Yojana. The total cost per flat including everything came near 3 lakh rupees. Moreover, the prevailing conditions in these flats are significantly better than the previous homes of the dwellers. The government has bought land, materials etc at a comparatively lower price and therefore the price reduction.
- Cost-effective & Eco-friendly Technologies: Building materials account for about 60% of basic inputs in any housing programme and their costs can go as much as 75% of the cost of a house for low-income groups. There is a growing concern that persisting shortage of cost-effective building materials for the vast majority of population is a serious impediment to improving the housing conditions of the people. While popular traditional materials are short in supply, high demand for them has resulted in their high prices and taking them out of the reach of the poor. Most of the new alternate materials developed in recent past are cost-effective and environment-friendly. But they are yet to be translated into marketable products for mass application. Excepting cement and steel, all other materials required for housing are likely to have constraints of supply.
- Keeping the aspects in view, the Government of India and State Governments have been promoting research in the fields housing and construction activities. This has led to a number of new alternative building materials and techniques aimed at reducing the cost of house construction and improving the performance of conventional building materials and techniques. Energy-efficient manufacturing processes and use of renewable raw material resources of wastes and by-products of industry, agriculture and forestry, etc., have resulted in Cost-Effective and Eco Friendly (CEEF) products. As it was seen

that the use of CEEF building materials and techniques was hampered by the general lack of understanding on part of beneficiaries due to ignorance and illiteracy, the Government has initiated a massive programme of demonstration, education and counselling for the poor.[xi]

- The government, along with TERI is coming up with a full proof guideline that needs to be followed by the upcoming massive housing projects and the commercial establishments as well.

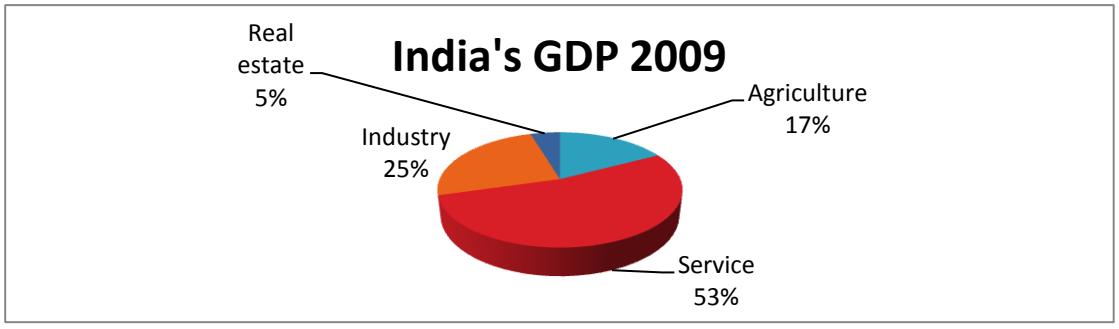
4. Results and Discussions

4.1 Findings from the literature:

- **The current scenario of Real Estate- India:**

The market capitalization is anticipated to double from current listings of worth Rs. 80,343 crore to 1.7 trillion. If the economy grows at a rate of 10% and the infrastructure sector grows at 15%, it can generate more than 3 million jobs. A REIT investment in developed countries would fetch a return of 3% to 4% whereas it fetches 12% to 15% in India.

- **Contribution Of the Real Estate to India's Economy:**



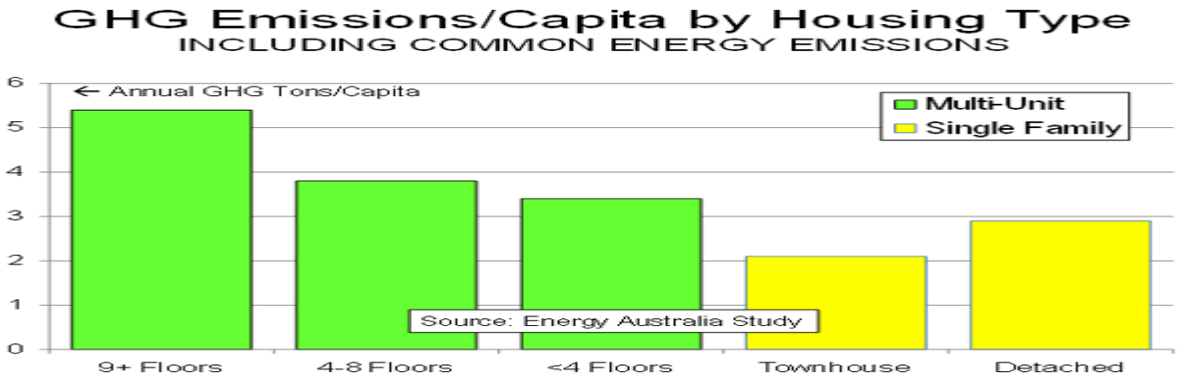
- **The Non-holistic approach of Indian Real Estate growth:**

Indian real estate boom is not holistic in the sense that not all sections of the society are its beneficiaries. Its drivers are the private developers and their sole goal is monetary benefit. Their money driven methods are understandable and it

will take proper governmental approach to make the real estate boom evenly good for all.

- **Problems arising due to high rise buildings especially ecological problems:**

  More energy consumption comes into picture due to the elevators, Air conditioners, big water pumps etc. A study conducted by 'General Electric' revealed that if a faucet is left open for 5 minutes in a high rise, an equivalent energy of a 60W bulb lit for 14 hours is consumed. Also, due to increased energy consumption, more greenhouse gases are emitted.



  - The high rise buildings are more prone to the earthquakes and fires etc. Moreover, the population within the high rise is much more concentrated and it is difficult to escape under such circumstances. Therefore, strict safety norms have to be maintained which effects in increasing cost of construction.

  The high rise buildings generate more population pressure on a specific amount of land than a normal housing due to high population density. This leads to more waste generation, overcrowding, traffic jams etc. and causes environmental degradation. The local people suffer a lot because already their basic amenities are not met and these buildings compel them further to live amidst severe lack of resources.

- **Steps taken by the government:** Seeing the shortage of houses for the LIG and the EWS, these schemes have not been able to decrease the crisis much.

  Government of India has collaborated with private companies to change the face of slums and convert them to improved housing occupying less space.

Projects like Dharavi Redevelopment Project are coming up with the help of Public-Private-Partnership and in this everyone gets benefitted. Slum dwellers will get a better housing, companies will get more land and the government will be able to finish its plans easily.

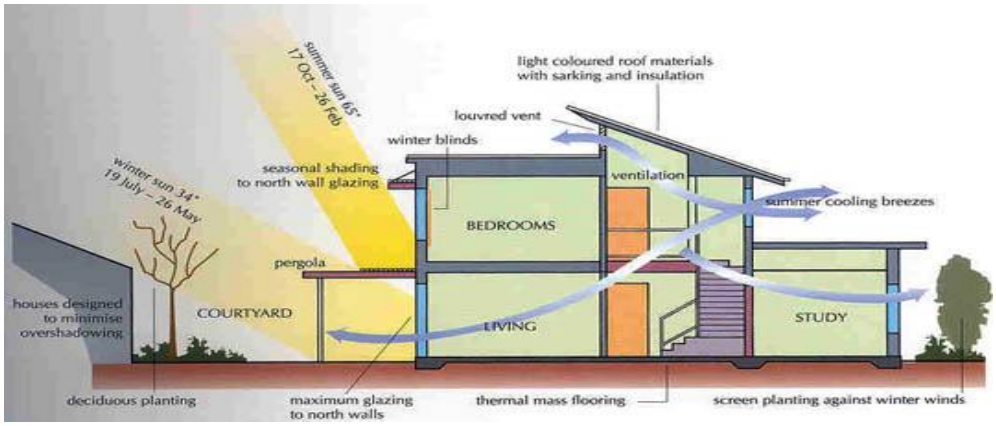
- **Studied about townships like 'Lavasa' and 'Aamby Valley':** A resident of 'Lavasa' will live in a sixteen times more spacious living than a normal Indian citizen. This is good as long as we also ensure that an average person of our society has enough space to lead his life with safety and satisfaction.

  Aamby valley Project is spread over 10,000 acres, 91% of which is open space. Having open space is definitely good, but can a country looking for immense construction space afford that. However, the environmental issues are clearly dealt by the project and it has almost 500 acres of water harvesting surfaces. Solar power projects and wind mills etc are also installed.

- **For better efficiency of both residential and commercial establishments:** There are innumerable methods that exist to reduce energy, to reduce waste generation and to decrease construction cost etc of the buildings. But, only the major ones are discussed here considering the scope, impact and viability. They are:

  For energy efficiency: Since, the consumption of energy in high rise buildings is far more than the normal buildings due to already told reasons, the relevance of energy saving technologies and architecture increases for these establishments.

  - Solar Passive Architecture (SPA) should be adopted for all the newly constructed buildings.



Source: Alternatewayofliving.blogspot.in

As we see in the fig. above that by proper architecture we can save a lot of energy lost in cooling the rooms.

- Proper insulation techniques should be ensured by implementing various innovations in construction. Some of the latest and considerably cheaper techniques are by using double glazed windows which traps air acting as insulator etc.

Also, use of solar reflective surfaces on urban roofs is an inexpensive measure that can reduce summertime temperatures within the house. Latest technologies in this field have allowed us to design the roofs such that selective absorption and reflection of various spectral wavelengths take place. Such roofs are known as 'green roofs'. Therefore roofing systems with visual colouring that can enhance a building's character while still reflecting a major portion of sunlight (like UV and infrared rays) can be designed. This reduces the load on the Heating, Ventilation and Air Conditioning (HVAC) system of the building and hence their payback period is limited to a year in most cases.

Energy generating/saving Technologies: Various new technologies have come up which can generate or save enough energy. Some of them are:

- **Automation of the electrical equipments used in the building**:

This is pretty expensive at the time of installation. However, it saves a considerable amount of energy and therefore its payback period is not too much. This is one of the achievements which have the ability to drastically reduce energy consumption profile of the urban establishments. For e.g. many times it happens that we leave

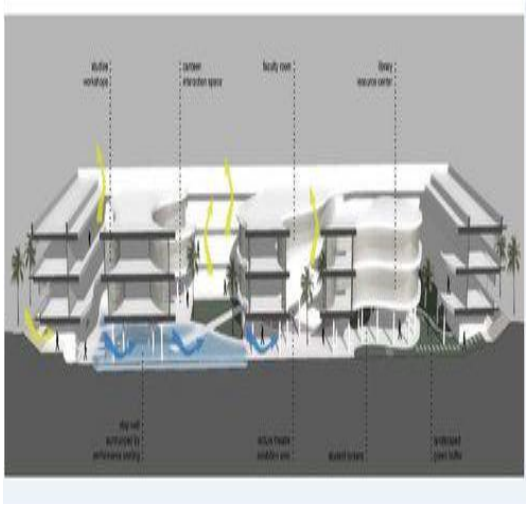
our fans and lights on even though nobody is there in the room. Automated systems detect the absence of person the room and the electrical appliances switches off automatically. All the lights of the hallways are connected to one common point and when luminosity decreases below a certain limit, it detects it and automatically switches on and vice versa. Similarly we can use it to reduce energy wastage by various other appliances. The picture below shows few from the many automated appliances available in the market.

- **Using toilet flush water to generate energy (Broadbent., 2010)**.

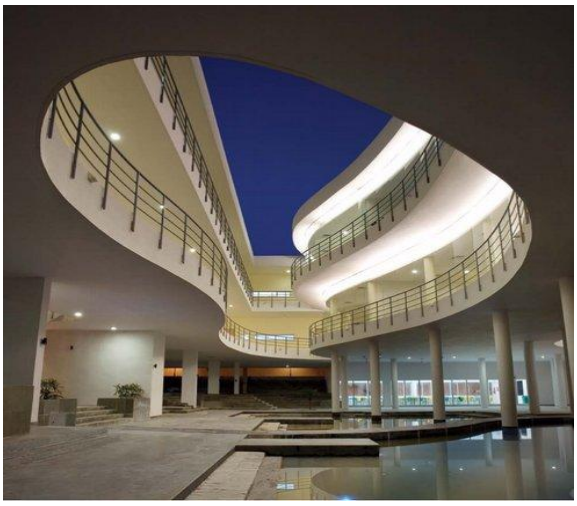
Annually, it might produce for an average seven story building-50,400,000,000J of energy. This much energy is sufficient enough to lighten up 200 25W CFLs to lighten up for the whole year at rate of 8 hrs /day. This implies that all the energy requirements needed for hallways, lifts, lawn etc. would be met by this technology. It would also save an approximate of Rs. 70,000 per year of energy costs. This technology is not very expensive. However, the feasibility of this technology and other effects has not been evaluated up till yet. This is just an example of how technology can save energy and change the face of the current energy consumption profile.

- **Using pool to cool**:

A traditional way of cooling in India was the step well, a pond dug into the ground or surrounded by walls above ground so that the air is cooled by evaporating water in an enclosed, shaded zone. This ancient practice can be incorporated in rooms by modifying the technique to fit into the Indian flats. Architect Manit Rastogi explains that the entire building is raised above the ground and a scooped out under belly forms a natural thermal sink which is cooled by water bodies through evaporative cooling. These water bodies are fed by the recycled water from the sewage treatment plant and help in the creation of a microclimate



through evaporative cooling.

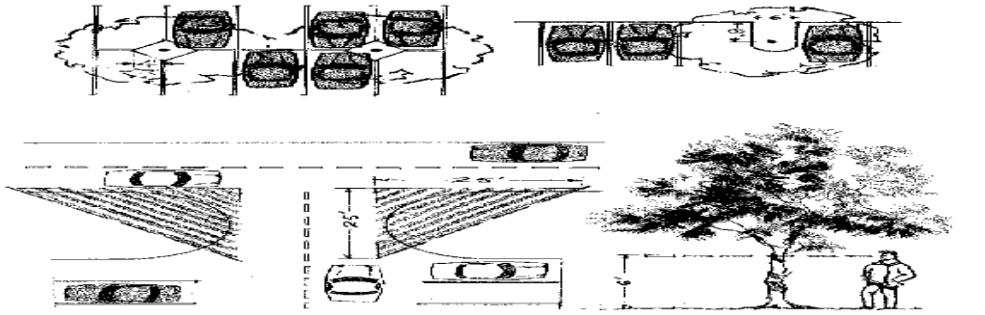


© *Morphogenesis*

- Installing solar panels and solar heaters: Solar panels are not cheap and its payback period is easily more than a decade. Therefore, it is not very much recommended for the Indian scenario. However, seeing the zero pollution emission and the energy saving capabilities of solar panels the government should provide more subsidies to it. Once installed, it will serve for years.
- Often, in winters we use geysers to heat water which consume lot of energy. Therefore, much of this energy consumption can be reduced by using solar heaters. Solar heaters are very cheap and can be easily installed.

- **Other methods to reduce effect of massive construction**
  - Use of cements and Plaster of Paris etc. should be reduced as far as possible. This causes a lot of pollution and harms the environment.

- By the proper implementation of architectural techniques more trees and plants etc. can be planted in these residential apartments.



Source: **PLANNING FOR A BETTER COMMUNITY LANDSCAPE** By W. R. NELSON, JR., AND J. A. PORTER

Diamond-point planting (upper left) shows how trees may be planted in a parking lot without losing parking spaces. The planting technique shown in the upper right-hand drawing is commonly used but takes up about half a parking space per tree. The shaded areas in the lower left-hand drawing designate space that should be left free of plantings in order to aid motorists' vision. The figure at lower right shows that tree branches should not be any lower than 6 feet from the ground so as not to obstruct vision. This is just one of the innumerable examples of how plain architectural modifications might help save space and environment without any cost hike.

- Often at the time of construction of high rise buildings, vast quantity of lumber is required. This can be and should be reduced by utilising optimum value engineering, using engineered lumbered and wood products, using prefabricated trusses and reusing scrap lumber etc.[xii]
- Protecting the site also is important during construction. For this only one access route should be maintained for the workers. There should be a designated area where all the waste could be stockpiled for later use. Hazardous material should not be dumped near the building site. Trees and protected areas should be cordoned off.
- Water conservation should also be provided in high rise buildings. Install water-efficient fixtures, including showerheads, faucets, and toilets, and water-

efficient appliances, such as washing machines etc. Catchment areas should be made to make up for most of the water needs of the building. Soil erosion should be avoided by designing driveways.

4.2 Findings from the fields and impact on the theoretical focus of the project:

- **Green Buildings-** On my first field visit to Mr. Girish Sethi, Director (Energy Efficiency),TERI, He also told me about the GRIHA rating system devised by TERI. The role of government with the help of NGO's like TERI was discussed in detail. Most of the information that I received about the architectural innovations and technological inventions to save energy in the buildings were due to him. He also told me to meet few people who can be helpful in this regard.
- **Solar Passive Architecture and other methods to save energy in buildings-** On my next field trip, I met Mr. Niteesh, Associate Fellow, Centre of Building Sciences. I learnt a lot about Green Buildings and the ECBC on this trip. He told me about Bureau of Energy Efficiency. I told him about few of my plans and he told how they can be better implemented. I came to know about the various ways of saving energy in the buildings by implementing various facets of architecture and technology.
- **Role of Government in mitigating the harmful effects of development projects:** My mentor particularly helped me in realising the role of the government properly. I came to know about the role of Urban Local Bodies and how much can they influence lifestyle of the denizens of the city. I also came to know about the other policies and initiatives started by the government. He also briefed about the real estate scenario in India.
- **Housing shortages, housing schemes by the government, and the condition of these housings:** Mr. Sarvesh Mishra, gave me a general idea about the demand supply gap for the housing for the urban poor. Under the 'Kashiram Awas Yojana', cost of one house was close to three lakh which was considerably cheaper seeing the good quality of the housing. He also told about

the completion rate of the project. This made me aware of the good efforts made by the government to provide housing to all.

4.3 Gap analysis

Since there is no governmental body particularly established for real estate, there are few steps which government has taken. Few steps like restructuring Dharavi etc. have come up in the form of PPP model. Then, steps like improving infrastructure and providing affordable housing are taken by the government by the help of ULB's. There are few problems with the existing policies which are discussed below:

- Due to the absence of a proper governmental setup for real estate, there exists a lack of communication between the private builders and the governmental authorities. Different rules are laid down by different governmental authorities like the MoEF, Urban Development Boards etc. A full proof plan is not there. Therefore, complications might arise at a later stage like that of the 'Lavasa' township. Due to lack of a single complete and autonomous construct, if a governmental body wants to amend a plan for good, it has to consult various other bodies. Though, mostly all bodies might agree, but the plan takes a longer time to be implemented.
- Government at both state and central level have done a tremendously good work in providing better housing to urban poor through its various housing schemes. These houses are of considerably good quality and at cheap interest rates (Subsidized). However, these houses cannot meet the demands of all people of the LIG and EWS.

The demand for EWS houses alone in 2007 was near about 21 million. Just to show the demand supply gap, currently 1.5 million houses are under construction in various cities for poor people under the Rajiv Gandhi Awas Yojana. Therefore, the government needs to look for other alternatives also to meet the increasing demands. It lack in funds and that all the houses will be built by the government will be a highly uphill task.

- There is not extensive research being done in the area of Building sciences and cheaper housing techniques. The scenario of India is totally different from the other parts of the world. Few of the world class eco-friendly technologies are only discarded by the Indian mass because of their high costs. Laurie Baker did research in this field and came out with some excellent and unique techniques particularly fit for Indian Housing. Similar to this, much more research needs to be done by the Indian architects and scientists. More NGO's like TERI etc. have to be encouraged to come up to ensure sustainable growth.

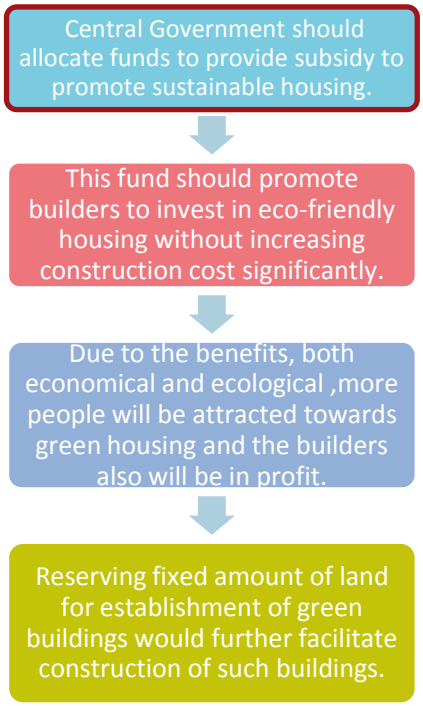
5. Recommendations, Scope and Strategy for Implementation:

After going through various facets of real estate, chiefly the construction of high rise buildings, the development of massive new projects, SEZ's and thereby the increase in cost of housing in urban areas, I thought of the following recommendations that can be implemented to ensure sustainable development.

I. **Recommendation:** Government should invest in innovative construction technologies to promote mass housing developments at subsidised construction costs. Also the urban local bodies must reserve land on its development plans for the development of green homes only.

Scope: This will encourage the builders to make eco friendly homes and will make it quite affordable for the common people also. Reservation of lands for green buildings would ensure that at least few green homes are still built in a totally money driven market. Still the government provides almost 30% subsidies on sustainable products like solar panels etc. However, this must extend to the construction costs of such buildings and the land costs too.

Flowchart:

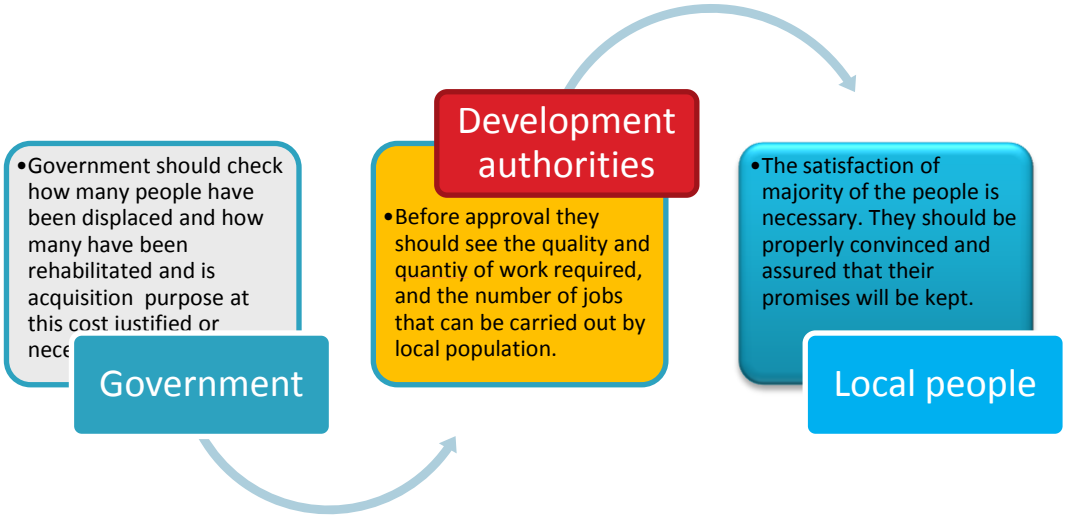


II. **Recommendation:** A specific ratio of local people involvement in the project development should be made mandatory for approval of any upcoming massive development projects or SEZ's.

- **Scope:** Innumerable times have we seen in India that the local farmers or people protest when their land is acquired by the Government for some development project and the locals are handled compensation. The poor, illiterate people have little idea of what to do with such a huge sum of money given to them at once. They know little about investment etc. Therefore, within few years they lose all their money by making a few wrong decisions. Now, a farmer under such circumstances has no job and now no money. Therefore, to prevent this, along with the rightful compensation the government should make it mandatory for the developers to provide them jobs in the projects.

  This would serve two purposes- a) the developer will get a good local labour pool. b) The local people would not feel betrayed and be satisfied with the decision. Therefore, little or no resistance will be offered by them. It is a win-win situation.

Flowchart:

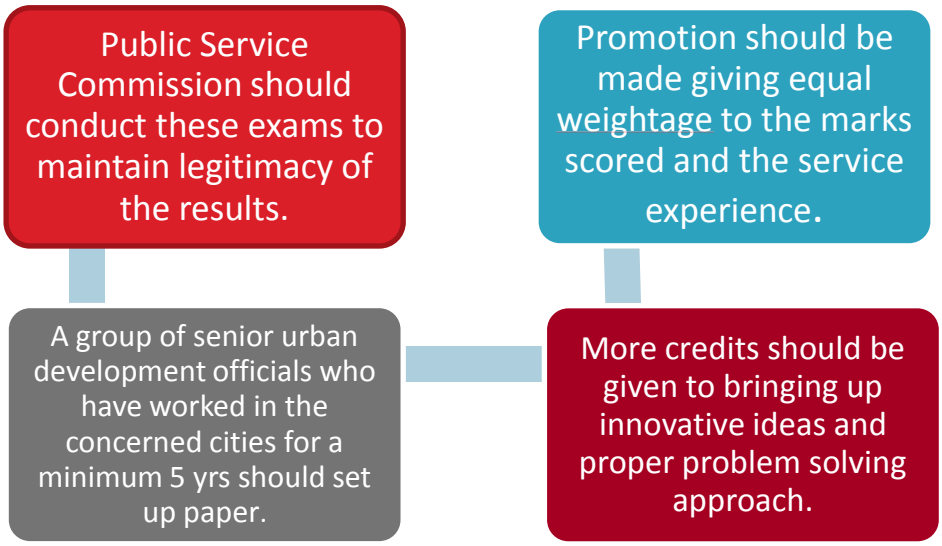


III. **Recommendation**: There should be a promotional examination for the ULB authorities. This exam would be containing questions regarding the current demographics, location, and conditions prevailing in the different parts of the city. The paper should also contain questions asking the workers on their ideas to improve different problems of the city and to design the best possible infrastructure.

Scope: One of the main obstacles of effective urban planning in India is a lack of up-to-date, comprehensive and sufficiently detailed information about urban areas. This lack of information is a major reason behind the failure of urban municipalities to include informal settlements (known as slums) in city-wide planning and urban development.

This kind of exam would facilitate proper understanding of the city among the development authorities and new and better ideas might come as a solution to the housing and other problems.

Flowchart:

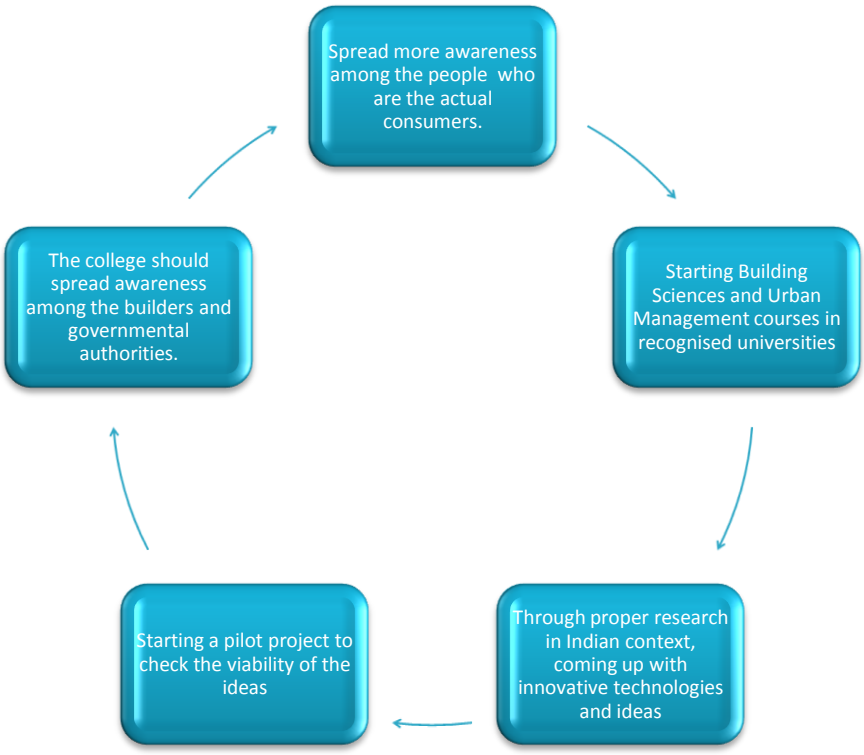


IV. **Recommendation:** Initiate awareness programs among the developers and people related to the upcoming technologies and cheaper construction

techniques. Extensive courses on Building Sciences in recognised universities should be brought up to encourage research on this matter.

Scope: The reason why better and eco friendly technologies are not so commonly used by the developers in India at is less due to money driven mentality and more due to ignorance and half knowledge about these technologies. Most of the developers think of these technologies as cumbersome and expendable. They need to be made aware of the economical and social benefits. The people should also be aware that these eco friendly technologies are not only good for environment but they also save energy and hence they payback in specific amount of time and then yield profits. The latter argument might appeal more to the people. Similarly cheaper construction techniques like Adobe, Cob or Rammed Earth etc. are seen with apprehension. However, they are the most sustainable methods of building houses. Such constructions can easily and only be encouraged by making the people aware of its benefits.

Flowchart:



V. **Recommendation:** Scaling the Initiative through Private-Sector Collaboration by establishing a PPP model.

Scope: The model will allow the project to move forward efficiently in all aspects of its development, from legal hurdles -- such as building permits -- to more technical considerations, such as the system design of the water supply. Already, plans for rebuilding Dharavi with the help of private investors is coming up. This can be thought of as a pilot project (A big one) and future work can be modelled according to the success and failures of this project.

6. Suggestions for future work

- I could not read much about the slum dwellers. India has a population of 91mn people living in slums which is too much. This is primarily because the real estate boom that we talk about is not a boom in the holistic sense because its affect does not permeate till this lowest section of the society. Often, the government and the people are indifferent towards the slums because these people are impoverished and don't have much say in the society. These are the real third world citizens. Hence as a responsible citizen of India it becomes our duty to improve the quality of life of our fellow brethrens. Therefore, through this project the pathetic condition of the slum dwellers is to be presented and a model implementable solution is to be brought up.

- I could not go into the details of the role of government in the real estate sector. The GoI is highly benefitted from this sector but up till now, no separate governmental set up is there to handle this area. Seeing the enormity of the

sector, what are the reasons for the government is so unresponsive in this regard? Also, Urban Local Bodies of a metro city play a huge role in the real estate development of the city. Therefore, what are the functions of ULB's and how much control can they exercise on the real estate sector should be properly investigated.

7. Conclusion

Real Estate is one of the fastest developing sectors of India. It is contributing immensely to economy, providing unprecedented amount of jobs to people in such a short span, affecting lifestyle of people, revamping the infrastructure of the cities, realizing massive development projects and catering to the household needs of the masses.

However, we need to understand that this development is coming at a cost. This cost that we are paying is too much. When we Indians bargain on even the smallest thing bought from the supermarket, why should not we bargain in this case too when the stakes involved are way too much? Certainly, we need to mitigate the harmful effects of the real estate boom. Also, the real estate we witness is totally money driven. Little scope for environmental concerns or cheaper construction remains in such a case.

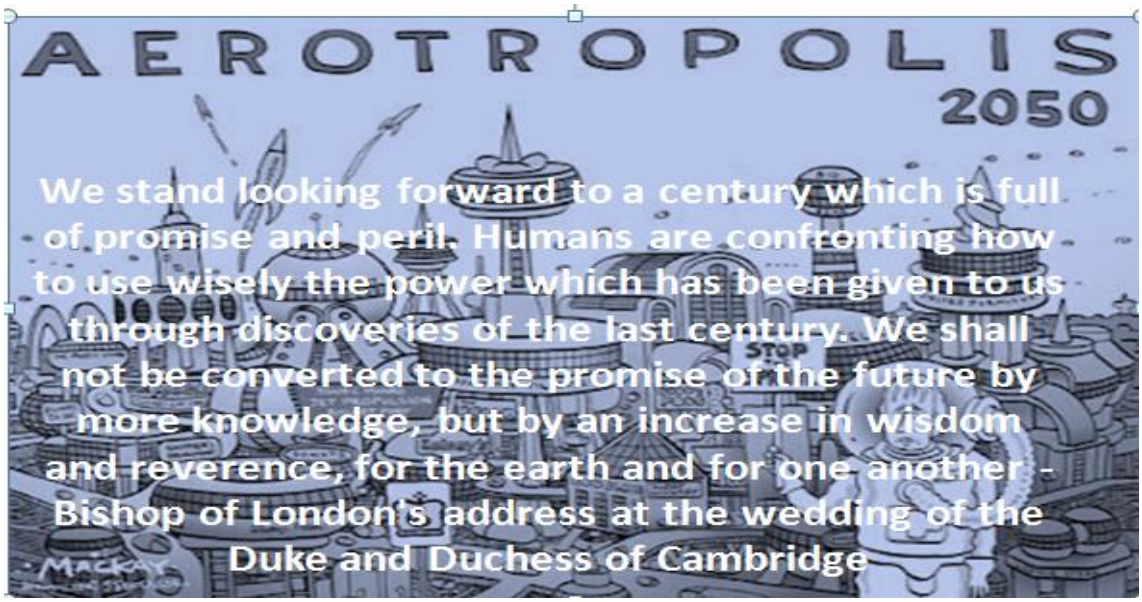
Till 2050, India will surpass China in population to be the most populous country in the world (nothing to be proud of). 80 % of the population will start

living in the cities. The pressure which will be exerted on these cities is either beyond imagination or something we won't want to imagine. All kind of problems will then become manifold- Energy crisis, water crisis, deteriorated quality of air, shanty livings etc. There is still time. If we give correct direction to our real estate market, development would have very little or no effect on our environment, energy reserves and our cities would be prepared to sustain even greater pressure, if needed. We can achieve the goal by ensuring sustainable development.

Sustainable development is needed urgently. Any delay would make the matter worsen exponentially. In general, when we think of the word sustainable, we start thinking about the future generations. However, sustainable growth stands for thinking about the needs of both the present and the future generations for the simple logic that a bright future could not rise up from a crumbling present. Therefore, for ensuring sustainable growth in real estate sector, we must not only consider the environmental or social aspects but also the economic aspects that affect our urban poor people who are presently forced to live in slums and other shanty dwellings.

Now, the government needs to intervene and formulate policies, provide subsidies to better construction technologies, eco friendly materials and energy saving techniques. It has to formulate policies to encourage the builders to invest in green buildings. It needs to give the people displaced due to big projects, a better compensation which stays with them for a lifetime.

Not only the government, all of us need to be equally concerned and supportive in our own fields and decisions. No government can fulfil its duties if the citizens are not willing to co-operate. A technocrat must come up with eco friendly and cheaper construction technologies, an architect must come up with least energy consuming design, an individual should consume only as much as he needs. To sustain our cities for a brighter future, every denizen needs to his bit of effort and treat the city as his home. And then only, can we improve the quality of life of our people and the upcoming generations.



Sketch by Brittany

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(b) Book

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Appendix A

Meetings and Interviews

Date: 11/06/2012

Time: 12.30 pm – 2.00 pm

Name and designation: Girish Sethi, Director (TERI, Industrial Energy Efficiency)

Duration of Discussion: 90 minutes

Discussion :

- He also told about the architectural changes that are needed to be done in this regard.

- He told me the various ways in which we can reduce the energy consumption in the high rise buildings and the possible technologies that are thought of in the near future to be incorporated in these buildings.
- Mr. Girish Sethi, gave me a very brief account of the energy consumption profile in the high rise buildings.
- He gave me few data of which (with his consent) I included in my project.

Date: 11/06/2012

Time: 3.30.00pm-5.15pm

Name and designation: Mr. Niteesh, Associate Fellow, Centre of Research and Building Sciences.

Duration of Discussion: 105 minutes

Discussion:

- Mr. Niteesh told me about the concept of 'Green Buildings' and also about the ECBC rules.
- He told me the various sites on the internet from where I can get some better statistical data.
- He gave me few case studies of various buildings of India to go through.

- He also told me about 'GRIHA' which is basically the criteria for rating these building (on how environmental compliant they are) on a scale of five.
- He told me about the worldwide organisations which work in this field like LEED (Leadership in Energy and Environment Design) etc.
- He asked me to go through the a book '**Energy-Efficient Buildings In India'** written by Mrs. Mili Majumdar to know more about solar passive architecture.
- He mailed me one of his presentations regarding 'Green Buildings'.

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[iv] Theses-Shashank Jain. IIT Roorkee.

[v] Congress on Urban Green Spaces (CUGS) report on Urbanisation.

[vi] Bodine Street Garden (Bodinestreetgarden.org)

[vii] The Value of Open Space: Evidence from Studies of Nonmarket Benefits By Virginia McConnell and Margaret Walls

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