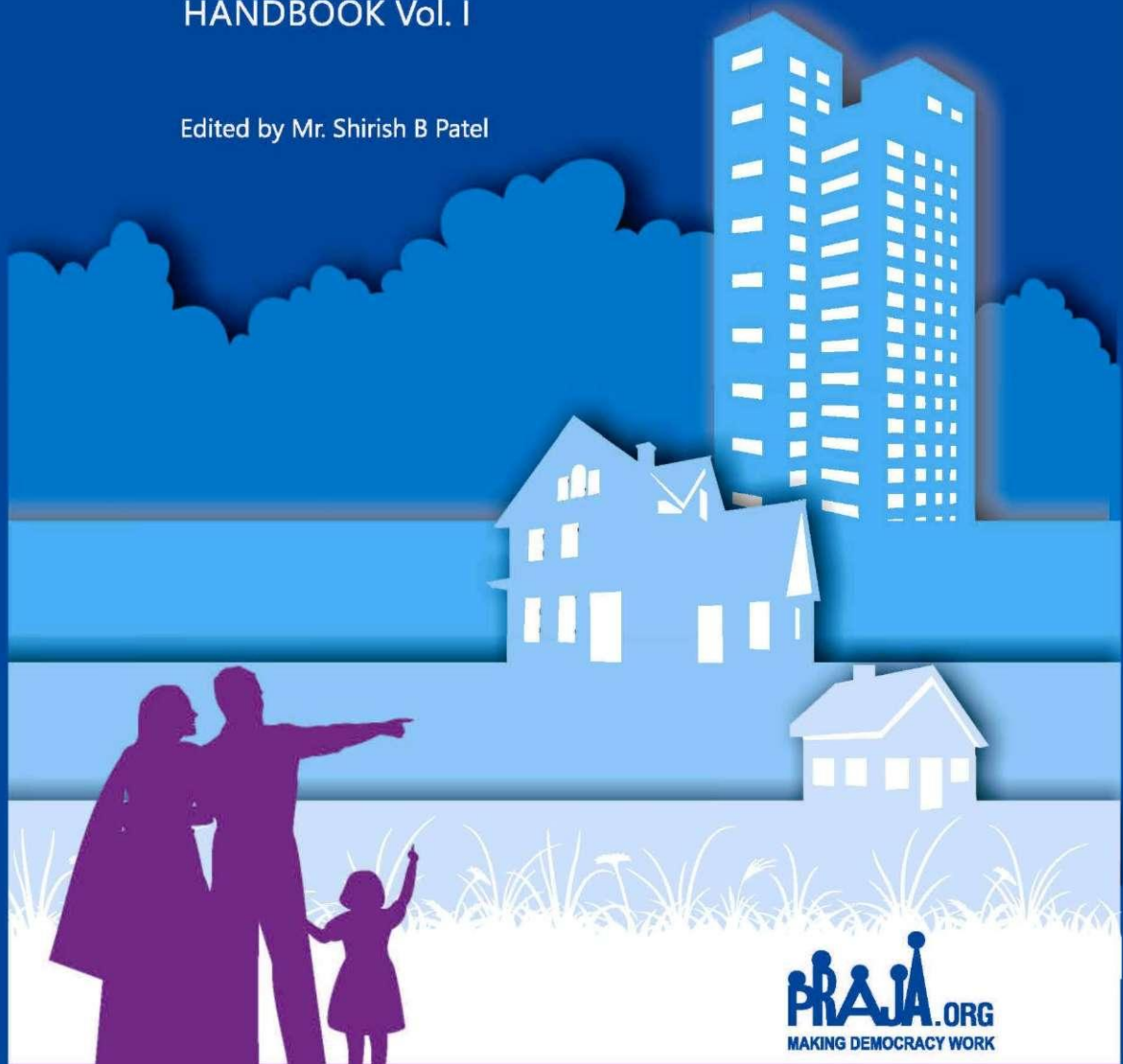# HOUSING, FSI, CROWDING, AND DENSITIES

HANDBOOK Vol. I

Edited by Mr. Shirish B Patel

PRAJA.ORG
MAKING DEMOCRACY WORK

HOUSING, FSI, CROWDING, AND DENSITIES

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ACKNOWLEDGEMENTS

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PRAJA.ORG

MAKING DEMOCRACY WORK

About Praja Foundation

Founded in 1998, Praja Foundation is a Mumbai-based non-partisan voluntary organisation enabling accountable governance. Praja empowers the citizen to participate in governance by providing knowledge and perspective. We aim to provide ways in which the citizen can get politically active and involved beyond the ballot box, thus promoting transparency and accountability.

Concerned about the lack of awareness and apathy of the local government among citizens, and hence the disinterest in its functioning, Praja seeks change. We strive to revive the waning spirit of Mumbai City, and increase interaction between the citizens and the government. To facilitate this, Praja has created www.praja.org, a website where the citizen can equip themselves with information such as: the issues faced by municipal wards, the elected representatives, the responses received and a discussion board, thus allowing an informed interaction between the citizens of the area and elected representatives.

We believe that accountable governance follows if you have:
- Well-informed and intentioned Elected Representatives (Municipal Councillors, Members of Legislative Assembly and Members of Parliament)
- Well-informed Media
- Well-informed Citizens

With this aim the 'Praja Dialogue' was launched in 2008 to bridge the gap between citizens, elected representatives and government in order to improve governance and bring accountability through meaningful dialogue on basic issues concerning citizens.

Praja not only provides information for meaningful dialogue on governance but we also train elected representatives to understand the nuances of laws governing their working and effectively use information to solve citizens' issues.

Through our programme, Praja Katta, we engage with youth to build on their understanding of the working of governments (roles of local, state and national government), tools like Right to Information Act and undertake projects for improving their quality of life through good governance.

Praja believes that when the three most important constituents of Governance (viz. Elected Representatives, Government / Administration and Citizens) come together on a platform for dialogue which is based on data, facts/information from the local level on various civic and security issues affecting citizens, we can bring about change and establish good governance practices.

ABBREVIATIONS

CD- Community District
DCR- Development Control Regulations
DP- Development Plan
ELU- Existing Land Use
EWS- Economically Weaker Sections
FSI- Floor Space Index
GD- Gross Density
HC- Home Crowding
HIG- High-income Groups
IC- Indoor Crowding
JNNURM- Jawaharlal Nehru National Urban Renewal Mission
LIG- Low-income Groups
MCGM- Municipal Corporation of Greater Mumbai
MIG- Middle-income Groups
MMR- Mumbai Metropolitan Region
ND- Net Density
PAP- Project Affected Person
P/Ha- Persons/Hectare
PF- Plot Factor
RAY- Rajiv Awas Yojana
SC- Street Crowding
SRA- Slum Rehabilitation Authority
TDR- Transferable Development Rights

FOREWORD

Housing is a basic human need. For example, proper housing is instrumental to security, a sense of well-being, and alone provides an environment conducive to proper education and wholesome human development. As many have argued, it seems to me that there is significant merit in the view that housing should be considered a basic human right. Even if readers contest that view, in any case I believe it uncontroversial that providing adequate housing is a fundamental responsibility of society.

The statistics concerning housing in Mumbai - and indeed the housing statistics from most Indian cities - are downright disturbing. In Mumbai, the 2011 census states that 41.85% of the people of Mumbai live in slums (that is, not only do they not have proper homes, very often they are denied basic infrastructure including garbage clearance). That's a staggering number of people - many many millions. No wonder then, that when city based non-profit UDRI surveyed Mumbai's citizens, they identified housing as their number one problem. But it's not only 'their' problem - it's actually a challenge for each one of us as citizens to understand and address - after all, each one of us is part of this society, and it's our collective responsibility to resolve this pressing issue. We owe it to our fellow citizens to make rules and pass laws in a manner that promotes decent and affordable housing for all.

Given the importance of housing, it's also surprising that there is little serious dialogue about this issue. Perhaps many of us have 'tuned out', considering the issue too big to address? Or we have abdicated our responsibility to wishful thinking and hope in the invisible hand of the market? What I usually come across in discussions on housing are some three letter acronyms, batted around as solutions in a facile manner: FSI, TDR, SRA and so forth.

This handbook makes a high quality effort to provide facts about the housing situation in Mumbai, frame the basic issues concerning housing, explain the basic rules and tools that are used, and also point to possible pitfalls in our current approaches to the issue of housing in Mumbai. It's written by experts who, with their expertise in urban planning and urban affairs and their involvement in the affairs of the city have the background and the depth to explain the subject simply and clearly - but without resorting to oversimplification and distortion.

www.microhomesolutions.org

By reading the book carefully, you will be rewarded by knowledge of the key approaches that have been used successfully to provide housing for more – such as incremental housing, inclusionary housing, etc. You'll understand the importance of urban planning in general and Mumbai's Development Plan in particular to provide space and to set priorities for affordable housing. You'll be able to visualise the relationship between FSI and crowding – and see in what manner higher FSI in plots leads to more load on the streets. You'll have data about the relative density of New York City vis-à-vis Mumbai – another often-misunderstood subject.

Praja hopes most of all that this handbook will enable Mumbai's citizens, civil servants and corporators to engage in a more informed discussion that will set our democratic wheels in motion, and finally provide humane living conditions for all.

Anuj Bhagwati
Trustee
Praja Foundation
March 24, 2014

PREFACE

"Housing is a human right. There can be no fairness or justice in a society in which some live in homelessness, or in the shadow of that risk, while others cannot even imagine it."[1]

The right to adequate housing and shelter, a basic human right, still remains a distant dream for many in Mumbai. As per the 2011 Census of India, over 52 lakh people in Greater Mumbai live in slums[2]. With soaring real estate prices and lack of affordable housing solutions, lakhs of families are forced to live in inhuman conditions in the city of dreams.

The mismatch in housing demand-supply occurs across all income segments. While the economically weaker, low and mid-income segments remain underserviced, supply exceeds demand in the high income segment. The median household income in Greater Mumbai is only Rs.20, 000 per month, while the lowest price for even a single bedroom public housing unit commences at Rs.14, 00,000[3]. There is an urgent need to correct this mismatch in demand and supply in the city's housing stock, and hence there is a case for Government intervention in the affordable housing segment.

However, State housing schemes have been severely inadequate in addressing the city's growing demand. It is necessary to create 11 lakh low-income houses for slum dwellers, in addition to the creation of new housing stock for the city's growing population[4]. As per data available with Praja, about 2.2 lakh housing units have been created by MHADA, MMRDA and the Slum Rehabilitation Authority till date. This number includes rehabilitation of persons displaced by various infrastructure projects and projects currently under construction. Moreover, majority of affordable housing projects are being developed on the outskirts of the city, forcing people to commute up to 100-150 km a day to and fro business districts.

The quality of life in urban cities is a blend of amenities (shelter, water supply, public transport etc.), social infrastructure (facilities pertaining to health, education, socio-cultural activities etc.), and open spaces and these factors cannot be ignored in the planning of housing schemes.

Understanding the workings of the Real Estate and Housing sector can be challenging, with a lack of readily available information for a layman who may not be familiar with the concepts of urban planning.

www.microhomesolutions.org

This Handbook is our endeavour to familiarize Elected Representatives and citizens from all walks of life with Housing concepts and practices, and lays emphasis on low-cost housing. It explains concepts such as Inclusive Housing, Floor Space Index etc. in a simple manner.

You get an overview of:

- Key concepts used in Housing
- Terms and Concepts frequently used in Urban Planning
- Important Agencies and their Functions

According to the Constitution of India, land, housing and urban development are State subjects and fall under the purview of the State government. The State Government is empowered to enact and enforce necessary laws and frame policies that support this function. Thus, it is the duty of our Elected Representatives to pursue policies that ensure decent living conditions for the residents of Mumbai.

Awareness must precede action. The first step towards improving the quality of life and living standards in our city is to be informed citizens. We welcome you to refer this handbook and hope that it will build on your understanding of the subject. We look forward to your participation in Praja's endeavour, and hope to start a dialogue on this pressing issue.

Write in to us at **info@praja.org**
to share your thoughts/comments on this Handbook.

artist: Mario Miranda

Facts about Greater Mumbai

Total Area- 458.28 sq. km
Developed Area- 271.17 sq km (59.1%)
Area under Special Planning Authorities- 43.22 sq km (9.4%)
Natural Areas- 113.04 sq km (24.7%)
Vacant Land- 22.83 sq km (4.9%)
Land under primary activities(plantation, salt pan lands)- 8 sq km (1.7%)

Population as of 2011- 1.24 crore
Population living in slums- 41.85%
Eastern Suburbs- Proportion of slum population- 51.91%
Western Suburbs- Proportion of slum population- 42.69%
Island City- Proportion of slum population- 27.88%

Household size as of 2011- 4.48
Household Income Distribution- Only 9% population earns more than Rs.60,000
per month
Median Household Income(as of 2008) - Rs.20,000 per month

Source: Preparatory Study, Development Plan Mumbai 2014-34, MCGM

I.HOUSING CONCEPTS

1.1 Affordable Housing

1.2 Inclusionary Housing

1.3 Incremental Housing

1.4 Rental Housing

I.HOUSING CONCEPTS

In this section, we introduce you to fundamental concepts used by institutions such as local governments and urban planning bodies to address the growing housing needs in urban areas.

thetimes.co.uk

1.1 Affordable Housing

'Affordability' is a relative concept and has a different meaning for different people. What may be affordable to one section of the population is out of reach for another. Hence, for a large and diverse city like Mumbai, no one size can fit all.

When the British built their bungalows they were careful to provide servants' quarters in the compound-for their bearers, their cooks, their malis and their ayahs. When the textile mills were built in Bombay in the late 19th and early 20th centuries care was taken to house the mill workers in chawls. Though this was poor quality accommodation even by the standards of that time, but there was recognition that Government had the responsibility to make sure workers were housed.

With independence all that changed. No connection was made between providing employment (and this was welcomed, and encouraged) and providing corresponding housing. It was no part of the employer's responsibility to make sure his employees were housed. In the early years after Independence some effort was made to provide public housing, but this effort soon ceased because housing to the "minimum" standard of 250 sq ft of a pucca house was unaffordable. In the alternative, Government could have provided at the very least land, with water supply and sanitation, for people to build their own settlements. This was not done. As a result, we now have over 50% of Mumbai's population living in slums, which are essentially unauthorised and illegal. In 2005, the Government of Maharashtra had 4,413 Police Constables and 81 Police Inspectors living in slums. The numbers have if anything worsened since. These are officers of the law who are illegal residents of the city. The Government is willing to give a policeman a job, but not a place where he can pitch his tent.

The affordability of housing is differently understood by different people. Today several well intentioned developers are producing housing they call "affordable" at a price of around Rs.10 lakh, most often on the outskirts of a town or city. Normally, affordability means a capital cost of around 3-4 years of annual income or a monthly rental cost of around 25% of monthly income. This means that a semi-skilled worker, like a motor car driver, who typically earns Rs.10, 000 a month, should be able to rent a place for about Rs.2, 500 a month, or buy a house for about Rs.4 lakh. Given land prices in the city, how are such prices possible?

Table 1: Mumbai- Housing Stock by Type [5]				
No.	House Type	Price Range INR	% of Stock	Nature of Stock
1	Pavement Dwellers	3,00,000-23,50,000	3	Informal
2	Slums		45	Informal
3	Chawls	20,00,000-40,00,000	15	Formal but non compliant with present standard
4	Slum Rehabilitation		2	Formal, initially free to slum dwellers
5	EWS/LIG		5	Public Housing
6	MIG/HIG	10,20,000- 85,00,000	2	Public Housing
7	1 BHK apartments			Formal
8	2-3 BHK apartments	65,00,000- 25,00,00,000	28	Formal
9	3+ BHK apartments			Formal
	Total		**100**	

Source: Policy Research Working Paper 5475, November 2010, The World Bank [6]

In Table 1, total households are allocated to available stock according to their purchasing power using standard affordability multiples for home purchase—2.5 x annual income.

Factors affecting Affordability

(a) One is the cost of land. If that was excluded from the price, housing would be affordable for many more people.

(b) Another is the demand for up-front payment. If the down payment was quite small, and payment could be in instalments, many more would be able to afford the same cost house. The availability of long-term finance is thus critical to expanding affordability.

c) And finally, if the house could be built not in one go, but incrementally, over a period of (years or decades, expanding and improving in step with the growing income of the family, affordability could be dramatically improved.

A High-level Task Force [7] on 'Affordable Housing for All' has suggested that the following parameters be used to define affordability:

Table 2: Parameters to define 'Affordability'		
	EWS/LIG	**MIG**
Size	300-600 sq ft carpet area	Not exceeding 1,200 sq ft carpet area
Cost	Not exceeding 4 times household gross annual income	Not exceeding 5 times household gross annual income
EMI/Rent	Not exceeding 30% of gross monthly income	Not exceeding 40% of gross monthly income

Source: Report of the High Level Task Force on 'Affordable Housing for All', 2008

As you can see, affordable housing means different things to people depending on their needs and resources. For a Public Housing scheme to be truly inclusive, it needs to factor in these differences.

1.2 Inclusionary Housing

Historically, affordable housing projects in Mumbai have been marred by lack of land availability in the main city. As a result, many housing schemes have been developed on the periphery of the city. In a bid to make housing affordable, planners have overlooked the need for 'inclusionary' housing in urban areas. By developing housing projects segregated on the basis of economic backgrounds, developers have in a way contributed to the ghettoization of Mumbai. The primary reason to distribute inclusionary housing through the city is to ensure some kind of social integration across income classes.

1.2.1 Inclusive Housing around the Globe

With the notable exception of Singapore, most countries in the world have given up on providing public housing. This is because they have found public housing unmanageable. Instead, they have mandated policies of what is called Inclusionary Housing. These countries include the USA (where the practice first started), Canada, the UK, France, Italy, Spain and others.

According to this Policy, every developer who undertakes any building construction project must set aside a specified proportion of the built floor space for inclusionary housing.

• Basically what each of these countries mandates is that every developer who undertakes any building construction project, whatever its purpose, be it a mall or an office or high-value residential apartments, must set aside a specified proportion of the built floor space for inclusionary housing. In most countries the proportion to be thus set aside is 25%. In Spain it is 50%. In most countries it is required to be on the same site as the for-sale construction. In some countries it can be on a different site, but not too far away.

- Public spaces in particular are shared by people from a variety of walks of life. The wide dispersion incidentally reduces travel demand because the lower-income population comes closer to where their jobs are.

- Needless to say, no developer in any country in the world likes inclusionary housing. But it is mandated because countries understand the need to house everybody, and since governments have stopped building public housing there is a need to find a workable alternative.

- Inclusionary housing is not addressed to the poorest of the poor. It is intended for all those who fall below 80% of the median income—in other words, they constitute the lowest 40% of the entire population.

- Public housing did not work because Government combined in itself the functions of owning, building, maintaining and subsidising housing. With inclusionary housing these functions are split between three separate agencies, each best equipped to carry out its specific function.

  - The Developer understands construction. He builds the inclusionary housing. He is reimbursed the cost of construction. What is not reimbursed is the cost of land. He has to provide this without charge, because it is only on that basis that he gets permission to build the for-sale component of the rest of the project.

  - A separate agency, usually an NGO, owns, manages and maintains the property. It is strongly regulated by Government in regard to what it can charge by way of rents or prices when inclusionary housing is offered for sale. In the UK these NGOs are usually Housing Associations. They can borrow from banks against mortgage of the property. They draw up the specifications for the inclusionary housing which the developer has to follow, and they supervise and pay for the construction.

  - Besides construction and maintenance, the third aspect of inclusionary housing is the subsidy. This is provided by Government on a family-by-family basis. In the USA, it is in the form of housing vouchers which can only be used towards paying the inclusionary house rent.

- Since inclusionary housing can be bought by occupants, in a development it is often not possible to distinguish between those who get a subsidy and those who do not.

- For those who believe it is not possible or acceptable on the same site to have high value floor space as well as inclusionary housing, we should note that in Mumbai, albeit emerging from a completely different context, we have several successful Slum Redevelopment Authority schemes. In these, slum dwellers have been re-housed in pucca buildings on the same site as the high-value construction.

Affordable housing projects in Mumbai have been marred by lack of land availability in the main city.

1.3 Incremental Housing

Incremental housing, also known as Sites-and-Services, is a step-by-step urban development process[8] for building housing communities. Its fundamental approach is that owners control the expansion of their housing based on their needs and resources. It is an affordable way to resettle households with minimum housing and services and provides flexibility in housing decisions. The world over, Sites-and-Services programs emerged in the early 1970's, and in India they were implemented in Chennai as early as 1972. The idea is to provide resources that households cannot avail easily or afford themselves: E.g. a plot of land with basic, essential utilities (clean water, sanitation, flood protection, security lighting, etc.), municipal services (garbage collection, schools, etc.) and, financing. Infrastructure is designed in a way that it can be upgraded and expanded over time.

Key Features:

*   Allow building incrementally
*   Reduce up-front and future costs
*   Make building affordable (for homeowners, local governments and service providers)
*   Fit the evolving needs of low-income communities
*   Increase density and use land more efficiently
*   Provide flexibility

Image: Incremental Housing, Savra Gheda colony of New Delhi

Source: http://incrementalcity.wordpress.com/2012/09/18/unthinking-housing-for-the-urban-poor/
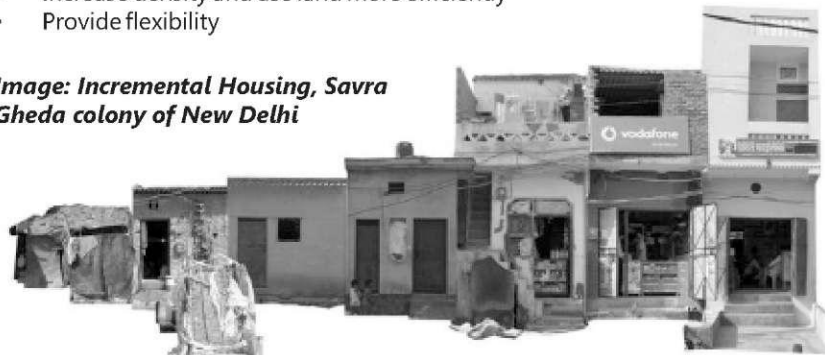
Case Study: Charkop sites-and-services Project
Location: Charkop, Mumbai
Period: 1985-1990
Cost: Rs.250 crore

Charkop is laid out as a mixed-income development, with 5-6 storeyed middle-income apartment blocks, 60 and 100 sq m bungalow plots, and sites-and-services units on 25-40 sq m plots for the lowest of the income groups accommodated here. There are schools, playgrounds and public parks accessible to all income groups. The project was developed by MHADA with a loan from the World Bank

- On the smallest plots, in principle all that was provided was a plinth and a wet point—meaning a connection to water supply and sewerage. The occupant was expected to build his own hut on the plinth, with whatever cheap material he could afford. Thereafter, he would improve it over the years as and when possible with more durable materials.
- The bare plot itself with its wet point was given to the occupant on a 30-year lease, and with a 20-year loan to recover the cost of land and the plinth and wet point construction.
- Virtually all the allottees chose to construct their homes with brick walls and an asbestos cement sheet roof. Twenty-five years later, with the 20-year loan for the plinth and wet point fully paid back, some of the homes have remained unchanged. Many more have added an internal stair and a floor above and a few have gone even higher. Flooring, which was originally rammed earth, is now commonly stone, and in some cases marble.

Image: Charkop – typical sites-and-services co-op society of 33 plots. Most plots are 3m x 8m. Those abutting the road are larger.

9m wide road
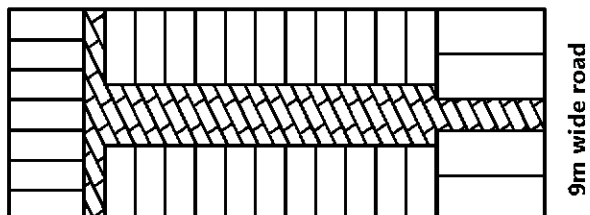
Shown above is a plan view of the layout. The shaded area is open to the sky. Note that there are abutting layouts on 3 sides, top, bottom and left which are mirror images of the above. So ventilation is poor, with an opening only on one narrow side of the plot, but this is needed to achieve the highest densities.

With the added floor above, the original 22 sq m plot is now commonly a 44 sq m (about 500 sq ft) home. It is true however that it is poorly ventilated, with other houses abutting both long sides and the rear wall, so that only the front face is open. However, in the way the plots have been laid out they have become strong co-operative communities of 33 families in each co-operative.

L to R: Entrance to a typical 33-family sites-and-services co-op and view of a typical internal courtyard. Some houses have remained single-storeyed; most have added an upper floor. Note the manholes of the drainage line running down the centre of the courtyard.

Here is a gate into the courtyard where the entrance passage has been (illegally) built over to add an extra room.

Incremental housing, also known as Sites-and-Services, is a step-by-step urban development process for building housing communities.

View into the courtyard from the entrance passage which has been covered over, showing the access stair placed within the entrance passage. This must be a co-op with weak enforcement and a strong individual member who can get away with this.

The main road, with apartment buildings on plots that abut the main road.

Looking towards the entrance passage from within the courtyard. Note again that some houses are single storied and some have added a floor.

The 9m wide road on to which each courtyard opens. Note that sites-and-services plots abutting the road are allowed to have a shop opening on the street, with the family living space behind the shop. This works well and gives the street a feeling of being busy and active.

Salient Features of the Project

- Adjoining the sites-and-services, at intervals, are plots for schools, school playgrounds and a public park.
- In the Charkop scheme the cost of land for the sites-and-services plots was cross-subsidised by charging more for the bungalow and apartment plots.
- The critical issue here is density, and how much we can achieve with this kind of scheme. The sites-and-services plots alone, with their internal courtyards included, have a net density of 348 dwelling units per hectare. The apartment blocks have a net density of half that, 171 units per hectare of buildable plot area. The plots together constitute 60% of the total area. 10% is taken up by social facilities, 10% by open space and 20% by roads. These are all local roads, not intended for arterial traffic, which runs outside the boundaries of the scheme.
- Two-thirds of the scheme's population is in the sites-and-services scheme; one-third is in bungalow plots and apartment blocks.

We should note that sites-and-services, despite all its plus points, is not a solution for the poorest of the poor. Rather, it is addressed to those above the bottom 10 percentile, who have a regular source of income and can afford to pay back a loan in instalments, however small these may be. But it does take care of the housing needs of a very large section of the total population.

1.4 Rental Housing

Rental Housing refers to a property owned by someone other than the resident or by a legal entity for which the resident pays a periodic rent to the owner. Social rental housing is defined as rental accommodation in which the rent is set at a level below market rates to make it affordable for economically disadvantaged sections of society. One such form of social rental housing is Public Housing in which the housing stock is created and owned by the Government. While home ownership has its own merits, rental housing can play an important role in filling gaps in housing markets. Also, in a city like Mumbai with a large migrant population, regulated rental schemes can offer citizens a wider range of housing options to choose from.

"Rental housing is a valuable tenure to virtually every household at some stage in their lifetime and therefore should constitute a substantial element in the housing stock of every society."[9]

The rental housing segment in Mumbai is mainly informal or unorganized i.e. serviced by individual property owners. The shortage of affordable housing in Mumbai has become more acute with the lack of alternatives such as rental housing. The development of rent markets has in turn been hampered by rent control regulations such as the Maharashtra Rent Control Act 1999.

"In many European countries, the public sector has sought increasingly to transfer the responsibility for looking after lower income groups to the social sector. In the United Kingdom, much of the responsibility for accommodating poorer households has been passed from the local authorities to housing associations. In 2001, social housing institutions accounted for one fifth of the total housing stock and more than two-thirds of the rental stock. In Denmark, social rental housing contributed to half of the new housing stock during much of the 1990s and accounted for 43 per cent of all rental housing in 2001. In Ireland, the social rental sector accounts for half of the rental housing stock. In the Netherlands, social housing institutions have become the main providers of rental housing and in 2001 contributed three-quarters of the total rental stock."

India's experience with Rental Housing schemes has been limited thus far. Based on the Maharashtra State Housing Policy of 2007, Government of Maharashtra initiated a Rental Housing Scheme (RHS) with the participation of private sector in 2007[10]. MMRDA is the Project Implementation Agency for the Rental Housing Scheme. Under the scheme, the private sector is offered incentive Floor Space Index in return for providing self-contained tenements of 160 sq ft carpet area, along with the land to MMRDA free of cost. The units shall then be allotted to eligible low income group households. The RHS is being implemented since 2008 in urban areas of the MMR (except in the limits of Navi Mumbai and Matheran Municipal Council.) Currently, Rental Housing Projects are in progress in the urban local bodies of Thane, Mira Bhayander, Kalyan and in Panvel Taluka of Raigad district. However, no project has taken off in Mumbai thus far. Moreover, the scheme is likely to be replaced by an ownership model of affordable housing, since the scheme has been found to be unviable[11].

hindustantimes.com

Rental Housing refers to a property owned by someone other than the resident or by a legal entity for which the resident pays a periodic rent to the owner.

II. URBAN PLANNING

II. URBAN PLANNING

Urban Development Mumbai

- **Development Plan**
- **Development Control Regulations**

In many villages, houses are built close to each other. This may be for security, or for social reasons. The layout is informal. Paths can be winding through the settlement. Some are wide enough only to walk upon; others are wide enough so that a bullock-cart can reach each house. There is usually some common, central area respected by all which no one builds upon. But notice that in the village there are no common services. Each family fetches its own water from the river, or common tank or well.

In many of our unauthorised slum settlements people have built their huts just as they would in their villages. Paths between huts are narrow and often meandering. Water is fetched by all from some common source. Proper sanitation is often not provided, and usually there is no organised garbage collection. Once you have a larger settlement the situation changes. Now it becomes important to organise a common water supply, and a common sewage system. This was what was done in Harappa and Mohenjo Daro. Streets were laid out that were wide enough to handle traffic. Different sections of the town were reserved for different functions. Along the street, plots were defined where individuals could build their own houses. The difference between a village and a town is that in the town certain services are common, organised and managed by the town. No one needs to dig his own well. No one needs to provide his own septic tank. Garbage is collected in an organised way, carried away and disposed of without the individual householder having to worry about it.

Different parts of the city are different because each locality in a city has its own specific function. When you go to the bazaar in a city you want all the shops to be there. They should not be randomly distributed throughout the settlement. Residences also similarly cluster together. On a busy street you might have shops on the ground floor and residences above. In between, in each locality, you need common areas for meeting and recreation, just as you have in a village. You also need schools, hospitals, police stations and all kinds of other common facilities that are shared by all. Now that we have come to understand the importance of sanitation, we can agree that we need public toilets too.
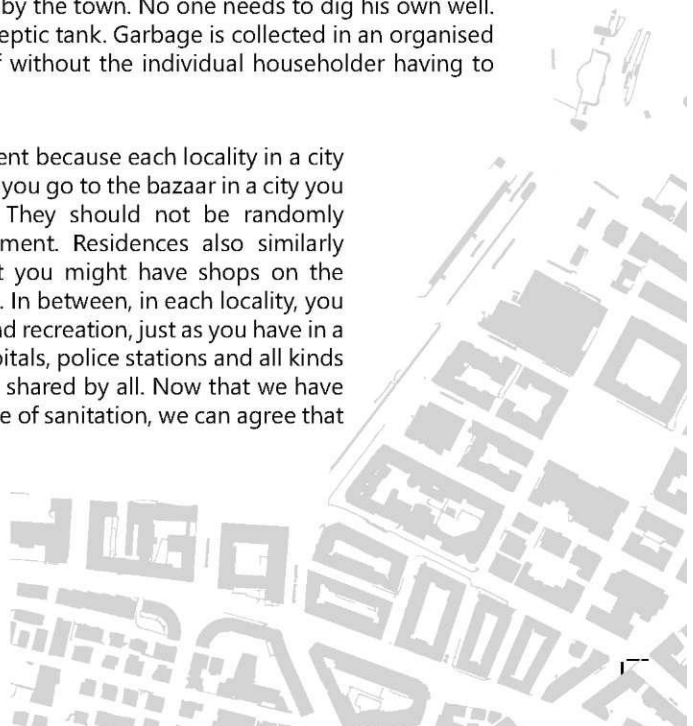
Different Layouts and Building Rules

In the middle of the 19th century Napoleon III commissioned Baron Haussmann to rebuild Paris. Haussmann demolished large tracts of the old city, with its meandering medieval streets. He replaced them with broad avenues and very strict building rules. Buildings along an avenue were required to build exactly to the same front line, touching the footpath. Each floor had to be at the same level, from building to building. The overall building heights were also identical. The façade had to be finished with the same stone. The ground floor was for shops, and cafes spilling out on to the footpath. It is these rules that give Paris its characteristic streetscape.

In Mumbai we have Ballard Estate where there are no front open spaces within a compound. All buildings follow a strictly defined front line. The Malad stone used throughout is also identical for all façades.

We also have Marine Drive, where the footprint of each building is identical with its neighbour's. The front line is also defined. Building heights were also originally identical. It is this uniformity that gives Marine Drive its particular character and charm. In Bhuleshwar, Kalbadevi and other parts of what the British called the native town the rules were less rigid. So the localities developed quite differently. In Dadar, plots were laid out and the rule was that your plinth could be no more than one-third of the plot. On this you were allowed to build Ground + 2 floors. Later, this was relaxed, and a third upper floor could be added.

The basic purpose of building regulations is to limit the number of people who can reside in an area for the following reasons:

* Water supply and sewerage systems have limits to the number of people they can handle.
* The road system's capacity is also limited. The locality's road area available for circulations gets further constrained if on-street parking is allowed, or if there is arterial traffic running across the locality and taking up much of the road.
* We also have to make sure that everyone gets sufficient light and air.
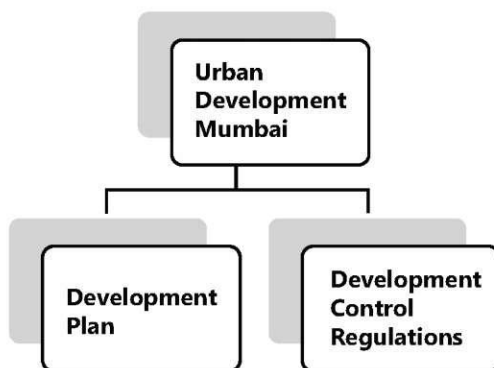* Buildings must not be so close to each other that fire can spread from one to the next.

By limiting how much floor space can be built on a plot we indirectly limit the resident population. Of course if people choose to live in smaller flats there will be more of them. If the floor space occupied per family is more, then for the same floor space there will be fewer families residing in the area.

2.1 Maharashtra Regional and Town Planning (MRTP) Act, 1966

With a view to securing planned development and use of land in a region, the MRTP act provides for the preparation of a Development Plan.

"Every Planning Authority shall carry out a survey, prepare an existing land-use map and prepare a draft development plan for the area within its jurisdiction, in accordance with the provisions of a Regional plan, where there is such a plan [publish a notice in the Official Gazette and in such other manner as may be prescribed stating that the draft development plan has been prepared] and submit the plan to the State Government for sanction. The Planning Authority shall also submit a quarterly Report to the State Government about the progress made in carrying out the survey and prepare the plan."[12]

Thus, the spatial growth and development of Mumbai is guided and managed by two main tools:

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              ┌─────────────────┐
              │ Urban           │
              │ Development     │
              │ Mumbai          │
              └────────┬────────┘
              ┌─────────┴─────────┐
    ┌──────────────┐    ┌──────────────────┐
    │ Development  │    │ Development       │
    │ Plan         │    │ Control           │
    │              │    │ Regulations       │
    └──────────────┘    └──────────────────┘
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2.2 Development Plan

The Development Plan (DP) of Mumbai provides a spatial framework towards building an inclusive and sustainable city. The Maharashtra Regional Town & Planning Act 1966 stipulates revision of regional development plans at least once in twenty years. The first DP for Mumbai was sanctioned in 1967. DP 1967 was revised subsequently and sanctioned in parts from 1991 to 1994. As the previous Development Plan of Mumbai came into force in 1994 and is currently in its final stages, a revised DP for the period 2014-34 is being prepared by the MCGM. Gaining an understanding of the existing land use situation is a key premise of the plan. A realistic understanding of the existing situation would enable formulation of land use zoning and regulatory conditions to meet with demands during the horizon period of the plan. In addition to General Zoning and Development Control Regulations, the Plan will identify undertaking of detailed area-specific planning and regulations for significant areas.

The MCGM is currently holding consultations with Elected Representatives, other government organizations, NGOs, academic institutions and citizens based on the Preparatory Studies for the Development Plan.

The Development Plan can be an important tool in the hands of civic authorities and civil society to plan for a slum-free Mumbai and focus on generation of affordable housing. However, areas under the jurisdiction of Special Planning Authorities such as SRA, MMRDA etc. have been left out of the planning process in the Preparatory Studies of the DP 2014-34. The result is that Mumbai's slum population has been left out of the scope of the Development Plan.

2.2.1 Fatal Flaws in the Development Plan:

The entire Development Plan is fatally flawed. First, as a process it has long since been abandoned all over the world. Great Britain, from whom we copied the process, gave it up 50 years ago. This is because it is based on forecasting what the city will look like 20 years from now. This is an impossible task because there are too many factors outside the planner's control that determine how the city finally develops.

Secondly, it is a pure Land Use Plan, as if that is all that is needed to control and direct development. In practice the way the city grows is determined more by urban policies and infrastructure projects, particularly transport systems and where new accessible land is added to the city. Policies in regard to FSI, or redevelopment, or rent control have a huge impact on the city, and all these lie outside the scope of the Development Plan. Further, in the specific case of Mumbai, large holes are cut out of the planning area, as being either slums, or areas under the control of a different Special Planning Authority such as MMRDA, which does its own planning for the area under its control, without reference to the Development Plan. What is left therefore is not comprehensive planning, not even of Land Use.

So the Development Plan is essentially a futile exercise, carried out with no deeper objective than formal compliance with an outdated law.

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The Development Plan (DP) of Mumbai provides a spatial framework towards building an inclusive and sustainable city.

Existing Residential, Slum and Urban Villages Land Use as per ELU Survey, 2012
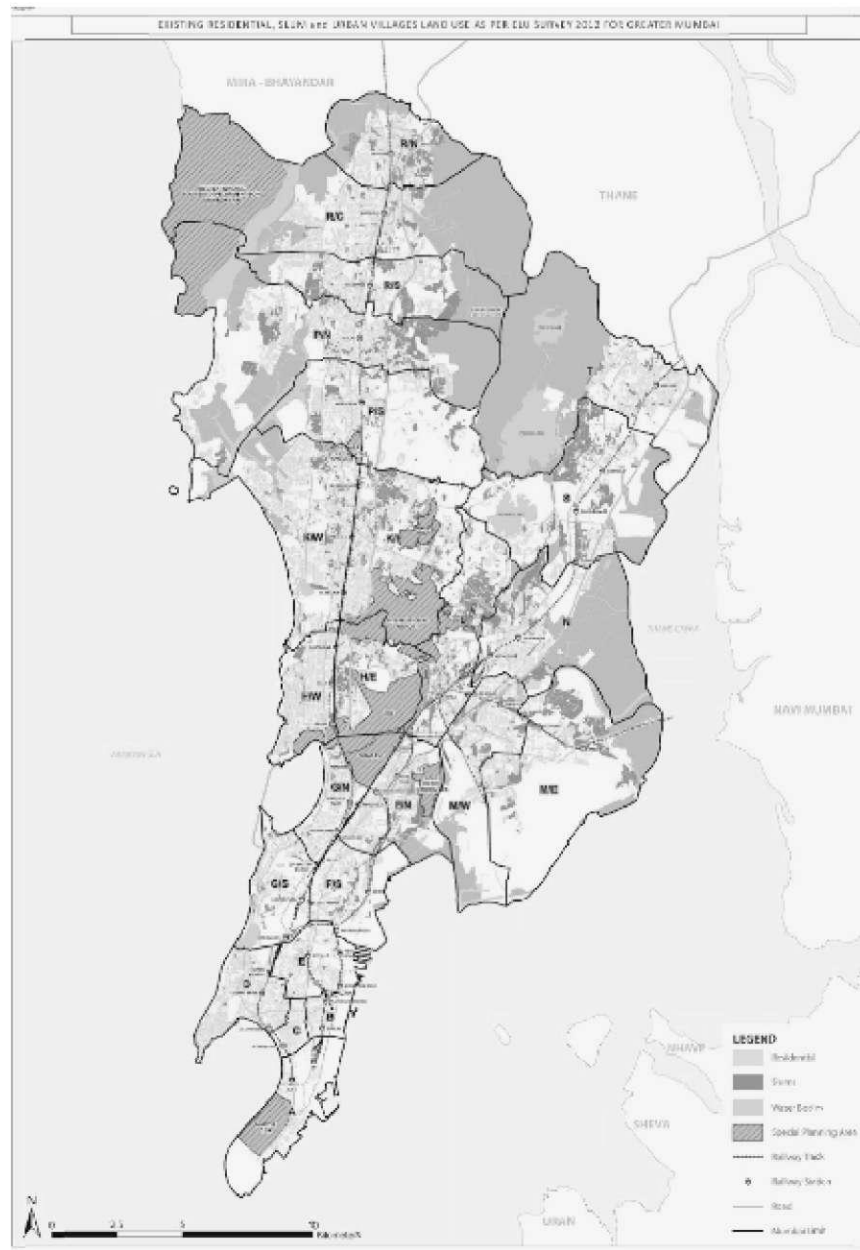
Source: ELU Report, Preparatory Studies- Development Plan Mumbai 2014-34, MCGM

The implementation of the Development Plan is addressed through Development Control Regulations. The regulations were framed to control development/ redevelopment in Greater Mumbai. The present DCR came into force from 25th March 1991.

The most crucial regulation under the DCR is the specification of Floor Space Index (FSI) for construction projects in Greater Mumbai. The FSI is determined depending on the location and type of construction projects. E.g. The FSI allowed in Mumbai City is 1.33 for all types of construction. However, for a cessed[13] building, the FSI can vary between 2.5 to 4. For MHADA layouts, the FSI is 2.5 and for Slum Rehabilitation projects the FSI is 4.

Other important Provisions under DCR :[14]

- Higher FSI for urban renewal schemes, redevelopment of old and dilapidated cessed buildings, and rehabilitation of slum dwellers
- Granting permission for development of land reserved for public housing/rehabilitation by introducing higher tenement density for the areas located for these reservations
- Insisting upon the developer for providing basic amenities in case of development of large chunks of land measuring more than two hectares
- Permitting higher FSI for reconstruction or redevelopment of old buildings constructed prior to 1940
- Permitting residential/commercial development in industrial zone lands with the provision of providing proportionate amenity spaces for additional population
- Permitting redevelopment of land of cotton textile mills for open spaces and public housing
- Preservation of buildings and precincts of historical, aesthetical and cultural value

'Cidco proposes floor space index of 3 for building redevelopment'

'FSI of 4 for old buildings: CM'

Floor-space index or FSI is a commonly used and often misunderstood term in Urban Planning. Intrigued by all the fuss around this term 'FSI', we spoke to Mr. Shirish Patel, an expert on urban planning affairs, to solve the FSI mystery. What is FSI and what does an increase or decrease in FSI mean for a city like Mumbai? These are some of the questions we address in this section.

Praja: What is FSI?

Shirish Patel: FSI (Floor Space Index) is the ratio of the built-up area of a building to the ground area of the plot on which it is built. This is an idea that came from America post World War II. Instead of prescribing the maximum plot coverage (one-third in the case of Dadar Hindu Colony, or Dadar Parsee Colony) and also prescribing the maximum number of floors (Ground + 3 in Dadar's case), we could instead prescribe an FSI of 1.33. On the same footprint, this rule would produce exactly the same buildings. This is where that peculiar number of 1.33 FSI comes from. It corresponds to one-third plot coverage and G+3 floors. The advantage of the FSI rule, for architects, is that they are now free to alter the footprint, making it smaller or bigger than one-third of the plot area. The building will then have correspondingly more or fewer floors, as desired. But the total built-up floor area will remain unchanged because of the prescribed FSI limit. For example, if the footprint is reduced to one-sixth of the plot area the building can have 8 floors (G+7) while still adhering to the FSI limit of 1.33.

Over the years, FSI has come to be the dominant building regulation in Mumbai. Façades with any kind of common theme, even a common front line, are a thing of the past. That is why we now have a more and more chaotic looking urban environment. Each building is always striving to be strikingly different from its neighbour.

Praja: Can you give an example of what happens when we suddenly increase FSI?

Shirish Patel: In the Western suburbs the FSI was earlier 1.0. In the 1990s the notion of Transferable Development Rights (TDR)[15] was accepted. These were granted to builders who took up redevelopment work which the city wanted. In compensation they were allowed to build in the Western suburbs up to an increased FSI limit of 2. This was double the previous value. Because the floor area available doubled, the population resident in the area also doubled. This was perceptible immediately in the increased street congestion.

🌸 *Praja: Can FSI be varied from one plot to another or one locality to another?*

👤 Shirish Patel: Yes indeed it should. What is called Transit Oriented Development (TOD) means exactly that. TOD means that you allow higher FSI (and therefore more crowding, a higher density of people) around a transit node. Around such a node people are within walking distance of the transit stop. As you move further and further away the FSI should go on declining. The lowest FSI, for example for bungalow plots, should be furthest away from the transit stop.

🌸 *Praja: In that case why have we not adopted this earlier? Why has FSI been more or less uniform, 1.33 throughout the Island City, and 1.0 in the Suburbs?*

👤 Shirish Patel: There has been a notion that one must be equally fair to all landlords. So they should all have the same FSI. But there are other ways of compensating owners for differences in FSI. It is also partly laziness on the part of urban planners. It is too much trouble to work out what the FSI should be in each locality. This would depend on its transit capacity and other physical and social infrastructure. It would depend also on how wealthy its residents are (which determines how much floor space each family will want). The rule makers find it simpler just to specify a uniform FSI.

🌸 *Praja: Should FSI be higher on plots that house poorer people in smaller flats, or higher on plots where richer people live in larger flats?*

👤 Shirish Patel: Plot area multiplied by FSI is the total built-up floor space. Poorer people occupy less space per family, so there will be more poor families, and less rich families in the same amount of floor space. We want to limit the total population in a locality, because the physical and social infrastructure can support only a limited number of people. This means we should allow more FSI in rich areas, and less FSI in poor areas.

🌸 *Praja: How is it that Manhattan has FSI that goes up to 15, whereas in Mumbai it has been limited to 1.33 till recently (or 2 with TDR in the suburbs)?*

👤 Shirish Patel: In Mumbai a family averages about 5 people, living typically in an apartment of 25 sq m. That is 5 sq m per person. In Manhattan the apartment size is typically 1,000 sq ft (about 90 sq m) and occupancy averages 1.7 persons. The average floor space there works out to 55 sq m per person. Each Manhattan resident occupies 11 times as much floor space as a Mumbai resident. So for the same plot area, FSI 11 will have 11 times the built-up floor area as FSI 1. But because of the space each family takes up, FSI 11 in Manhattan will have the same number of people at FSI 1 in Mumbai. Similarly, in terms of head count, FSI 15 in Manhattan corresponds to FSI 1.33 in Mumbai. These apparently very different FSI values of 15 in one place and 1.33 in another will give us identical levels of street crowding in both cities. So when you compare FSI in different cities you need to also remember how much floor space each resident occupies in each of those cities.

Here is a table comparing Mumbai's Island City and central Manhattan[16]

Table 3: Mumbai vs. Manhattan			
	FSI	Floor Area (typical) sq m / capita	Persons / hectare of buildable plot area
Mumbai	1.33	5	2,667
Manhattan	15	55	2,727

It can be seen that both cities, with very different values of FSI, are almost the same in regard to the density of people per unit of buildable plot area. Doubling or trebling Mumbai's FSI will only make it two or three times denser than Manhattan in regard to the number of people on the ground.

It is true that prosperity brings about changes. As our economy improves and affordability changes, families may begin to occupy larger flats. That is the time when you can have larger flats. Then for the same number of people you will need higher FSI. If we hurry it up, and provide higher FSI now, ahead of any significant change in prosperity, all that will happen is that more families will move into the locality, in the same small accommodation. There will be increasing impoverishment for all the older residents in respect of what each family enjoys by way of the infrastructure of schools, medical facilities, parks and playgrounds, as well as roads, water supply and sanitation.

Praja: Since land is one of the major components of cost in an urban flat, will increasing FSI not bring down flat prices? After all, the same land price will then get distributed over many more floors. This should surely bring flat prices down.

Shirish Patel: This is the biggest myth of all. It is foolish to imagine that a builder will sell at his cost plus a decent profit margin. On the contrary, he will sell at the highest price the market will tolerate. With a higher FSI he will have more flats to sell. He will sell at the same high price. Why should he sell at less? He will make still more money. Flat prices will not come down. It is neighbouring land prices that will go up. There is no example, in Mumbai at least, of increased FSI having resulted in lowered flat prices. FSI has been going up steadily over the past several years. So have flat prices.

Praja: Should built-up areas for parking be allowed free of FSI?

Shirish Patel: No! We must remember that each car parking space represents two motor car trips: one for coming into the space, the other for moving out. So each parking space is a trip generator, and those trips finally come on the roads. This will usually happen at least once a day, sometimes more often than that. In India people don't buy cars to keep them in the garage all the time. So when allowing parking spaces we have to very importantly consider the streets onto which the traffic from these spaces will flow. If those street capacities are insufficient, parking on abutting plots should not be allowed. It should certainly not be encouraged by allowing free FSI.

In most countries abroad there is an upper limit on how many parking spaces can be allowed in a building. There cannot be more than a specified number. We seem to have inverted the logic. In Mumbai we mandate a minimum number of parking spaces, instead of setting a maximum. So we are ensuring that each building will add at least a certain definite amount of traffic to the city's road network. Instead of limiting traffic demand, we are encouraging it.

Parking space should be counted in FSI. The builder may choose to provide it, or not. Just as floor space adds people to a locality, parking space adds cars. Just as we want to limit the number of people in a locality, so also we should limit the number of cars. In Manhattan it is not uncommon for families to own a car which is parked in a multi-storeyed garage, often a considerable distance away from where the family lives. It is rarely taken out on a routine basis for regular, daily commuting trips. Instead, these are by public transport. But the car is available if needed, for family outings, and emergencies.

We would do well to learn from experience with cars, and parking, from the rest of the world. We should heed the advice of Hermann Knoflacher, a transportation planner, that in a city your car should never be parked outside your doorstep. Instead, it should be at least as far away from you as the nearest bus stop.

Praja: In discussions regarding FSI, we have started hearing of a new term called 'Crowding'. Can you explain what this means?

Shirish Patel: Societies at different levels of prosperity have different standards of consumption. This applies not only to commodities but also to something like floor space. Poorer societies manage with floor areas per person that would not be tolerated in a wealthier society. In Mumbai you will find families of 5 or even 10 sharing a 25sqm apartment. This would be unheard of in Manhattan. There every child expects to have his own room. How do we measure and compare this variation in floor space consumption from one city to another?

One suggestion is that we adopt a new metric called "Crowding". Instead of saying that in Mumbai people live in 5 sq m per capita, and in Manhattan occupy 55 sq m per capita, we can say that in Mumbai Residential Crowding is 2,000 persons per hectare (a hectare is 10,000 sq m), and in Manhattan Residential Crowding is 182 persons per hectare of built-up residential area. It is an inversion of the residential space taken up per capita.

Praja: But why do we need this new metric, "Crowding"?

Shirish Patel: The advantage of "Crowding" as a metric is that it can be applied to a range of other needs in an urban area, apart from residential floor space. Thus we can have "Job Crowding", which means the number of jobs per hectare of commercial area; "Park Crowding", which means the number of people per hectare of public park area; and "Amenity Crowding", which is the number of people per hectare of amenity area (schools, medical facilities and so on). In particular, we can

measure "Street Crowding", which is the number of people in the locality per hectare of street area. This would be an important measure in indicating how crowded your street life is likely to be.

Indoor Crowding (IC): Persons/Built-up area
Street Crowding (SC): Persons/Street Area
Plot Factor: Buildable Plot Area/Street Area

Praja: What is the mathematical relationship between FSI and various forms of Crowding?

Shirish Patel: As it turns out, there is a very interesting relationship between Street Crowding (SC), Indoor Crowding (IC) and FSI. But this linkage requires us to introduce a fourth parameter, which we call Plot Factor (PF). PF is the ratio of buildable plot area in a locality to the total street area in that locality. By street area we mean the public, shared space, used for circulation of pedestrians and vehicles. In arriving at street area, we need to exclude the area taken up by arterial through traffic, and the area taken up by on-street parking. Neither of these is available for local circulation.

The formula that connects these four parameters is:

SC = IC x FSI x PF
If we expand each term in the formula into its basic meaning we see that the formula is:

$$\frac{\text{Population}}{\text{Street Area}} = \frac{\text{Population}}{\text{Built-up Area}} \times \frac{\text{Built-up Area}}{\text{Plot Area}} \times \frac{\text{Plot Area}}{\text{Street Area}}$$

On the right hand side the "Built-up Area" and "Plot Area" terms cancel out, and we are left with Population / Street Area, which is the definition of Street Crowding.

In the figures below, we illustrate street crowding with different values of FSI, plot factors and home crowding.

🚶 =100 Persons

Home Plot   Street

FSI=1   1ha.   1ha.
HC=200 p/ha.
SC=200 p/ha.

Figure 1: *Street Crowding with FSI of one and Home Crowding 200 persons/Ha*

🚶 =100 Persons

Home Plot   Street

FSI=1   1ha.   1ha.
HC=2,000 p/ha. SC=2,000 p/ha.
Mumbai's G-N has HC=2,181 p/ha.

Figure 2: *Street Crowding with FSI one and Home Crowding of 2,000 persons/Ha*

Figure 3: *Street Crowding with FSI one and Plot Factor two*

$\text{\large \textmale}$ = 100 Persons

Home Plot   Street

1ha.   1ha.   1ha.

PF=2, FSI=1
HC=200 p/ha. SC=400 p/ha.

Figure 4: *Street Crowding with FSI eight and Home Crowding 200 persons/Ha.*

$\text{\large \textmale}$ = 100 Persons

Street

Home Plot

1ha.   1ha.

FSI=8
HC=200 p/ha. SC=1,600 p/ha.

Figure 5: *Street Crowding with FSI eight; Plot Factor 2 and Home Crowding 200 persons/Ha.*

$\text{\large \textmale}$ = 100 Persons

Home Plot

Street

1ha.   1ha.   1ha.

PF=2, FSI=8
HC=200 p/ha. SC=3,200 p/ha.
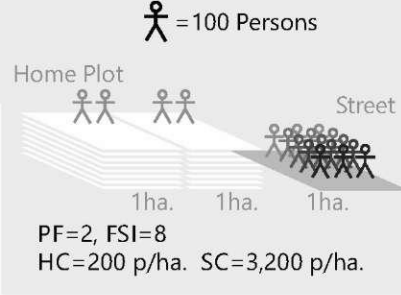
Praja: What is the meaning of the planning term "Net Density"?

Shirish Patel: Net Density is the population of a locality divided by the buildable plot area. We could also call it Plot Density. We can express this in terms of Indoor Crowding and FSI as follows:
ND (or PD) = IC x FSI
Expanded, these terms mean:

Population		**Population**		**Built-up Area**
--------------	=	-----------------	x	------------------
Plot Area		**Built-up Area**		**Plot Area**

On the right hand side the "Built-up Area" terms cancel out and we are left with Population/Plot Area, which is Net Density (also called Plot Density).

Praja: And what is "Gross Density"?

Shirish Patel: Gross Density is, very simply, the total population of the area divided by the total area of the locality. Since we have chosen Street Crowding as an important basic parameter for designing a locality, we can express Gross Density in terms of Street Crowding as follows:

GD = SC / TF

Where TF means "Total Factor", the ratio of total locality area to its street area.
Expanding the formula we have:

Population		**Population**		**Total Area**
--------------	=	-----------------	÷	---------------
Total Area		**Street Area**		**Street Area**

Notice the division sign on the right hand side. Once again, the Street Area terms cancel out and we are left with Population / Total Area, which is Gross Density.

Table 4: Street Crowding in Manhattan and selected Wards of Greater Mumbai				
Locality	All Users Indoor Crowding	All Users FSI	All Users Plot Factor	All Users Street Crowding
Manhattan CD-5 (Midtown)	296	**16.04**	1.26	5,986*
Manhattan CD-8 (Upper East Side)	180	7.29	1.67	2,190
A-mid	638	3.66	0.73	1,695
B	692	1.79	0.88	1,086
C	1,018	2.05	2.39	4,992
D-East	1,201	1.75	2.46	**5,182**
D-West	366	1.34	**4.71**	2,317
G-N/S-E	**3,116**	1.13	2.84	3,682
Island City	1,042	1.12	2.2	2,570

Note: Manhattan has an underground railway.

While the quality of infrastructure and standard of living in Mumbai is often compared to the other alpha cities of the world, these comparisons overlook the sheer density of people packed in to this bustling city. Hence, Mumbai needs its own home-grown solutions to address the shortage of land and housing in relation to the city's population.

Praja: Can the Street Crowding formula be expressed graphically?

Shirish Patel: Yes. The graphical representation leads us to some important inferences. This is what the graph looks like:
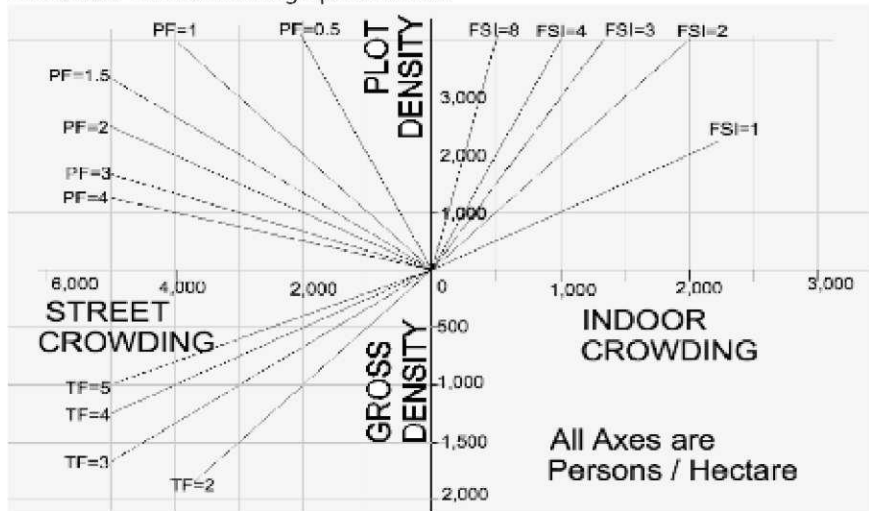
Let us understand this graph. We begin with the positive X-axis on which we mark Indoor Crowding in persons / hectare. Street Crowding is on the negative X-axis. The diagonal radial lines in the first quadrant are the multiplier lines for FSI. If we start

with any given level of Indoor Crowding (IC), and move up to the relevant FSI, then turning left at that point and extending the horizontal line leftwards brings us to the product of IC and FSI on the positive Y-axis. This is Plot Density (number of persons per hectare of plot area), also called Net Density.

The second quadrant contains the diagonal radial lines for Plot Factor (PF). These are again multiplier lines. Once our horizontal line reaches our locality's PF value, we turn left again and move downwards, where on the negative X-axis we read off Street Crowding, the product of IC, FSI and PF.

In the third quadrant we introduce diagonal lines representing various values of the Total Factor. Total Factor is the ratio of the entire area of the locality to the Street area. Continuing our vertical line downwards from the Street Crowding value, until it reaches our locality's value of Total Factor, and turning again we move horizontally rightwards to read off the value of Gross Density on the negative Y-axis.

Praja: Can we see what different localities in different cities look like on the graph?

Shirish Patel: On the graph below are plotted diagrams for a few localities in Mumbai, and two from Manhattan.
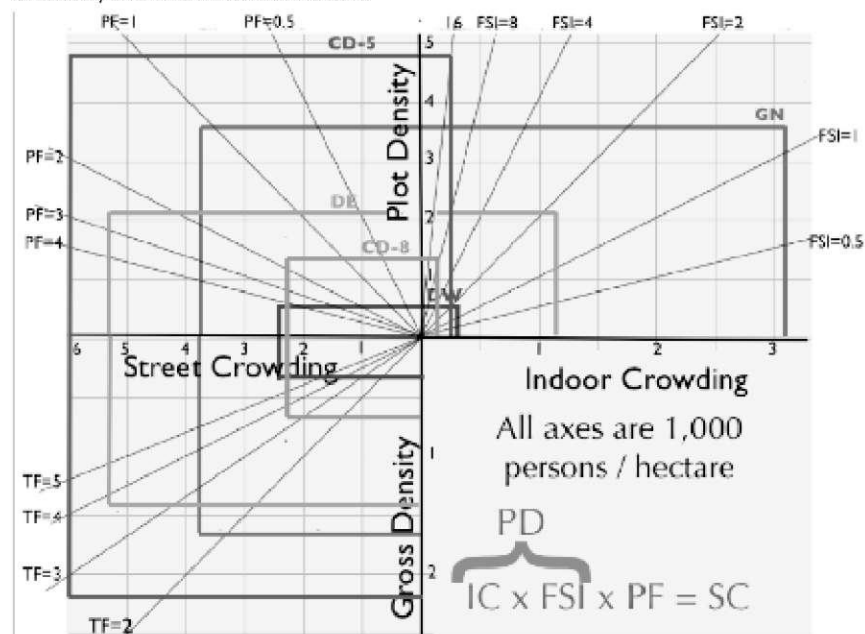
Mumbai's D-East is a mixed residential and commercial district. It is properly laid out. It was earlier occupied by a mixture of British and native inhabitants. D-West is the most pricey and upmarket residential district in all of Mumbai. It has large vacant

tracts occupied by the Governor's establishment and a wooded area that holds the Parsi Towers of Silence (the area for disposal of their dead). G-North (South-East) is partly properly laid out, and partly Dharavi. All these localities, and Manhattan's CD-5[17] and CD-8, are over 200 hectares in area. We have chosen this size so that each such locality can be expected to have within it amenities and open spaces sufficient at the very least for its own needs. Some of these facilities may also be large enough to serve residents from other parts of the city.

Notice the following:
- Values used are for the sum total of residents and jobs in a locality. This is not quite correct and needs to be refined.
- Values for Indoor Crowding in Manhattan are remarkably low, both for CD-5 and CD-8; and are generally much lower than for localities in Mumbai;
- Street crowding in CD-8 is also lower than for any locality in Mumbai; CD-5 values are high because of very high daytime street crowding. But we must remember that Manhattan has an underground railway, which takes much of the load off its streets;
- In Mumbai, the horizontal upper line seems to rise with diminishing prosperity- the poorer the locality the larger is its Plot Density.
- The Gross Density for residents is nowhere higher than 1,700 persons / hectare in Mumbai. This is despite not having enough land set aside for amenities and open spaces. A figure of 750 appears more realistic as an absolute upper limit for global planning. And the figure of Gross Density should be calculated on the residual area after deducting what is needed for arterial transport and on-street parking.

Praja: What is the advantage of this graphical representation?

Shirish Patel: Besides other advantages, we can immediately understand the impact of changes in FSI. For example, let us see what the graph reveals if the FSI in G-North is suddenly increased to 4. This is exactly what has been sanctioned for Dharavi. With no change in Indoor Crowding, the vertical line goes off the chart, to a Plot Density of about 12,500 persons / hectare. With no change foreseen in the layout of streets, and therefore no change in Plot Factor, we end up with Street Crowding of about 13,000 persons / hectare. This is two and a half times worse than anything seen on our diagram so far. It is far beyond anything seen so far anywhere in the world.

Praja: When studying a locality, would it make sense to look at not just its resident population, or its job population, or its visitor population, but also at its vehicular population, both visiting and resident overnight, either on-street or off-street? Could these be turned into a parameter measuring vehicular crowding, as distinct from people crowding?

Shirish Patel: Yes, this would be well worth doing. It would be an extension of the notion of Street Crowding by people to Street Crowding by vehicles. Since streets are occupied both by people and by vehicles, the crowding on account of one is as important as the crowding on account of the other.

In particular we should note that encouraging parking, whether on-street or off-street (that is, on abutting plots by allowing free FSI for parking) would definitely increase vehicular crowding in the locality, something that is bound to add to the overall congestion.

Praja: There is going to be a huge influx of population into our towns and cities. Where is the land to accommodate this influx? Is higher FSI not an imperative to cope with this influx?

Shirish Patel: This is a very common misunderstanding. Accommodating more people on a plot (by raising its FSI) means that you must also provide more road space for these people, more area for parks, and more area for schools and hospitals. The higher the FSI the higher the proportion of land you need for public use. So overall, the proportion of land area occupied by buildable plots diminishes. This counters the effect of higher FSI, so finally there is not too much change in the overall density, measured in numbers of people per square kilometre of city area.

If you want to accommodate more people, there is no escape: you have to provide more land. And most importantly, you have to extend your transport systems so that they bring this land within easy reach of the rest of the city. We should choose an optimum density for the city, not too crowded and comfortable to live in. Our focus thereafter should not be on increasing FSI to make the city less livable, but on extending transport networks. Increasing FSI alone, without enlarging road systems and public facilities, will only diminish facilities for everyone. It worsens living conditions, with no long-term gain. Opening up new lands is a far superior strategy if you want to cope with a growing city population.

Table 5: List of Features/Areas excluded from FSI Computation		
Staircases	Electrical sub-station	Mamti (structure on the roof at the head of the staircase)
Staircase landings	Electrical generator room	Space under lift machine room
Car elevator lift duct/shaft/pit	Elevator lift machine room	A.C. plant room
Stack parking (multiple level mechanized parking)	Mobile transmission tower	Dry balcony
Fire fighting duct/shaft	Flower bed/plant bed	Balcony up to 10% of floor area
Crèche/Balwadi in SRA scheme	Entrance gateway	Built in storage below window
Car/vehicle parking spaces	Stilt	Void/space accessed under plinth

Table 5...Contd.: List of Features/Areas excluded from FSI Computation

Watchman cabin/room	Driver's room	Servant toilet/room
Driver's toilet	Fire escape staircase	Generator room/store
Staircase lobby	Electrical transformer space	Space under elevated overhead tank
Passenger elevator lift duct/shaft/pit	Pump room	Service floor
Underground storage tanks (domestic/fire)	Garbage collection room	Service elevator lift duct/shaft/pit
Elevator lift landing	Fire equipment room	Verandah
Refuge area/space	Lily pond	Built in cupboard
Gymnasium (if applied by housing society)	Covered car vehicle driveways	Built in storage above window
Basement used for parking, storage and utilities	Fire escape staircase landings	Entrance foyer
Electric meter cabin/room	Welfare centre in SRA scheme	Telephone room
Society office	Storage room	Postal box room

Further, 35% extra floor area is permitted (as fungible FSI) for residential development and 20% for Industrial/Commercial Development for the following areas which were earlier exempted.

Table 6: List of Features/Areas included in FSI computation

Covered parking spaces	Area of fire escape	Servants toilet, other than at staircase mid-landing level, stilt level, parking level
Air condition plant room/ air handling unit room, meter room, D.G. set room except provided in basement	Fire check floor/service floor of height exceeding 1.8 m	
	Room for installation of telephone concentrators	Ornamental projection
		Letter box room
Covered areas required on top terrace for utilities in excess of 20 sqm	Covered swimming pool	Balconies
	Part/pocket/intermediate covered terraces	Area of one public telephone booth and one telephone exchange (PBX) room
Deck parking exclusive of car lifts and passages there to on habitable floors	Niches below window sill	
	Driver's room/sanitary block on podium and parking floor	Parking floor in excess of required parking

FSI of 4: Why it is not workable in Mumbai[18]

	Case 1: FSI 4 and 25 sq m apartments		Case 2: FSI 4 and 100 sq m apartments	
Buildable	1 ha	14%	1 Ha	38%
• FSI	4		4	
• Builtup area	4 ha		4 ha	
• Sqm/capita	5		20	
• Residents	8,000		2,000	
Institutional area @ 2 sqm/capita	1.6 ha	22%	0.4 ha	15%
Open area @ 3 sqm/capita	2.4 ha	32%	0.6 ha	23%
Street area @ 3 sqm/capita	2.4 ha	32%	0.6 ha	23%
Total area	7.4 ha	100%	2.6 ha	100%
Gross density	1,081 p/ha		769 p/ha	

It will be seen from Case 1 that if we give a builder FSI 4 on his 1 hectare plot, we will need a further 6.4 ha. of area for institutions, open spaces and streets to service the population housed on his 1 ha. plot. Who is going to provide this area, 6.4 times the area of the developer's plot?

	Case 3: FSI 3 and 25 sq m apartments		Case 4: FSI 3 and 100 sq m apartments	
Buildable	1 ha	17%	1 ha	45%
• FSI	3		3	
• Builtup area	3 ha		3 ha	
• Sqm/capita	5		20	
• Residents	6,000		1,500	
Institutional area @ 2 sqm/capita	1.2 ha	21%	0.3 ha	14%
Open area @ 3 sqm/capita	1.8 ha	31%	0.45 ha	20%
Street area @ 3 sqm/capita	1.8 ha	31%	0.45 ha	20%
Total area	5.8 ha	100%	2.2 ha	
Gross density	1,034 p/ha		682 p/ha	

Even with FSI 3, we find that with 25 sq m apartments we will need someone else to provide 4.8 ha. of land area for each hectare of the developer's plot.

Annexure I: Agencies and Schemes

1. Agencies

Three main parastatal agencies play a key role in the promotion and development of Mumbai's Housing sector:

	MMRDA: Mumbai Metropolitan Region Development Authority **Constitution:** 26th January 1975	
Functions:	• Preparation of Regional Development Plans • Providing financial assistance for significant regional projects • Providing help to local authorities and their infrastructure projects • Coordinating execution of projects and/or schemes in MMR • Restricting any activity that could adversely affect appropriate development of MMR, etc.	
Schemes:	• Slum Rehabilitation Schemes undertaken for the persons affected by MMRDA projects. • Implementation of Rental Housing Scheme in MMR region • Rehabilitation and Resettlement (R&R) of residential and non-residential Project Affected Persons (PAPs)	
Relevant Divisions	• Social Development Cell • Rental Housing • Lands – Slum Rehabilitation Authority Cell	
Contact:	Bandra-Kurla Complex, M.M.R.D.A. Office Building, Bandra-Kurla Complex, C-14 & 15, E Block Bandra (East), Mumbai - 400 051 Phone : +91-22-2659 0001 / 4000, Fax No. : +91-22-2659 1264	
To know more:	http://mmrda.maharashtra.gov.in/home	

	SRA: Slum Rehabilitation Authority **Constitution:** 25th December 1995	MHADA: Maharashtra Housing And Area Development Authority **Constitution:** 5th December 1977
	• To survey and review existing position regarding Slum areas in greater Mumbai. • To formulate schemes for rehabilitation of slum areas • To get the slum rehabilitation scheme implemented	• Construction of residential buildings under various housing schemes for different sections of society • Structural repairs and reconstruction of dilapidated buildings • Provide basic amenities such as water taps, drainage etc. in slums
	• Under provisions of DCR 33(10) also called in-situ scheme • Provisions of section 3.11 also called PAP scheme • Under provisions of DCR 33(14) also called transit scheme	• Development of sick/closed mill land allocated to MHADA under amended DCR 58 for mill workers housing and transit. • Undertaking composite housing schemes on the clear plots handed over by MBRRB with emphasis on housing for Economically Weaker Sections and Low-income groups
	-	• Mumbai Housing and Area Development Board • Mumbai Building Repairs and Reconstruction Board, • Mumbai Slum Improvement Board
	Administrative Building, Anant Kanekar Marg, Bandra (E), Mumbai 400051. Tel.: 26590519/ 26590405/ 26591879 26590993,Fax: 26590457 Email: info@sra.gov.in	Grihanirman Bhavan Kalanagar, Bandra (East), Mumbai 400051. STD Code No. 022, Fax No.26592058, Telephone No. 26592877 / 2622.
	www.sra.gov.in	www.mhada.maharashtra.gov.in

2. Central Government Schemes

i. Rajiv Awas Yojana (RAY)

Rajiv Awas Yojana (2013-2022) is a centrally sponsored scheme launched by Ministry of Housing & Urban Poverty Alleviation, for the benefit of urban poor. Through the scheme, the Ministry plans to cover all towns, cities and urban agglomerations in India. It envisages a slum-free India and calls for a multi-pronged approach focusing on[19]:

- Bringing existing slums within the formal system and enabling them to avail of the same level of basic amenities as the rest of the town;
- Redressing the failures of the formal system that lie behind the creation of slums;
- Tackling the shortages of urban land and housing that keep shelter out of reach of the urban poor and force them to resort to extra-legal solutions in a bid to retain their sources of livelihood and employment.

Strategy

Provide support to States/Union Territories/Urban Local Bodies for
- Housing and improvement of basic civic infrastructure and social amenities in each selected slum
- Rental and transit housing
- Creation of affordable housing stock through public-private partnership

The Implementation Phase of the Scheme is being run on a mission mode during 2013-22, for which Rs. 32,230 crore has been allocated by the Planning Commission of India 12th Five Year Plan. However, as of February 2014, no projects have been approved for Maharashtra under the Preparatory and Implementation phases of the scheme[20].

ii. Interest Subsidy Scheme for Housing the Urban Poor (ISHUP)

The 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 through the Jawaharlal Nehru National Urban Renewal Mission (JNNURM).

Main Provisions

- Subsidized loan for 15-20 years for a maximum amount of Rs. 100,000 for a EWS individual for a house at least of 25 sq mts.
- Maximum loan amount of Rs.160, 000 for an LIG individual for a house of at least 40 sq. mts.
- Nodal agencies for the scheme are the National Housing Bank (NHB) and the Housing & Urban Development Corporation Ltd. (HUDCO)

Annexure II: Census 2011 data of Mumbai

1. **Ward-wise Population of Greater Mumbai as of 2001 and 2011**

| Zones	Wards	Population 2001	Population 2011
Island City	A	210,847	185,014
	B	140,633	127,290
	C	202,922	166,161
	D	382,841	346,866
	E	440,335	393,286
	F/N	524,393	529,034
	F/S	396,122	360,972
	G/N	582,007	599,039
	G/S	457,931	377,749
	Total	3,338,031	3,085,411
Eastern Suburbs	H/E	580,835	557,239
	H/W	337,391	307,581
	K/E	810,002	823,885
	K/W	700,680	748,688
	P/N	798,775	941,366
	P/S	437,849	463,507
	R/C	513,077	562,162
	R/N	363,827	431,368
	R/S	589,887	691,229
	Total	5,132,323	5,527,025
Western Suburbs	L	778,218	902,225
	M/E	674,850	807,720
	M/W	414,050	411,893
	N	619,556	622,853
	S	691,227	743,783
	T	330,195	341,463
	Total	3,508,096	3,829,937
Greater Mumbai		11,978,450	12,442,373

Source: Census 2001-2011

2. Ward-wise Slum and Non-slum population of Greater Mumbai

	Wards	Slum Population	Slum Population (%)	Total Population
Island City	A	63,400	34.27	185,014
	B	14,400	11.31	127,290
	C	-	-	166,161
	D	33,000	9.51	346,866
	E	77,800	19.78	393,286
	F/N	308,400	58.29	529,034
	F/S	95,200	26.37	360,972
	G/N	189,600	31.65	599,039
	G/S	78,300	20.73	377,749
	Total	860,100	27.88	3,085,411
Eastern Suburbs	H/E	234,800	42.14	557,239
	H/W	118,500	38.53	307,581
	K/E	403,800	49.01	823,885
	K/W	108,800	14.53	748,688
	P/N	504,500	53.59	941,366
	P/S	264,000	56.96	463,507
	R/C	104,300	18.55	562,162
	R/N	221,500	51.35	431,368
	R/S	399,200	57.75	691,229
	Total	2,359,400	42.69	5,527,025
Western Suburbs	L	490,400	54.35	902,225
	M/E	245,300	30.37	807,720
	M/W	217,200	52.73	411,893
	N	385,600	61.91	622,853
	S	537,900	72.32	743,783
	T	111,800	32.74	341,463
	Total	1,988,200	51.91	3,829,937
Greater Mumbai		**5,207,700**	**41.85**	**12,442,373**

Source: Census 2001-2011

3. Ward wise total population and slum population (2011)
(excluding areas under Special Planning Authority -SPA)
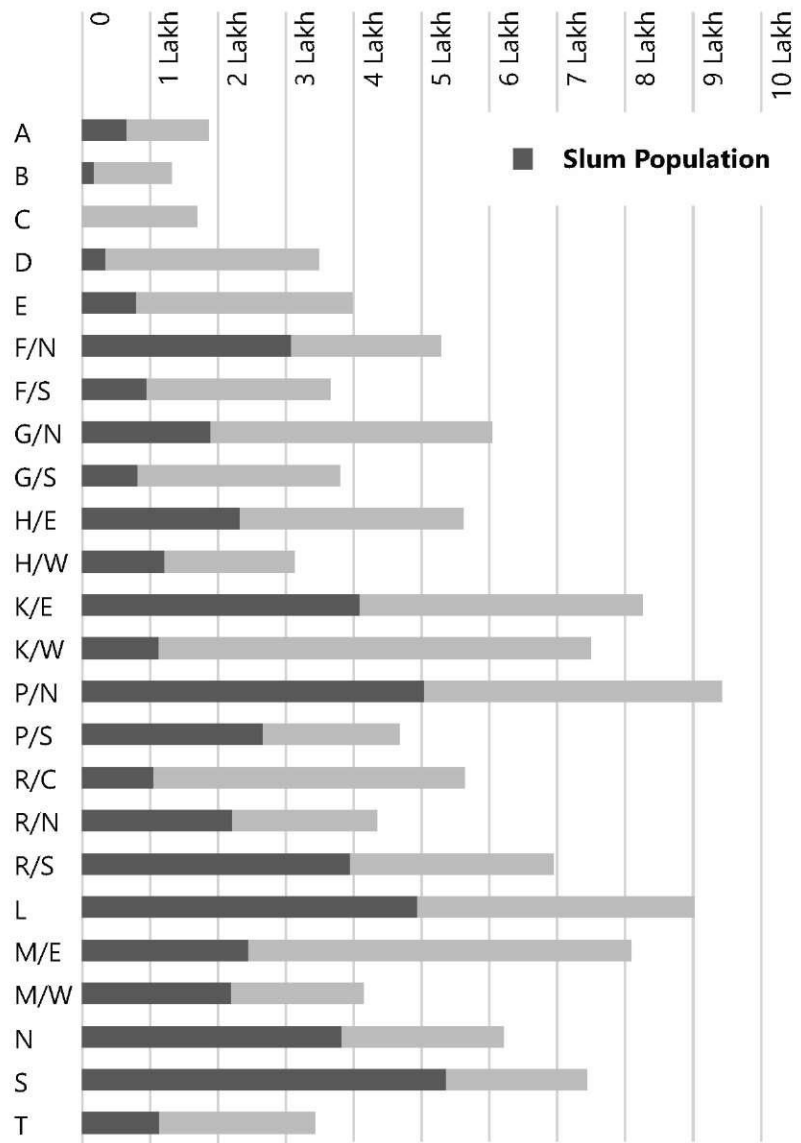
Source: Page 103,MCGM Preparatory Study Report

Annexure III: Resources for Further Reading

Subject	Source	Current Link
Preparatory Studies – Development Plan 2014-34 Mumbai	MCGM	http://mcgm.gov.in/irj/portal/anonymous/qlPreparatoryStudiesReport
Development Control Regulations for Greater Mumbai	MCGM	http://mcgm.gov.in/irj/portalapps/com.mcgm.aaboutus_overview/docs/DC%20Regulation%201991.pdf
Rajiv Awas Yojana	Ministry of Housing & Urban Poverty Alleviation	http://mhupa.gov.in/ray/Ray_index.htm
Interest Subsidy Scheme for Housing the Urban Poor (ISHUP)	Ministry of Housing & Urban Poverty Alleviation	http://mhupa.gov.in/programs/housing/index.htm

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End Notes:

1: Jordan Flaherty, Floodlines: Community and Resistance from Katrina to the Jena Six
2: Primary Census Abstract Data for Slums, 2011, Census of India
3: Preparatory Studies, Development Plan for Greater Mumbai 2014-34
4: Strategy for Housing & Slum Improvement, Mumbai City Development Plan 2005-2025
5: Annez, P. C., Bertaud, A., Patel, B., & V.k., P. (2010). Working with the Market, Approach to Reducin
6: Annez, P. C., Bertaud, A., Patel, B., & V.k., P. (2010). Working with the Market, Approach to Reducin
7: Report of the High Level Task Force on 'Affordable Housing for All', 2008
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8: Incremental Housing: A proactive Urban Strategy
http://web.mit.edu/incrementalhousing/articlesPhotographs/pdfs/PagesMondayMag.pdf
9: UN-HABITAT, 2003, Rental Housing: An essential option for the urban poor in developing countries,
10: *http://mmrda.maharashtra.gov.in/rental-housing*
11: 'It's curtains on rental housing' *http://archive.indianexpress.com/news/it-s-curtains-on-rental-housing/1192590/*
12: MRTP Act, 1966
13: A building that pays cess --a tax commonly referred to as the "repair fund"- is termed as a cessed building. Such buildings are typically old constructions.
14: Mumbai City Development Plan 2005-2025
15: TDR- In certain cases, the development potential of a plot of land may be separated from the land itself and may be made available to the owner of the land in the form of Transferable Development Rights.
16: Manhattan is one of the five boroughs (similar to a municipal corporation) of New York City, USA.
17: New York City is organized into 59 community districts. Manhattan has 12, each about 400-500 hectares in area. Each CD is represented by a Community Board, composed of volunteer community members that assist neighbourhood residents and advise on neighbourhood and citywide planning and service issues.
18: The values assumed for Institutional and Open areas per capita are below the norms given in the National Building Code (2005). The value for Street space per capita is below the worst case among Mumbai's existing Wards
19: *http://mhupa.gov.in/w_new/RAY%20Guidelines-%20English.pdf*
20: Over all Progress (State-wise), Ministry of Housing and Urban Poverty Alleviation