Starving Mumbai from infrastructure investments and new floor space:
A critique of Mumbai's Malthusian urban policy over the last 40 years.

Mumbai FAR/FSI conundrum

The perfect storm: the four factors restricting the construction of new floor space in Mumbai

By
Alain Bertaud
duatreb@msn.com
HTTP://alain-bertaud.com
HTTP://alainbertaud.com

Revised July 20, 2011

Mumbai's ill conceived Malthusian approach to development

The financial pages of major international newspapers are full of praise for Mumbai's economic and business accomplishments. Mumbai accounts for 40% of India's income tax collections and 40% of its foreign trade. It is home not only to the headquarters of major national financial institutions but also to the largest and more successful Indian based international corporations. However, the contrast between what one reads about Mumbai's entrepreneurial success story and its current deteriorating physical appearance is striking. In spite of its economic dynamism and affluence, about 55% of Mumbai's inhabitants live in slums, and this proportion has been increasing over the last 20 years. In 1971, Mumbai slums contained 1.32 million people representing 22% of the population. In 2001, the slum population had grown to 6.6 million representing 55% of the total city's population! A lot of slum dwellers are gainfully employed and are not poor in terms of their relative income. Rather, they are the victims of a number of misguided land use policies and of a lack of government investments in infrastructure. It is not only hard to comprehend this, given Mumbai's contribution to the National fiscal income, but it is also difficult to advocate a continuation of the current land use regulatory system, limiting development with such a record!

The current urban policy may be qualified as "Malthusian" because it has been consistently reluctant to consider that an increasing population was a sign of success rather than of failure. With an estimated average of about 4.5 m2 per person in 2009, the consumption of residential floor space in Mumbai is one of the lowest in the world and would be expected from a city in a desperate economic situation. As a comparison, consider Shanghai in 1984: recovering from more than 10 years of Cultural Revolution, it had a floor area per person of 3.6 m2. Shanghai's Municipality considered that rapidly increasing floor consumption was to be the city's first priority, and by 2010, the average floor space consumption in Shanghai was 34 m2/person.[1] The main goal of the regulatory policy has been to control the size of Mumbai by penalizing any type of new development, fearing that economic success would attract more people who would then have to share an already deficient and immutable infrastructure. This is a very pessimistic view of urban development and

[1] This was achieved in part by drastically increasing the FSI to allow redevelopment of obsolete buildings with relocation largely in situ.

one that has been proven wrong in the very successful development of other large mega-cities of Asia. The development of cities like Seoul, Shanghai, Hong Kong and Singapore prove that with the right policy and management, cities are able to grow rapidly while constantly improving their infrastructure and their environment. Mumbai already has the talent and the entrepreneurs; there is no reason to be afraid of urban growth and to freeze the spatial development of the city anymore.

An international property management firm – Cushman & Wakefield – characterizes Mumbai on its web site in the following manner:

> "*Mumbai, the financial powerhouse of India, is also a major commercial center, and the headquarters to some of most respected Indian corporations and institutions apart from several high profile multinational subsidiary operations.*
> *With well-developed financial and capital markets, a mature services economy, a strong infrastructural base and a highly skilled and efficient workforce, Mumbai is the primary gateway to one of the largest consumer markets in the world.*
> *Till recently, Mumbai had the dubious distinction as one of the world cities with some of the most expensive real estate globally, this premier Indian metropolis remains one of India's more complex and demanding real estate markets. "*

Of course Cushman & Wakefield are only monitoring the high end of the residential and commercial real estate market. However, the very low floor space consumption per person and the large areas occupied by slums are showing that their diplomatically euphemistic statement about the "most demanding and complex" real estate market applies also to the poor.

The sequence of poor policy decisions resulting in Mumbai's current, shocking physical deterioration is very complex[2]. The very low floor space consumption per person and the large areas occupied by slums indicate that these complexities also disproportionately affect the poor. There is no silver bullet to solve the problems created by the unfortunate but well-intentioned policy decisions of the past. However, Mumbai's current affluence and dynamism should allow a rapid solution once the problems are well analyzed and the myths of the past, which engendered these destructive policies, are recognized as such. What are the exceptional factors in Mumbai that would explain why a comparative affluence, a booming economy, and a well-qualified workforce do not translate also into decent housing conditions?

Which factors are responsible for this situation? What is so exceptional about Mumbai?

The very low consumption of floor space coupled with very high real estate prices would point to supply bottlenecks, both supply of land and supply of floor space By comparing Mumbai with other metropolises in Asia it appears that indeed four factors are exceptional and might contribute to the very low supply of land and floor space:

i. An exceptional topography that reduces the amount of developable land;

ii. A draconian and ill-conceived land use policy restricting the area of floor space which can be built on the little land available;

[2] The author of this paper has not studied yet the new "Concept Plan for Mumbai 2052" prepared by Surbana International under the supervision of MMRDA. Hopefully, this concept plan addresses some of the concerns raised in this paper

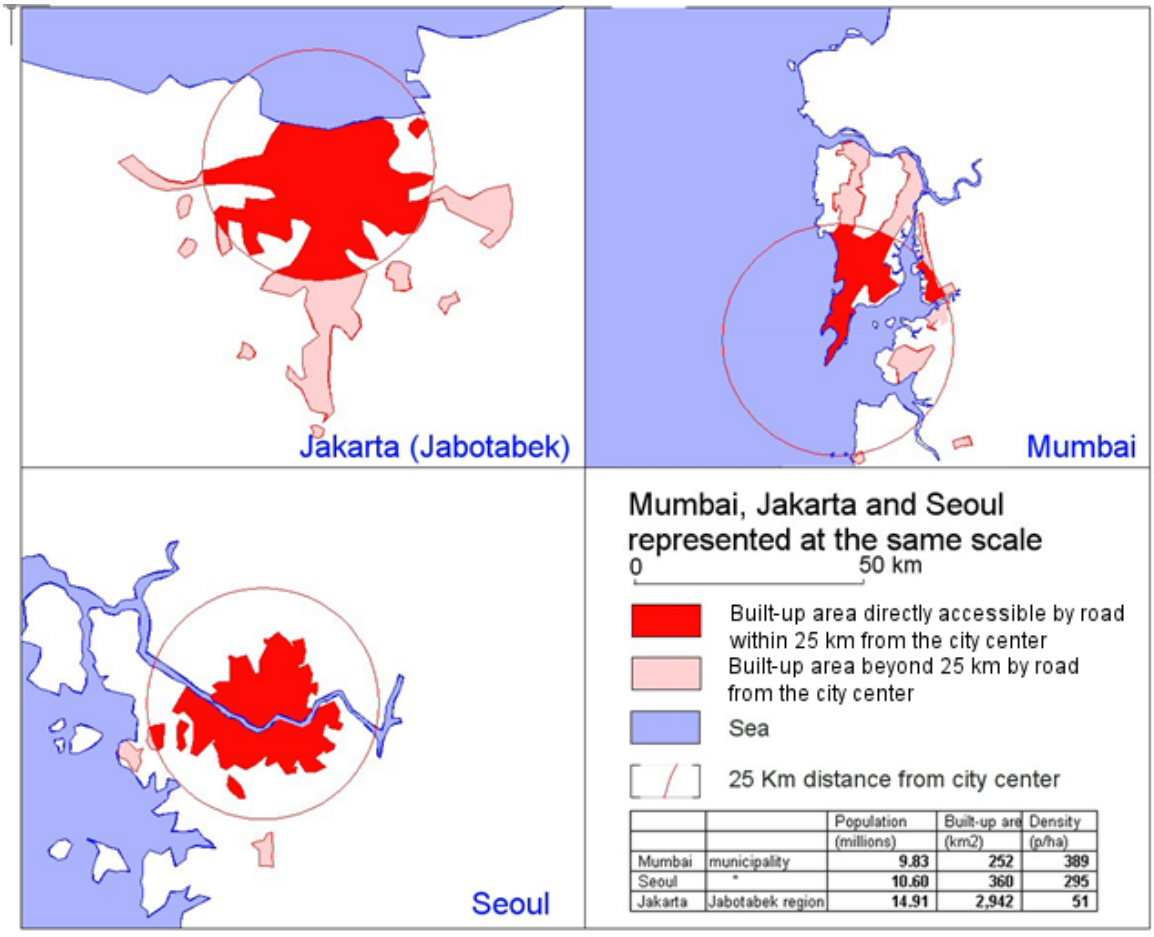
iii. Muddled property rights preventing households and firms from freely trading land and floor space as a commodity;

iv. A failure to develop major primary infrastructure networks, which prevent the city from overcoming its topographical constraint. In turn, the weakness of the infrastructure network is used to justify the restrictive land use policy.

These supply bottlenecks, which taken individually would not be exceptional, are seldom encountered simultaneously within the same city as they are in Mumbai. Their combined impacts are mainly responsible for the abnormally low floor area consumption per person and for the ever-growing slums. Although little can be done to remove the topographical constraint, it does have environmental advantages, potentially giving easy access to the sea to a large part of the population. However, a coordinated effort to reform land use regulations, to improve property rights, and to develop major primary infrastructure could significantly improve housing conditions and increase the consumption of floor space per person, in particular that consumed by the poor.

Let us look, first, at the nature of these bottlenecks and second, at what can be done to reform land use regulations, improve property rights and create new infrastructure to make housing in Mumbai consistent with the dynamic city aptly described by Cushman & Wakefield.

An exceptional Topography



		Population (millions)	Built-up are (km2)	Density (p/ha)
Mumbai	municipality	9.83	252	389
Seoul	"	10.60	360	295
Jakarta	Jabotabek region	14.91	2,942	51

Figure 1: Comparison between the built up area of Mumbai Jakarta and Seoul represented at the same scale

Mumbai's narrow peninsula, which at the time of the city's foundation constituted an attractive site to install a port, has become a liability stunting the city's economic growth and

hindering its physical extension. A city located on a peninsula has less land to expand than a city located inland or than a port located along a straight coast.

To evaluate how severe Mumbai's topographical constraint is, let us compare the area occupied by water within a 25 km radius of 3 large Asian cities: Mumbai, Jakarta and Seoul. Within a 25 km radius of Mumbai's city center (Churchgate), water occupies 66% of the total area of the circle, as compared to 22% for Jakarta and 5% for Seoul! (see Figure 1). But the city doesn't even occupy the entire land area theoretically available. Within 25 km from the CBD, the built-up area of Mumbai occupies an area of only 212 km2, as compared to 360 km2 for Seoul and 1438 km2 for Jakarta. The geographical location of Mumbai reduces the land available for development by about 50% as compared to the land available in Jakarta. However, Mumbai could overcome this topographical constraint by addressing the other three factors that make its situation exceptional and, thus, by:

(i) Using land more intensively, by reforming its land use policy and developing a new underground mass transport system that would increase mobility in spite of high densities

(ii) Using land more efficiently, by clarifying property rights and allowing the redevelopment of obsolete land use

(iii) Expanding the land area available by improving access to the hinterland by developing its infrastructure, in particular rapid transit, bridges and highways.

A Draconian Land use policy

Typically, cities in which topography creates a constraint on land supply compensate the lack of land by increasing the height of buildings. In that manner, they are able to provide to their inhabitants about as much floor space as cities without topographical constraints. This common sense solution has usually not been promoted by wise urban planners but by a simple market mechanism: where land is scarce, it is expensive, and when land is expensive, people consume less of it. Therefore, there is a demand for high, compact buildings. This is why cities located on islands – for instance, New York, Hong Kong or Singapore – are well known for their skyscrapers while cities located in flat plains without major water barriers, – like Paris, London and Berlin – are not. In Mumbai, which, although not anymore an island, has similar topographical constraints as New York or Hong Kong, the amount of floor space which is allowed to be built on the land available is drastically restricted by regulations. Mumbai's land use regulations put exceptionally severe restrictions on the area of floor which can be built by unit of land. The regulations which are restricting the Floor Space Index (FSI)[3] greatly reduce the floor space available for residences and for businesses.

FSI restrictions

How severe is the regulatory restriction on FSI compared to other cities in the world? In most large cities the FSI varies from 5 to 15 in the Central Business District (CBD) to about 0.5, or below, in the suburbs. In Mumbai, the permitted FSI is uniform and in 1991 was fixed at 1.33 for the Island City[4] and 1.00 for the suburbs, although some higher FSI has been allowed in some isolated

[3] The regulation of the Floor Space Index (FSI, or in some other cities Floor Area Ratio (FAR)) is a common regulation linked with zoning. An FSI of 2, for instance, allows building an area of floor equal to twice the area of the plot on which it is built. An FSI of 2 therefore would allow 2000 m2 of floor space to be built on a 1000 m2 plot. If half of the land is built upon, the building would have 4 floors to fully use the allowed FSI.

[4] The Island City designates the part of Mumbai located South of Mahim creek and of the Mithi River. It is the heart of historical Mumbai.

lots outside the Island City area through the program called Tradable Development Rights (TDR) [5]. Mumbai regulations are exceptional not only because of the extremely low and uniform maximum FSI, but also because of the trend in FSI variations since the FSI regulations were imposed in Mumbai for the first time in 1964. The map of Figure 2 shows the distribution of FSI values (not including TDRs) in the metropolitan area. The graph of Figure 3 shows the distribution of FSI values by distance to the CBD in Mumbai compared to other major cities.

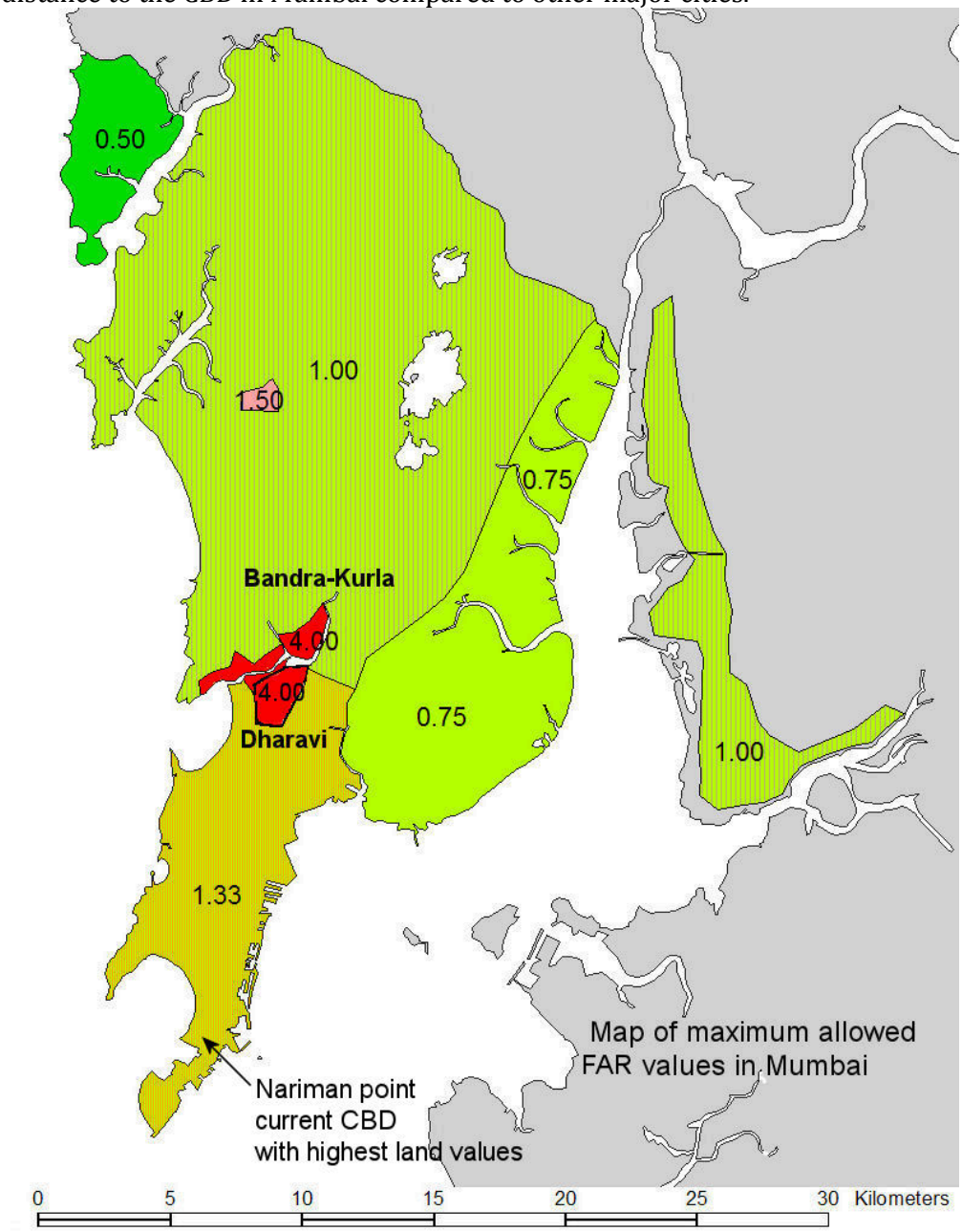


Figure 2: Schematic representation of Mumbai fsi regulations

[5] In 1991, Mumbai began a program of Tradable Development Rights (TDRs). This program initially provided tradable extra FSI to developers for surrendering land for public purpose and, at a later date, for providing free houses to slum dwellers or tenants of dilapidated dwellings. The most comprehensive review and analysis of the consequences of the FSI and TDR policy has been provided by V.K. Phatak in "The City", Vol 1 Number 4 (December 2002-January 2003) by Bombay First.

In most large cities of the world, as technology and infrastructure improve, the FSI in the CBD tends to increase, while the average population density tends to decrease. A decrease in density corresponding to an increase in FSI is counterintuitive. However, it happens in most modern cities because a general increase in FSI is always associated with an increase in floor space per person and per job[6]. So more floor space is built on the same unit of land, but people and enterprises consume more of it per person and per job, so population density tends to decrease.

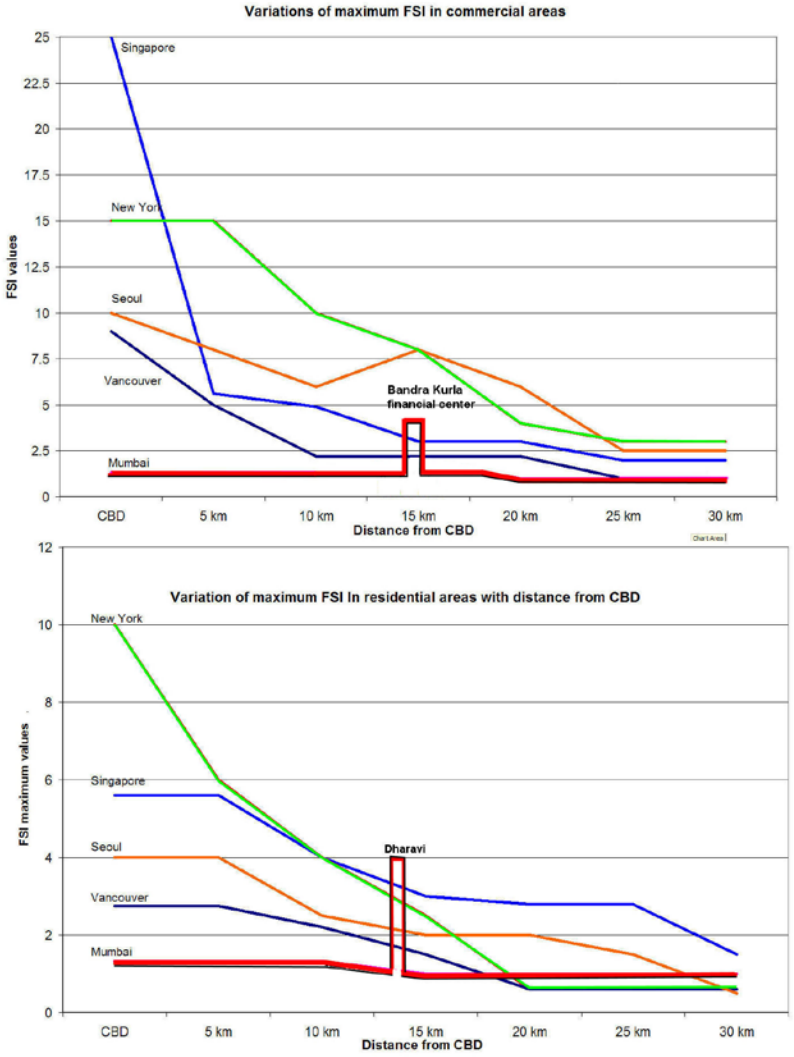


Figure 3: Distribution of FSI values in Mumbai compared to some other major cities

Most cities of the world therefore have a policy to increase FSI with time. This progressive increase in FSI has two purposes; first, it allows households and firms to consume more floor space as their incomes increase without having to move to new areas in the suburbs; and second, an increase in FSI contributes to a decrease in the city spatial expansion into the countryside, decreasing population dispersion, transport costs and pollution due to transport[7]. In addition, in

[6] We have to distinguish here between increasing the FAR for one building, which has no effect on average consumption of floor area, and increasing the FAR for a large area of the city, which significantly increases the supply of floor space and therefore decrease prices and increase average consumption of floor space.

[7] The effect of FSI restrictions on urban expansion has been explored in a recent paper: "Analyzing Building Height Restrictions: predicted impacts, welfare costs, and a case study of Bangalore, India" by Alain Bertaud and Jan K. Brueckner. World Bank Policy paper # 3290, April 2004.

most cities, planners practically always establish the regulated FSI at a higher level than the FSI of existing buildings. This practice encourages the redevelopment of obsolete buildings. By contrast, the practice in Mumbai has been to decrease the permitted FSI over time, resulting in obsolete buildings that can never be redeveloped economically because the new buildings would have a smaller floor space than the building they replace.

Since FSI was first imposed in Mumbai in 1964, it has constantly decreased[8]. In 1964, it was fixed at 4.5 in Nariman point; since then it has been reduced to 1.33 in most of the Island City. Many buildings predate the imposition of the FSI regulations and therefore have a FSI higher than 1.33. As a consequence, any redevelopment of old buildings would entail a loss of floor space, which, given the high price of floor space in Mumbai, make any redevelopment projects uneconomical and make relocation in situ impossible. One needs only to take a short walk through downtown Mumbai to see old dilapidated buildings which have never been replaced

With time, the demand for floor space in Mumbai became so high that the State Government decided to tap the value of private real estate as a resource to finance its social programs – slum rehabilitation and reconstruction of rent controlled dilapidated buildings. Initially the State had restricted the trading of additional FSI in exchange for land or public facilities that the local government could not afford to buy or build. This practice, started in 1991, is called Trading of Development Rights (TDR). The main objective in creating TDRs was not to improve land use efficiency but to finance roads, housing or community facilities that the city did not have the means to finance from its own resources. The result was an increase in FSI, above the maximum 1.33 authorized for individual plots, in dispersed locations where the infrastructure or even the street width were not necessarily compatible with the new increased FSI. The increase in FSI for some isolated private lots as a consequence of the institution of TDR was therefore not a deliberate spatial policy based on a perceived need to increase the available floor space, but only a way of generating some financial resources for the local authority, sometimes to the detriment of the original locations.

To this day, the total amount of additional FSI granted through TDR is not known, but it failed to alleviate the restriction on the construction of floor space imposed by the uniform FSI. The failure of TDR to increase significantly the floor space available to Mumbai's residents is not surprising. The Mumbai's municipality is a monopolist that created an artificial shortage of floor space by restricting FSI to exceptionally low levels. Naturally, market price for floor space jumped to extremely high levels. The municipality then called this price increase a market failure, and as expected from a typical monopolist, slowly released some FSI against TDR at the highly inflated price. A release of FSI on a large scale will decrease floor price and therefore the Municipality's monopolistic power. The monopolist power of the Municipality is further reinforced in Mumbai by the limit on land supply imposed by topography, as discussed above.

Mumbai's fixed FSI has created the conditions of a zero sum game for the consumption of floor space. Poor households have to face a constant reduction of their consumption of floor space because they cannot compete with the increased consumption of more affluent households. The poor, therefore, are progressively pushed out of formal housing into slums or are reduced to build shacks on sidewalks. Under the present regulatory limits on FSI, the only possible addition to the total floor space of Mumbai is through densifications of slums, which fortunately escape the FSI regulations as long as the construction stays informal. The creation of new sidewalk dwellings has also become one of the few new sources of affordable housing.

The coastal zone regulations

In addition to the FSI regulations Mumbai is subject to Coastal Zone Regulations (CRZ), which limits new constructions within 500 meters from the high tide zone, even in areas under CRZ

[8] See Phatak 2006.

II where land is already developed. While this type of regulations is justified to protect coastal zones in rural areas it is an odd regulation in a city built on a narrow peninsula. If such regulations had been in place elsewhere, cities like New York, Hong Kong, Singapore, San Francisco and Rio de Janeiro would have never been built! The CRZ-II regulations further reduce the supply of land and floor space which can be built and is, together with the low FSI, partially responsible for the low floor space consumption of the middle class and the poor living in Mumbai.

Muddled property rights are also responsible for low land use efficiency

Land use efficiency is not achieved by designing clever new master plans but by the continuous trading of property which progressively reallocates land to reflect current demand from consumers. This explains why warehouses are eventually transformed into apartments and obsolete factories into office buildings. The trading of properties depends on clear property rights. Any fuzziness in titles or in the right to dispose of property decreases the volume of real estate transactions and eventually freezes urban land into obsolete uneconomical land use. Over the last 50 years, Mumbai has submitted to a number of well-intentioned but disastrously misguided laws and regulations which have nearly succeeded in freezing private land transactions in large areas of the city.

The Urban Land Ceiling and Regulation Act

Compared to many other countries of Asia, India – with its independent judiciary and legal system – has a strong tradition of protecting property rights. While this respect for property rights is certainly strong in some other areas of the economy, in urban areas a number of legal and administrative measures have dramatically reduced the clarity of property rights. The Urban Land Ceiling and Regulation Act (1976) (ULCAR), which was abrogated by the Government of India in 1999 but maintained by the Government of Maharashtra until 2007, greatly reduced the ability to transfer property and to assemble land by the private sector. For almost a quarter century, the ULCAR contributed to practically freezing legal development of land by the private sector in urban areas, not including cases in which exemptions were obtained. The negative effect of ULCAR is still felt in the land use of Mumbai many years after the Act has been finally abrogated by the State of Maharashtra in 2007.

Rent control

Rent control legislation, still active, is now one of the main obstacles in preventing land to be used efficiently. The devastating effect of rent control legislation on the housing sector is well documented both in India and internationally[9], and there is no point in describing again the negative effect this well intentioned measure has had on housing conditions and on poor households. However, the negative effect of rent control legislation on urban land use efficiency is less well known.

Rent control prevents land from being redeveloped. The longer a building is under rent control the higher is the difference between controlled rent and market rent. Over time, the real rent paid to the landlord tends toward zero. As a consequence tenants never move; they are even able to transmit to relatives the right to occupy their apartment after their death. De facto, a large part of the property right is being progressively transferred from the landlord to the tenant, except for the

[9] See for instance Shlomo Angel "Housing Policy Matters", Oxford University Press, 2000, and "A Review of Empirical Evidence on the Costs and Benefits of Rent Control" Bengt Turner & Stephen Malpezzi, 2003. "Rent Control", Richard Arnott, September 1997.

right to sell which remains with the landlord. But even this right to sell has been partially transferred to the tenants who have the right to sell their individual units by sharing the "key money" or "Pagdi" with the landlords. While landlords still have the right to sell entire buildings under rent control, they seldom do it for an obvious lack of demand. Indeed, what is the value of a building which provides a negative income? Therefore, the older and the more decrepit a building is, the less likely it is to be sold, rebuilt or maintained.

The State Government has been well aware of the problem represented by the lack of maintenance in rent controlled buildings, which at time has resulted in the death of tenants in collapsing buildings. However, as in the case of the low FSI, the maintenance problem created by rent control was considered to be a market failure rather than a government failure, and therefore the State Government decided to substitute itself for landlords to insure the maintenance of privately owned buildings under rent control.

To that end, the State Government created the Bombay Building Repairs and Reconstruction Board to take over the maintenance of decrepit buildings and to redevelop properties that were on the point of collapsing. The property rights of these buildings are therefore even more muddled after this government intervention. Property rights are now being spread between landlords, tenants and the Board in charge of maintenance and redevelopment.

It is interesting to note that when dilapidated buildings had to be rebuilt by the Board, the State allowed an increase of FSI from 1.33 to about 3.2 (Phatak, 2002), acknowledging that it was not possible to relocate the tenants in situ without increasing the FSI. The irony was that a building has to be near physical collapse to benefit from a FSI increase. A number of Mumbai's residents have paid with their lives for the failure of the State Government to correctly predict the exact time when a rent controlled building was about to collapse. Recently, the Government has introduced a new scheme of FSI incentives to promote private investments in reconstruction of dilapidated buildings. But the FSI increases are piecemeal and are not linked to any infrastructure investment or spatial strategy.

Residential buildings under rent control represent the majority of buildings in the Island City. The negative economic impact on land use efficiency produced by freezing the sale and redevelopment of so many buildings during more than 50 years in the part of the city where there is the most demand and where land is the most expensive is certainly not trivial.

Land is a city's most valuable asset. Misallocating this asset has dire economic consequences. The Urban Land Ceiling Act together with rent control, by preventing the market from reallocating land use while the economic base of the city was changing, have certainly greatly contributed to the large number of slums and to the city's low floor consumption per capita. The land misallocation has also certainly contributed to reduce the productivity of the extraordinarily entrepreneurial and active Mumbai population.

An underdeveloped primary infrastructure

One of the main arguments for restricting FSI in Mumbai has always been that the existing infrastructure is already insufficient and would not allow higher densities. We have shown that while FSI increase might shift density from one part of the city to another, it would not increase the overall density of the city. The deficient infrastructure argument, however, has some merit for one good reason: Mumbai's current infrastructure is completely inadequate for a modern city of its size. The infrastructure of Mumbai should be the object of massive investments in the future, and this has nothing to do with increasing or decreasing FSI. In such an affluent city, preventing the construction of additional floor space as an alternative to building more infrastructure is a bizarre policy choice.

How underdeveloped is Mumbai's infrastructure? Let us concentrate on the most obvious area of underdevelopment: road and transport. Mumbai does not yet have any rapid road access allowing travel from one part of the city to the other (the equivalent of a ring road or rapid arterial

roads found in most large cities of the world) with the exception of the recently built Bandra Worli sea link, which is only 5.6 km long in a city extending over 48 km from Colaba to Bhayandar. Only two roads, none with limited access, allow traveling from north to south; one of these roads is the main link between the airport and the CBD. There are only 5 access points by road from Mumbai peninsula to the mainland! The rail system in Mumbai is efficient and is carrying more passengers than buses[10], but it has not been modernized and extended, and most stations are not easily accessible from all parts of the city. The trains are also grossly overloaded. During peak hours, railroad-cars designed for 190 passengers are typically overloaded with 520 passengers (apparently, another world density record). The bus system is paralyzed by the lack of major roads and the congestion created by the overloaded system. Most railways tracks are at grade and constitute barriers between neighborhoods, and therefore, they contribute to road congestion and to longer commuting trips. In addition, the running of commuter trains at grade in a very dense city like Mumbai results in several deaths per day.

The undeveloped road network makes it difficult to quickly access the only areas possible for urban extension, which are located in Thane and Navi Mumbai. New bridges and rapid ferries linking Mumbai's narrow peninsula to the main land are the only way to eventually increase the supply of land available to development without increasing too much the commuting distance. For instance, the distance from Churchgate to Navi Mumbai (south of Panvel Creek) would be only 26 kilometer via the projected Mumbai Trans Harbour Link (MTHL) bridge[11], compared to the current 41 kilometer trip. The current distance between Churchgate and the closest point in Vashi is 31 kilometer, and most of the time, it requires more than one hour of driving. When the MTHL bridge is built, the distance to Navi Mumbai would the equivalent of the distance from Churchgate to Jogeswari, except that the trip would take a much shorter time as a large part of the trip could be done at 60 km an hour over the new bridge, providing the dispersal systems on both side of the bridge are well designed.

The first feasibility study for the MTHL bridge was published in 1962. At the time this article is being written, in May 2011, a contract is apparently waiting for final approval. If implemented, it would contribute significantly Mumbai's ability to grow and to improve its land use without reducing the amount of space already used by housing and business. The comparison of the lay-out of three major cities built around a large bay – Mumbai, San Francisco and Hong Kong-Guangzhou-Pearl Delta – shows that the new bridges to be built between the old Mumbai's docks and the main land are certainly not extravagant (Figure 4). The building of bridges across San Francisco bay and the Pearl River delta have transformed a topographic liability into an asset. The new cross city rapid roads and the approach to the new bridges would require substantial relocations. The possibility of relocation depends on a relaxation of FSI regulations. The new FSI rules should be spatially consistent with what is done in other large metropolises of the world: i.e. following a gradient linked to market land prices. FSI increase should not be provided on an ad hoc basis depending on the Municipal financing needs for individual projects.

[10] "Basic Transport & Communication Statistics for Mumbai Metropolitan Region" MMRDA, March 2001 page 137

[11] Mumbai Trans Harbour Link (MTHL) bridge will be an eight-lane (two-way, four-lane) 22.5-km bridge connecting Sewri in South Mumbai to Nhava in Navi Mumbai.

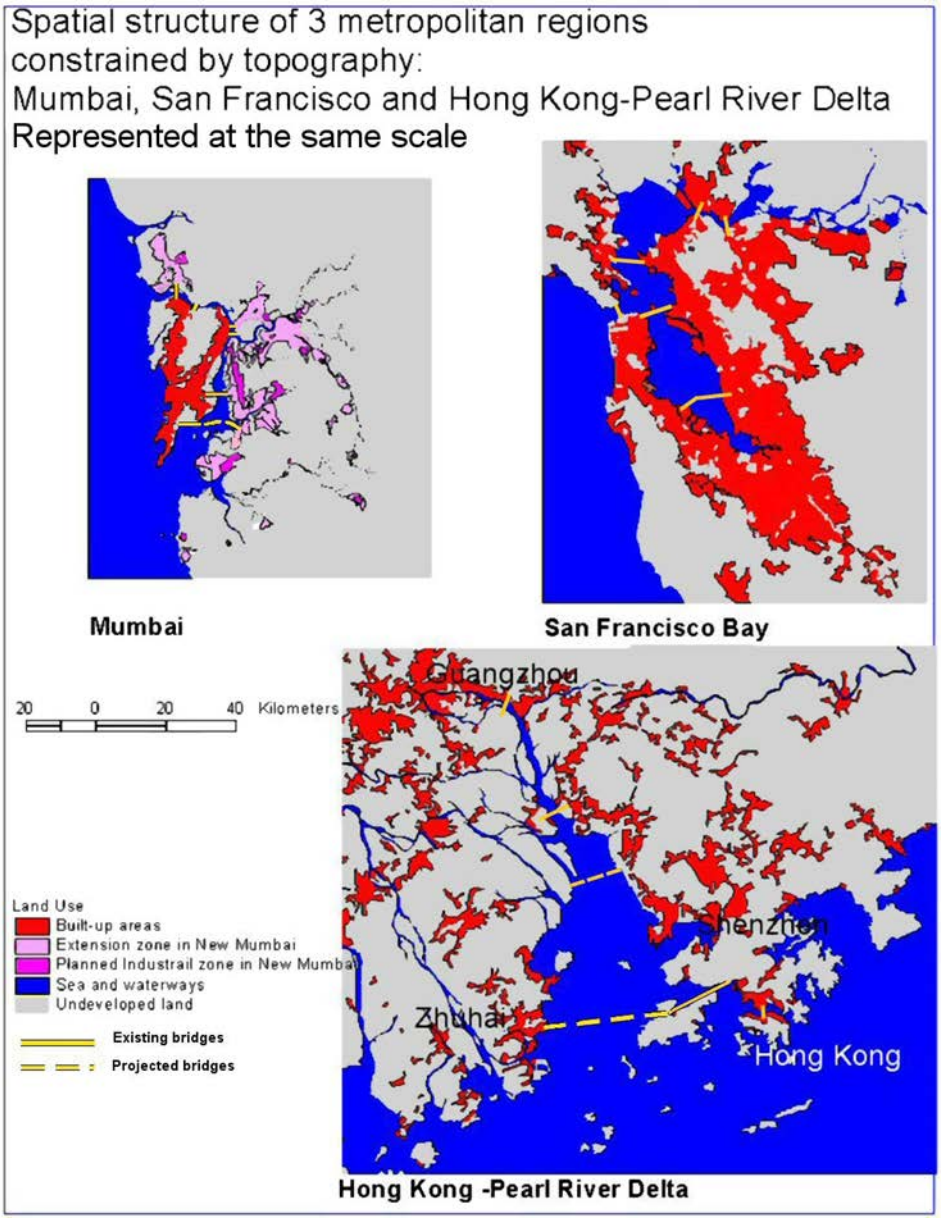


Figure 4: Spatial structure of 3 metropolitan regions constrained by topography

How to overcome the failed policies of the past?

The real choice is not between increasing the FSI or not increasing it, The real choice is between increasing the FSI or relocating a large number of households out of Mumbai

Relaxing the current FSI values has become by far the most controversial policy issue in Mumbai.

The following statement – made by a former planning official during a meeting of the Maharashtra Economic Development Council in October 2003 – is typical of the types of argument raised by advocates of the FSI status quo:

"*What will prevail in the end:*

- *the vision of private developers, who are pushing for increasing the Floor Space Index (FSI or FAR) so that they can build taller towers?*
- *or the vision of the common man, who is suffering because of a crumbling infrastructure?"*

This commentator opposes the "vision" of the common man to the vision of the developer; he does not seem to realize that eventually if people in Mumbai want to consume more than the current 4.5 square meter of floor space in which they squeeze in, some developers would have to build additional floor space somewhere or several million people would have to leave Mumbai to make room for those who can afford more floor space at the current high prices. The common man is likely to desire an increase in its living space and a decrease in the cost of floor space. So the vision of the common man is not necessarily opposed of the vision of the developer trying to respond to households demand.

The large profits that developers might make and the possible corruption of civil servants linked to an arbitrary and piecemeal increase in FSI constitute certainly a large part of the public concern justifying a rejection of an increase in FSI. However, while corrupt developers and officials might benefit from the present system, they are unlikely to benefit from an across the board transparent increase in FSI, as it would result in lower apartment prices and possibly lower land prices. There is no doubt that an increase in FSI and a streamlining of property rights would revive the building industry in Mumbai; many new jobs would be created, and some people might very well get rich in the process. But, rejecting an increase in the construction of badly needed floor space because some developers or land owners might get rich is like preventing farmers to cultivate wheat in the middle of a famine because they might make money by selling their wheat.

What are the possible alternatives regarding an increase in FSI, if it is agreed that it is desirable for all households and in particular the poorest to increase their floor area consumption?

There are really 2 possible scenarios:

First scenario: The FSI stays at the present level, the total area of floor space stays constant over time within Mumbai municipality; the rich increase their consumption of floor space per person by paying extraordinarily high prices per square meter and push the poor out of the city or on the sidewalks; or:

Second scenario: The FSI increases in many designated area within the municipal limits; the total floor space area doubles over 10 years (as has been done in Shanghai) the municipality improves the infrastructure; the consumption of floor space increases for poor and rich alike; nobody has to leave the city or is pushed on the sidewalk. Eventually, sidewalk and slum dwellers join the main stream and are able to move into formal housing.

The real questions are therefore, first, how much additional floor space should be built, second, where this new floor space should be built, and third, what mechanism should be used to allocate the new floor space between different income groups. The limited scope of this paper does not allow providing an answer to these three questions. However, here lays the real debate; and certainly not whether additional floor space should be built in Mumbai or not.

Does increasing FSI increase population density? Myths and reality

The planners' original objective in reducing Mumbai's FSI was to impose an upper limit on population density. This objective has obviously not been met. Mumbai has the lowest maximum FSI in the world among any cities larger than 5 million people, but it has the highest built-up density in the world. In spite of the empirical evidence, the defenders of the FSI status-quo still argue that increasing the maximum FSI would increase the already very high density of Mumbai. In reality it is easy to demonstrate that FSI values have little to do with densities. Here is why.

The density of a city will increase only when the percentage of land developed each year is lower than the yearly percentage increase of the population. In other words, a change in urban density depends on only two factors: 1) how much land can be developed each year and 2) how many people are added to a city each year through natural growth (the difference between birth and death rate) and migration. We can see right away that decreasing the value of the maximum FSI neither changes the new land available for development nor changes the balance between the yearly numbers of births versus deaths or arriving versus departing migrants. The main reason still invoked today for keeping a low value for maximum FSI is, therefore, based on a complete misunderstanding of what causes urban densities to change. The progressive reduction of regulatory FSI has been correlated with a progressive increase in densities and a subsequent increase in slum population, demonstrating the absurdity of the theory that a low FSI would result in lowering densities or at least keeping it constant.

A change in FSI, however, has an impact on the area of floor space available per household. A lower FSI decreases the total floor space available for a given area of land and for a given population, and therefore decreases the floor area per person. As we will explore further later, this is exactly what happened to Mumbai. A lower FSI did not increase the amount of land available for development; it did not have any impact either on the ratio of birth over death or the yearly number of migrants. However, a lower FSI made floor space scarcer and therefore much more expensive. As a direct consequence it reduced the consumption of floor space per person, even more dramatically so for low-income households.

If putting a low upper limit on FSI does not reduce density, then why do most planners and a large part of the public still believe it does?

Let us imagine that in an area of Mumbai where the maximum permitted FSI is 1.33, the FSI would be increased to a maximum of 4 on just one lot. After reconstruction we could expect the floor space on this lot to increase by 200% [(4-1.33)/1.33]. Assuming that the average size of apartments and the number of people per apartment will remain the same before and after reconstruction, then, if the original lot had, say, 10 apartments housing 50 people, the new reconstructed lot with an FSI of 4 will have 30 apartments housing 150 people. The density of the lot will have increased by 200% in the same proportion to the increase in FSI. However, the density of the city will not have changed as the increase of the FSI in one block has changed neither the number of people in the city nor the amount of land occupied by the city. The households who moved to the new apartments created by the increase in FSI must have been coming from other parts of the city where the density has therefore decreased by the same proportion. However, the increase in FSI in one block has very slightly increased the total floor space area of the city and therefore very slightly increased the average floor consumption per person. The increase in floor space in this case has been too small to

have an impact on the price of floor space. But we could imagine that if the FSI was increased in, for example, 1/4th of the city area, the price of floor space in many areas of the city would fall as soon as developers could have the area rebuilt at the new FSI, putting a large area of new floor space on the market.

The FSI, therefore, has nothing to do with a city's average density. In Mumbai, slums often have an FSI below 1 with a density reaching 2000 people per hectare; while high rise apartments with an FSI of 3 or 4, often have a density around 1000 people per hectare. Because a higher FSI allows higher buildings with a smaller footprint, a higher FSI as a consequence allows larger open spaces in residential areas. For instance, most of the residential areas of Singapore have an FSI between 3 and 4, which allows public open spaces to cover around 70% of the land. Meanwhile Mumbai slums with an FSI often below 1, have no open space at all, no roads and only narrow footpaths.

Is the current infrastructure compatible with higher FSI?

It has been argued that Mumbai chronically deficient infrastructure is incompatible with the higher local densities that are expected with higher FSI – although we have shown that a higher FSI might increase some densities locally but will decrease it in other parts. There are two responses to this argument: first, there is absolutely no reason to consider Mumbai's infrastructure as immutable as is its topography. Delhi has managed to develop a subway system of 189 km between 2002 and February 2011, ranked today the 12th largest subway system in the world. There is therefore no reason why Mumbai would not develop an infrastructure adapted to its needs.

Should an increase in FSI be postponed until a satisfactory level of infrastructure is reached in Mumbai? This would be a mistake, as it is precisely an increase in FSI in strategic locations that would generate the resources that would be required to upgrade the local infrastructure.

The infrastructure will have to be redesigned and rebuilt in the areas where a large FSI increase is projected, not so much to take care of increased density than to correspond to modern standards of consumption. The new infrastructure could be financed by an impact fee imposed on developers at the time of reconstruction. In this manner the additional infrastructure cost will be borne entirely by those benefiting directly from an increased FSI but will not affect buildings which are not suitable or not ready for redevelopment.

This increase of FSI in specially designated areas of the city should at least aim at doubling the consumption of floor space per person within 10 years. The infrastructure should be adjusted for broad areas corresponding to a planned and transparent phasing of FSI increase by zone rather than by plot as it is currently practiced. Historical buildings could be protected by being allowed to trade their potential FSI with non-historical buildings located in the areas where FSI is being increased. Or alternatively, and in some limited cases, additional floor space could be built above the existing building, as has been done for Buckley Court in Colaba, provided that the original building is restored and maintained adequately.

The current situation, consisting in an immutable low FSI and an immutable deficient infrastructure, results in a constant "squeeze" of lower income groups into less and less floor space. The only flexibility in the system rests in the expansion of floor space in slums and in forcing the poorest people in "creating" new floor space on sidewalks. It is time to radically reassess the past policy and discard the fear of change which has paralyzed Mumbai land use until now.

Table of Contents

Bibliography

Bertaud, A., Buckley, R., Phatak, V. K. (2005). Reforming Mumbai's real estate raj: A prelude to a business plan. Unpublished report, World Bank, South Asia Region, Sustainable Development, Urban, Water & Sanitation, and Hazard Risk Management (SASDU), Washington, DC.

Bertaud, Alain and Jan K. Brueckner (2004) "*Analyzing building-height restrictions: predicted impacts and welfare costs*" Journal of Regional Science and Urban Economics

Bertaud, Alain.2010 "*Land Markets, Government Interventions and Housing Affordability"* Wolfensohn Centre for Development at Brookings Working Paper No. 18 May 2010

Buckley, R., Bertaud, A., Phatak, V. K. (2006, January). *Property rights and interlocking policy constraints in urban land markets: Reforming Mumbai's real estate raj*. Paper presented at the National Workshop on Land Policies and Administration for Accelerated Growth and Poverty Reduction in the 21st Century, New Delhi.

Ghokale, Subas, 2007 "Mumbai trans Harbor link property value capture feasibility report" MMRDA

Peterson, George. 2009. *Unlocking Land Values for Urban Infrastructure* PPIAF Trends and Policy Options Series No. 7, Washington DC: World Bank

Phatak, V.K. [2002] "*Developing Land and Real Estate markets The case of Mumbai Metropolitan Region*" reprinted in Mumbai Reader 07, Urban Design Research Institute, Mumbai

Phatak, V.K. [2002] *The Use of FSI in Developing Land and Housing Markets in Mumbai* in "The City" Vol 1 No.4 Bombay First, Mumbai

Phatak, V.K. [2006] *Filling in the Blank Policy* Indian Express November 9, 2006

Phatak, V.K. [2008] *Is it Money Space Index finally*? Hindustan Times Mumbai Edition 30 March 2008

Phatak, V.K. [2009] Charges on Land and Development Rights as Financing Resources for Urban Development in India Infrastructure Report 2009 Land: A Critical Resource for Infrastructure 3iNetwork, IDFC, Oxford University Press, New Delhi

World Bank , 2005. Judy Baker, Rakhi Basu, Maureen Cropper, Somik Lall and Akie Takeuchi "Urban Poverty and Transport: The Case of Mumbai" World Bank Policy Research Working Paper 3693, September 2005