Success when we deemed it failure?

Revisiting Sites and Services Projects in Mumbai and Chennai 20 Years Later

*Kathryn E. Owens, Sumila Gulyani, and Andrea Rizvi*

The World Bank
Social, Urban, Rural and Resilience Global Practice
15 December, 2016
Abstract

Twenty years after the sites and services approach was largely abandoned by the World Bank, new evidence from India demonstrates that the projects achieved many sought after urban planning goals. We revisited project sites in Chennai and Mumbai and found bustling and thriving communities. In sharp contrast to the critiques of the sites and services model, we find that the incremental housing approach has worked. We argue that these projects developed and offered a unique “land for housing” product – small serviced plots – that is not typically available in the formal sector and this helped broaden access to the housing market.

The bigger success, however, is that these projects resulted in the creation of well-planned and well-serviced neighborhoods that are both mixed-income and mixed-use. We identify specific features of the sites and services model that, we argue, can be deployed by policymakers to create inclusive and livable neighborhoods. Together these features offer a powerful model and tool for managing urban expansion and making cities more inclusive.
Acknowledgments

We are grateful to Vidyadhar Phatak, GOI’s manager for the Mumbai project, for invaluable insight into project implementation as well as guidance during fieldwork in Mumbai. We also owe huge thanks to Mr. T. Sadananthan and his colleagues at the Tamil Nadu Housing Board, original members of GOI’s team for the Chennai projects, for their advice and support during fieldwork in their city. We would like to thank Barjor Mehta for initiating and supporting this work, and Alain Bertaud and Praful Patel for sharing their experience on these projects and providing excellent comments. Thanks also to Amy Miller and the World Bank Archives staff for their support.
Contents

1 Introduction ........................................................................................................................................... 1
  1.1 Structure of the paper .................................................................................................................. 2
  1.2 Methodology .................................................................................................................................. 2

2 Sites and Services: A brief overview ................................................................................................. 4
  2.1 The sites and services model and its intent .................................................................................. 4
  2.2 World Bank-supported sites and services projects: Varied objectives and designs .............. 4
  2.3 The findings for and against: Mixed results but discarded nonetheless ................................ 5

3 Case studies: Sites and Services in Mumbai and Chennai ............................................................... 6
  3.1 The Sites and Services Program in India ..................................................................................... 6
  3.2 Program Overview and Site Selection in Mumbai and Chennai .............................................. 9
  3.3 Projects results at closure and 20 years later .............................................................................. 10
    3.3.1 The incremental housing approach worked ......................................................................... 10
    3.3.2 The number of beneficiaries was greater than planned, and increased over time ............ 14
    3.3.3 Cost recovery was achieved ................................................................................................. 15
    3.3.4 Summary ............................................................................................................................... 16

4 By design: Planning and infrastructure features that worked well ................................................. 16
  4.1 Small plot sizes ............................................................................................................................ 16
  4.2 Range of plot sizes and prices to target different income groups ........................................... 19
  4.3 Planning decisions and infrastructure standards that lowered costs .................................... 20
    4.3.1 Increasing density and maximizing sellable land ............................................................... 20
    4.3.2 Introducing hierarchy and a “sliding scale” of standards .................................................. 21
  4.4 Mixed Land Use: Planning for Commercial and Social Services ........................................... 28

5 Neighborhood location: City connection and relative land values ................................................. 30
  5.1 Planning for growth: Site selection that envisaged an expanding footprint ............................ 30
  5.2 Land value increases: Which sites did better? .......................................................................... 33

6 Creating the foundations not only for housing but also for inclusive neighborhoods .................. 34

7 Conclusions and implications ............................................................................................................. 36

References ................................................................................................................................................ 37

FIGURE 2: INCREMENTALLY BUILT MULTI-LEVEL HOUSING ........................................................................ 13
FIGURE 3: ARIOLI SITE PLAN WITH ELEVATIONS .................................................................................. 14
FIGURE 4: CURRENT BUILDING FOOTPRINT ....................................................................................... 18
FIGURE 5: AVERAGE POPULATION DENSITY IN SELECT CITIES AND PROJECT SITES............................... 21
FIGURE 6: LAND USE DISTRIBUTION IN SITE DESIGN ......................................................................... 23
FIGURE 7: STREET GRID IN PROJECT SITES VS PRIVATELY DEVELOPED SITES ........................................... 24
FIGURE 8: SHARE OF LAND ALLOCATED TO STREETS (%) ...................................................................... 25
FIGURE 9: SITE PLAN AT CHARKOP, MUMBAI ...................................................................................... 26
FIGURE 10: SITE PLAN MOGAPPAIR WEST, CHENNAI .......................................................................... 26
1 Introduction
Between the early 1970s and 1998 the World Bank invested in 100 sites and service projects across 53 countries with a total investment of $14.6 billion. The objective of sites and services programs was delivery of incremental housing for the poor through the provision of small serviced plots, sometimes with a core unit. The approach emerged in the early 1970s as a response to the rapid slum expansion and failure of past government affordable housing programs (Payne 1984; Peattie 1982; van der Linden 1986). However, after mixed implementation experience, the sites and services model was widely discredited, and ultimately abandoned in the mid 1990s by the international development community. Critics argued that these projects took too long, were too complicated, ‘leaked’ to the non-poor, and that remotely located sites suffered low occupancy. At the time, evaluators measured project success based on narrowly defined rates of completion, cost recovery, and achievement of stated project objectives within project duration. Many of these projects failed to deliver against these metrics within the limited project lifespans.

For this study, we revisited two major project cities in India—Chennai and Mumbai1—where about $200 million were invested in developing 28 sites over the period 1977 and 1994. The idea was to examine what happened at these sites 20-30 years after the initial investments. Revisiting these investments after 20 years or more gives us a unique opportunity to test the durability of some of the original ideas, claims, and critiques, and to assess their validity on the ground. We examine the following questions. What, if any, were the positive outcomes? What worked and what did not? What insights do these projects offer to cities and national governments that are thinking about mechanisms for accommodating even a small subset of the additional 2.5 billion people who are expected to reside in urban areas between 2014 and 2050 (United Nations, DESA 2014)?

Our findings in Chennai and Mumbai differ sharply from the negative assessments in the sites and services literature and evaluations. Over the 20-30 years since completion of different sites, these projects appear to have achieved remarkable success. In this paper, we present and discuss the following findings. First, the idea of “incremental” housing—where people would invest slowly, over time, at a pace that fitted each individual family’s circumstances—has worked. Second, the site planning and infrastructure design innovations introduced in these projects directly contributed to enhanced affordability and succeeded in delivering dense but well served and physically livable neighborhoods. Third, contrary to much of the erstwhile and current discourse that pushes for narrow targeting of lower-income households and a singular focus on housing, these projects strove for and succeeded in delivering mixed-income and mixed-use

---

1 The official names of both cities were changed in 1996 from Madras to Chennai and from Bombay to Mumbai. We will refer to both using the new official names except in reference to projects.
neighborhoods. This combination of factors has resulted in neighborhoods that are both livable and inclusive.

Now that several decades have passed, these project outcomes can and should be assessed using a framework that is broader than the project-specific goals set at inception. For this, we use the Living Conditions Diamond framework (Gulyani and Talukdar 2008; Gulyani and Bassett 2010; Gulyani, Bassett, and Talukdar 2012). The framework posits that living conditions are a composite of four dimensions—the unit, infrastructure, tenure, and the neighborhood. We find that these projects have succeeded in delivering across all four dimensions. First, the housing units have steadily improved in size and quality over time and are now rather good; this is entirely attributable to private investments by owners. Second, residents have access to good and well-maintained infrastructure—water, electricity, paved streets, drains, sewerage, street lighting—throughout these neighborhood. Third, these neighborhoods offer tenure that is secure for owners, while also offering a healthy mix of rental options for non-owners. Fourth, the neighborhoods are well-connected to the city, are in demand (as measured by healthy land values), have social and economic amenities (schools, clinics, shops, offices and, at times, industrial areas), and, most importantly, are inclusive, housing families from a broad spectrum of incomes.

Overall, the sites and services experience in Chennai and Mumbai suggests that we have a tool for better managing urban expansion and creating affordable housing. In this paper, we will identify some of the key features that contributed to the success of these sites and services projects, and discuss their relevance today as we plan for future growth.

1.1 Structure of the paper
The paper is structured as follows. In the rest of this section we discuss the methodology. In Section 2, we start with a brief history of the World Bank’s investments in sites and services schemes globally. We also review the commentary—positive and negative—emerging from assessments of these projects, with a special emphasis on some of the major critiques, in the 1980s and early 1990s that contributed to their demise. In section 3, we focus on the case studies and discuss how the long-term results compare to the original performance expectations. Section 4 highlights the key design, planning, and infrastructure features that contributed to long-term success. Section 5 examines neighborhood location and land values, with a view to understanding sites and services as an approach to urban expansion. We conclude with a discussion of the policy implications of our findings.

1.2 Methodology
We conducted a mixed-methods case study in two cities—Chennai and Mumbai in India—where 28 sites were developed between 1977 and 1994. We trace the trajectory of these projects and sites from inception and design stage, to the status at the time of project closure and, finally, the situation on the ground 20-30 years after delivery of the sites. We started our analysis by compiling project documents from the World Bank project archives on the four projects related
to Chennai and Mumbai. The documents included site maps, background studies, implementation reports, correspondence, official project agreements as well as midterm and final reviews. From the project archives, we compiled a list and started to identify the location of project sites.

In October and November 2015, we visited 15 of the 28 project sites in the two cities (Table 2). Staff or managers from the government’s original project implementation teams joined us on site visits in both cities, providing rare insight into the history as well as evolution of these projects. Using original project maps and local documentation, project staff helped us select sites that represented a variety of locations, sizes and designs. At each project site, we documented the general condition of services, housing typologies, construction quality, current market value, and occupancy. We also conducted short open-ended interviews with households at different sites. Subsequently, we interviewed some World Bank staff who had worked on these projects.

We also conducted a spatial analysis using satellite imagery of project sites in both cities to compare basic land use attributes and the nature of physical development. The boundaries of project sites were determined from original site plans and verified through discussions with project managers and staff. These personnel also provided information about types of services provided at each site as well as suitable comparative areas, where urban expansion occurred privately, over a similar time period and in close proximity. This information was georeferenced using QGIS to create a layer of project investments. Then we used Open Street Map’s building layer along with Google Earth satellite imagery to capture the current building rooftops on a four-hectare sample site within each investment and control site. We verified and updated the rooftops within our project and control sites to accurately reflect land use and average rooftop size. Using the additional layers obtained from Open Street Map and the World Bank, we used QGIS to analyze the imagery. This allowed a comparison of site layout, road density, and location within the urban built up areas. Results were triangulated with field observations and qualitative information from project staff to ensure the results reflected on the ground realities. Finally, we used information about market values and location to help determine the long term financial return of each site.

In addition to case-specific qualitative and quantitative analysis, we conducted a review of the literature—covering both academic and “grey” literature, including reports from international aid organizations—on housing and sites and services programs, published between 1970 and 2015. This time period encompassed the early theory that motivated the projects as well as more recent re-evaluations of project sites.
2 Sites and Services: A brief overview

2.1 The sites and services model and its intent
The sites and services model was a dramatic departure from traditional models of public housing provision. The model was based on an emerging understanding of ‘informal housing delivery systems’ (van der Linden 1992) and built on a premise of self-help. Proponents of this model argued that homeowners know what housing they need and are capable of providing it (Abrams 1964; Mangin 1967; Turner 1978; Turner 1983). Under the sites and services approach governments assemble land and layout basic services, producing serviced plots – sometimes with a ‘core’ house or even just a toilet - that they sell to households, with an emphasis on reaching those with low incomes. In return for payment, plot owners receive formal land title but are responsible for building houses, often incrementally, using a combination of their own labor, trained local contractors and mutual self-help (Kaufmann and Quigley 1987).

In many ways, sites and services marked a wholesale shift in national housing policy, moving governments from slum demolition and housing construction to the provision of fully serviced plots. To many governments it offered a means of reducing costs, increasing the flexibility of housing investment, while also recapturing some ability to enforce regulation and standards that were lost with widespread informal development (Peattie 1982; Payne 1984). For low-income households it provided improved living and health conditions, while also giving them financial security and a stake in society and economic development (Rakodi and Withers 1995). Given the novelty of the model, initial attempts at implementation were confined to small pilot projects meant to demonstrate the feasibility of the approach. Though widely trialed, the sites and services model was exclusively adopted by none, and remained one of numerous approaches to housing delivery in all countries in which it was implemented.

2.2 World Bank-supported sites and services projects: Varied objectives and designs
Initially the uptake of sites and services projects was impressive as it was rolled out across the globe in the 1970s and 1980s. As noted earlier, the World Bank invested in 100 projects with sites and service components across 53 countries with total project commitments of more than $14.6 billion (Figure 1). The sites and services approach was implemented with a large diversity of aims and programs designs. Projects varied in scope— some provided only basic community services, others included mortgages, and still others offered core houses (van der Linden 1992). The level of community participation also ranged from active engagement to total exclusion. Project objectives varied widely and included: housing the poor; increasing the stock of permanent housing; limiting public expenses; and restoring formal planning control (van der Linden 1986). Yet all sites and service projects shared an overarching goal to “harness in an orderly fashion the kind of investment which low income settlers have heretofore employed in ‘squatting’ or buying in illegal subdivisions” (Peattie 1982, p 133). One universal feature common to all sites and services programs were their small-scale. Even in countries that adopted multiple projects, most individual programs remained pilot in nature. Most were components of larger projects and none
were large enough to eliminate informal housing development or to replace other low-income housing instruments entirely.

**Figure 1: World Bank Sites and Services Project Portfolio, 1970 – 1998**

![Graph showing the number of projects and loan commitments over time](image)

Source: Author’s calculations from World Bank Shelter Database, 2015

The rapid uptake of the sites and services approach was matched in pace only by its rate of decline that started in the early 1990s. The scale and timeline of the World Bank’s support to sites and services projects is depicted in Figure 1. It shows the model’s implementation arc with the number of projects peaking in the mid 1980s before nearly disappearing in the 1990s. As World Bank support for the model waned, most countries also shrunk their investment in the model. Many countries continued to provide serviced sites but the low-income focus largely disappeared.

2.3 The findings for and against: Mixed results but discarded nonetheless

Not surprisingly, given the wide range of countries and project designs, the evaluations reflected highly mixed findings and often yielded conflicting critiques and evaluations (Mayo and Gross 1985; Peattie 1982; Keare and Parris 1982; Laquian 1983). On the positive side, several studies found strong benefits for beneficiary households. Multi-country studies concluded that sites and services delivered effective, affordable and well targeted housing (Keare and Parris 1982;
Kaufmann and Quigley 1987; Laquian 1983). Other studies demonstrated that sites and services projects (alongside slum upgrading projects) had positive impacts on income, housing quality, access to services and quality of life, with some evidence of land value increases in the project sites and adjoining areas (Laquian 1983).

Yet, as implementation expanded, criticisms began to dominate the sites and services discourse. One often repeated critique revolved around affordability and targeting. It was argued that the sites were still not affordable to the lowest income groups making it a very leaky subsidy with sites filtering up to higher-income groups. Concerns were also raised about the remoteness of project locations that forced low-income households into long commutes to jobs and other social services and delayed full occupation of sites. Many evaluations also pointed out serious implementation issues including significant delays caused by difficulties faced with land assembly. These in turn, fueled concerns about replicability and expansion. Finally, short term cost recovery became problematic and inhibited financing of future phases of the program.

But ultimately it was a confluence of growing project skepticism as well as global circumstance that led to the abandonment of the once-promising sites and services approach. A financial crisis unfolded in the early 1980s, limiting the resources that most governments could invest in housing while also accelerating slum development. This brought many of the fledgling sites and services projects under further scrutiny. Policy shifts and institutional reorganizations within the World Bank diluted support for the urban portfolio overall, and sites and services in particular (Zanetta 2001). Many implementation issues that might have otherwise been resolved through project adjustments like reducing project size, developing smaller plots, offering a variety of service packages and extending repayment plans were confused for systemic instrument failures (Peattie 1982; van der Linden 1992). Rather than proceed with design modification there was a large-scale abandonment in favor of in-situ upgrading solutions and housing finance support (Buckley & Kalarickal 2004). These were perceived to be more cost effective solutions on the basis of inaccurate cost comparisons to slum upgrading projects (Abbott 2002). Unlike sites and services projects, however, none of these alternate instruments directly tackled the lack of availability of land and housing products suitable for low-income households.

3 Case studies: Sites and Services in Mumbai and Chennai

3.1 The Sites and Services Program in India

India boasted one of the longest running and most diverse sites and services programs in the world, offering a unique opportunity to examine the long-term impact of the sites and services model across size, approach and context. Table 1 lists the projects in India with sites and services components, provides approval and closing dates, and the project evaluation rating at closure. For the sites and services components, it provides the total site area and the number of beneficiary households.
The first World Bank sites and services project in India was approved in 1973 in Calcutta. Between 1973 and 1997, the World Bank financed 11 projects in India with sites and services components, covering approximately 3,200 hectares and providing approximately 280,000 plots across 27 cities (Table 1). The projects ranged from single city projects to statewide engagements, and the size of total investment also varied. The projects had an average implementation period of 8 years. Similar to other countries, most of these schemes were components of larger multi-sector urban development programs.

Success was mixed, due to factors including scale, program staffing, local political dynamics and land acquisition. Seven projects (64%), achieved satisfactory ratings in formal evaluations conducted soon after project closure. These ratings reflect success with the sites and services components. The remainder of the projects were unsatisfactory largely due to land acquisition issues with both sites and services and other components.
<table>
<thead>
<tr>
<th>Project Name</th>
<th>Loan Amount ($ M)</th>
<th>Approval Date</th>
<th>Closing Date</th>
<th>Rating</th>
<th>Total Size</th>
<th>Beneficiary Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcutta Urban Development</td>
<td>35.0</td>
<td>8/14/73</td>
<td>11/19/79</td>
<td>S</td>
<td>125</td>
<td>4,547</td>
</tr>
<tr>
<td>Urban Development – Madras</td>
<td>24.0</td>
<td>3/8/77</td>
<td>6/29/82</td>
<td>S</td>
<td>175</td>
<td>13,500 12,179 90%</td>
</tr>
<tr>
<td>Urban Development - Calcutta Project (02)</td>
<td>87.0</td>
<td>12/13/77</td>
<td>8/8/84</td>
<td>U</td>
<td>127</td>
<td>8,187 8,187 100%</td>
</tr>
<tr>
<td>Urban Development - Madras Project (02)</td>
<td>42.0</td>
<td>12/16/80</td>
<td>3/15/88</td>
<td>S</td>
<td>180</td>
<td>15,000 18,300 122%</td>
</tr>
<tr>
<td>Kanpur Urban Development</td>
<td>25.0</td>
<td>10/27/81</td>
<td>3/31/88</td>
<td>S</td>
<td>267</td>
<td>14,777 14,892 101%</td>
</tr>
<tr>
<td>Urban Development - Calcutta Project (03)</td>
<td>147.0</td>
<td>5/19/83</td>
<td>3/31/92</td>
<td>U</td>
<td>29</td>
<td>25,000 1,842 7%</td>
</tr>
<tr>
<td>Urban Development - Madhya Pradesh</td>
<td>24.1</td>
<td>6/28/83</td>
<td>6/30/91</td>
<td>S</td>
<td>200</td>
<td>20,000 24,500 123%</td>
</tr>
<tr>
<td>Urban Development – Bombay</td>
<td>138.0</td>
<td>1/29/85</td>
<td>9/30/94</td>
<td>MS</td>
<td>700</td>
<td>85,000 90,000 106%</td>
</tr>
<tr>
<td>Urban Development – Gujarat</td>
<td>62.0</td>
<td>12/17/85</td>
<td>3/31/95</td>
<td>U</td>
<td>100</td>
<td>14,000 2,000 14%</td>
</tr>
<tr>
<td>Urban Development Uttar Pradesh</td>
<td>150.0</td>
<td>4/21/87</td>
<td>3/31/96</td>
<td>U</td>
<td>122</td>
<td>10,000 12,700 127%</td>
</tr>
<tr>
<td>Urban Development - Tamil Nadu</td>
<td>300.2</td>
<td>6/15/88</td>
<td>9/30/97</td>
<td>S</td>
<td>1,161</td>
<td>70,000 88,725 127%</td>
</tr>
<tr>
<td>Total</td>
<td>1,034.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,186 275,464 277,872 99%</td>
</tr>
</tbody>
</table>

Source: World Bank project documents, site visits and interviews with project managers as well as Independent Evaluation Group - World Bank Project Performance Ratings: http://ieg.worldbankgroup.org/ratings

Note: (a) Refers to project ratings, as a whole, at the time of closure, as recorded in the Independent Evaluation Group’s World Bank Project Performance Ratings. Evaluations in the 1970’s and early 1980’s did not include a codified rating so ratings were imputed as either Satisfactory (S) or Unsatisfactory (U). Ratings were then codified as part of the Project Completion Reports conducted jointly by World Bank operations staff and the Independent Evaluation Group in the 1980’s. The ratings scale changed in 1992 with the introduction of Highly Satisfactory (HS), Satisfactory (S), Moderately Satisfactory (MS), and Unsatisfactory (U), which were reported in the Implementation Completion Reports introduced in 1994.
3.2 Program Overview and Site Selection in Mumbai and Chennai

At the time that sites and services projects were introduced to Chennai and Mumbai, these cities were large rapidly growing urban agglomerations. This growth has been sustained over time. In 1971, the population of the Chennai Metropolitan Area was 3.5 million (World Bank 1977). This grew to about 8.6 million by 2011. Meanwhile, the Mumbai Metropolitan Region grew from 10.5 million in 1983 at the start of the project to 18.4 million by 2011. Both cities faced growing slum populations, but Chennai had a more successful track record of offering planning solutions than Mumbai (Pugh 1990). Over the last decade, both cities have experienced suburbanization with a de-concentration of the urban core and a shift of manufacturing and growth to the urban peripheries. The sustained growth and spatial changes over time allow us to assess results of these programs under conditions of urban expansion and redevelopment.

Implementation occurred on these programs over a period of two decades from 1977 to 1997. The Chennai program consisted of three projects—the first ran from 1977-1982, the second from 1980-1988, and the third from 1988-1997. The first two projects focused solely on Chennai, while the third project expanded coverage to include several other towns in Tamil Nadu as well. The number of sites delivered in each project grew as implementation experience improved. In contrast, the city of Mumbai invested in a single project that was initiated later in 1985, and thus benefited from the experience gained in Chennai and other Indian cities. Due to land acquisition issues, the investments in Mumbai took longer to be realized than expected but still managed to deliver more than the targeted number of plots and apartments before it closed in 1994.

The sites selected under the Mumbai and Chennai projects varied widely in size, location and other physical attributes. For example, the Mumbai projects ranged from small 7 ha infill developments to large 180 ha stand-alone sites. Some sites were well connected to bus and transport networks while others were more remote and needed investments in new trunk infrastructure to improve access. As most sites and service projects were relatively small components of larger city-wide development programs, efforts were made to coordinate site selection with other project infrastructure investments to ensure connectivity to employment centers. For example, in Chennai sites were selected to integrate with a project-funded ring road and bus service improvements (World Bank 1990 and 1992). All sites in both Mumbai and Chennai were greenfield developments, predominantly on reclaimed land scattered across the peripheries of metropolitan areas. In Chennai, project land was sourced exclusively from areas around large water reservoirs. In Mumbai, the original plan was to reclaim coastal wetlands but a regulatory ban forced project site relocations after implementation began.

2 Land for the sites and services programs was generally reclaimed from wetlands and land around water reservoirs. This eliminated the need for expensive and difficult land acquisition, however the process was problematic even then and it does raise important environmental and flooding issues.
3.3 Projects results at closure and 20 years later

In the section below, we take a closer look at how the Mumbai and Chennai projects have fared in achieving three of their major goals: (a) demonstrating the concept of incremental housing; (b) reaching a targeted number of beneficiaries; and (c) achieving cost recovery. For each goal, we report the result at project closure and what we found when revisiting these neighborhoods 20-30 years later.

3.3.1 The incremental housing approach worked

At the time of project closure, site development had been completed—that is, there were demarcated plots, some project-financed core houses, and basic infrastructure such as roads and water pipes. The majority of plots had also already been sold through a combination of lotteries and auctions; this demonstrated that there was demand for the type of housing products that were being offered through these projects. Overall, in Chennai, 13 sites were developed and 57,000 plots were delivered between 1977 and 1997. In Mumbai, the project delivered 88,000 plots and 17,000 apartments over 15 sites.

However, almost none of the project sites had a significant number of houses and residents by the time of closure. The low-occupancy was a cause of concern for the government, at least in Mumbai. A follow-on sites and services project had been planned for Mumbai but was never pursued by government. This was because the neighborhoods developed under the first project were physically under-built and under-occupied; it seemed like a relative “waste” of scarce land (interview with the Project Manager, Mumbai Urban Project, Sept. 2016).³

Twenty years or so later, it is clear that the incremental housing approach, as originally envisaged, has worked. But it has taken considerably more time than was factored into project designs, program evaluations and, possibly, into the policy dialogue with government; we will return to the issue of “time” later.

By the time of our field visits in 2015, nearly all individual plot owners had invested enough capital in their houses that the majority of project neighborhoods were extensively built out and densely occupied. Our site visits and discussions with original project staff and managers revealed that more than 90 percent of the 28 project sites were built out across the two cities. Details of size of each site and its uptake or plot occupancy are provided in Table 2. As can be seen (for those sites where data are recorded), all exceeded 90% uptake with two exceptions – Manali I and II in Chennai - that remain largely unoccupied; these sites are discussed later, in section 5. While project sites were highly variable in size, ranging from 12ha to

---
³ It is important to note that in India, at that time even professionals and highly-ranked civil servants had very low incomes and could not afford to enter the housing market until relatively late in their careers. Most professionals were excluded from the housing market by insufficient incomes, limited savings and lack of options for housing finance. Given this context, very slow build out should have been expected for projects targeting low income households. Currently incomes and housing construction are booming in India but urban development remains a long-term process. To put it in context the private sector uses 10 years as a rule of thumb to achieve high occupancy from commencement of “plot bookings.”
141ha (Table 2), the size of the site does not appear to have a strong correlation with long-term occupancy or overall uptake of the project. The fact that small sites also worked well demonstrates that site size need not be a constraint to sites and services development and shows that the model is feasible at a variety of project sizes.

The incremental development process was evident throughout the project sites. In these neighborhoods, there is a wide range of housing types, quality and size. There are very few of the original core houses. Owners expanded the housing footprint and often added floors. In fact, multi-story dwellings built with cement walls and roofs are prevalent. Ongoing house expansion and construction projects and field interviews indicate that this replacement process has been and continues to be incremental, with households slowly adding and completing additional floors as capital became available, exactly as envisaged in the original sites and services theories. We also observed interior upgrades to kitchens and toilets in many houses. The net result of the incremental development process is a quantitative increase in floor area and the number of units available at sites and services locations. This development and densification process is depicted in Figure 2. In the image/photograph on the right are units that are reflective of the “original” one level core houses with a single room and corrugated iron sheet roofs. On the left, are units post-investment – these comprise 2-3 level houses that have good quality construction and are well-maintained.

While the project design anticipated and accommodated some vertical investment, the current scale of investment exceeds original expectations. For example, in Arioli in Navi Mumbai, the original site development expectations were for two story structures on small plots as shown in Figure 3. During site visits in 2015 we found the majority of sites had at least three-story structures, and some had up to five stories. A majority of households also ignored setback guidelines to cover the entire plot. In both cities project managers recognized these “planning violations” but indicated that they decided to allow additional floors and waive setbacks as long as rights of way and streets were not encroached upon. The extent of vertical development throughout the sites and services locations demonstrates an active incremental development market. The upward development of buildings beyond two levels was not envisioned in the original project design and indicates the persistent demand for small housing types that are well-serviced.
Table 2: Program Sites in Chennai and Mumbai

<table>
<thead>
<tr>
<th>Sites</th>
<th>Plots</th>
<th>Size</th>
<th>Year</th>
<th>2015 Build Out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(#)</td>
<td>HA</td>
<td>Started</td>
<td>Completed</td>
</tr>
<tr>
<td>Chennai</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arumbakkam *</td>
<td>2,334</td>
<td>34.2</td>
<td>1977</td>
<td>1979/80</td>
</tr>
<tr>
<td>Villivakkam</td>
<td>3,751</td>
<td>71.6</td>
<td>1979</td>
<td>1981/82</td>
</tr>
<tr>
<td>Kodungaiyur I &amp; II</td>
<td>6,094</td>
<td>84.9</td>
<td>1979</td>
<td>1981/82</td>
</tr>
<tr>
<td>Mogappair East *</td>
<td>5,062</td>
<td>74.1</td>
<td>1981</td>
<td>1982</td>
</tr>
<tr>
<td>Mogappair West *</td>
<td>5,555</td>
<td>73.0</td>
<td>1983</td>
<td>1985</td>
</tr>
<tr>
<td>Maduravoyal</td>
<td>2,048</td>
<td>26.7</td>
<td>1983</td>
<td>1985</td>
</tr>
<tr>
<td>Manali I *</td>
<td>2,947</td>
<td>40.0</td>
<td>1986</td>
<td>1987</td>
</tr>
<tr>
<td>Manali II *</td>
<td>2,625</td>
<td>38.0</td>
<td>1987</td>
<td>1989</td>
</tr>
<tr>
<td>Ambattur *</td>
<td>10,806</td>
<td>141.6</td>
<td>1988</td>
<td>1994</td>
</tr>
<tr>
<td>Avadi *</td>
<td>4,012</td>
<td>50.9</td>
<td>1988</td>
<td>1993</td>
</tr>
<tr>
<td>Velachery *</td>
<td>1,789</td>
<td>20.9</td>
<td>1988</td>
<td>1993</td>
</tr>
<tr>
<td>Madhavaram *</td>
<td>9,884</td>
<td>123.9</td>
<td>1988</td>
<td>1994</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(#) HA started completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>( ) HA started completed</td>
</tr>
<tr>
<td>( ) HA started completed</td>
</tr>
<tr>
<td>( ) HA started completed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sites</th>
<th>Plots</th>
<th>Size</th>
<th>Year</th>
<th>2015 Build Out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(#)</td>
<td>HA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mumbai</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charkop *</td>
<td>15,420</td>
<td>180.0</td>
<td>1983</td>
<td>1993</td>
</tr>
<tr>
<td>Gorai *</td>
<td>9,800</td>
<td>100.0</td>
<td>1985</td>
<td>1989</td>
</tr>
<tr>
<td>Malavani</td>
<td>9,240</td>
<td>44.4</td>
<td>1991</td>
<td>1993</td>
</tr>
<tr>
<td>Kandivali</td>
<td>6,867</td>
<td>7.0</td>
<td>1989</td>
<td>1992</td>
</tr>
<tr>
<td>Mulund East *</td>
<td>2,003</td>
<td>10.1</td>
<td>1987</td>
<td>1990</td>
</tr>
<tr>
<td>Versova *</td>
<td>4,900</td>
<td>11.2</td>
<td>1990</td>
<td>1993</td>
</tr>
<tr>
<td>Turbhe-Mandale</td>
<td>***</td>
<td>44.0</td>
<td>1990</td>
<td>1993</td>
</tr>
<tr>
<td>Gorakshan</td>
<td>***</td>
<td>9.6</td>
<td>1989</td>
<td>1992</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(#) HA started completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>( ) HA started completed</td>
</tr>
<tr>
<td>( ) HA started completed</td>
</tr>
<tr>
<td>( ) HA started completed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sites</th>
<th>Plots</th>
<th>Size</th>
<th>Year</th>
<th>2015 Build Out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(#)</td>
<td>HA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Navi Mumbai</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airoli *</td>
<td>18,190</td>
<td>155.0</td>
<td>1985</td>
<td>1989</td>
</tr>
<tr>
<td>Kopar Khairane</td>
<td>14,165</td>
<td>116.0</td>
<td>1986</td>
<td>1990</td>
</tr>
<tr>
<td>Nerul</td>
<td>***</td>
<td>10.0</td>
<td>1990</td>
<td>***</td>
</tr>
<tr>
<td>Panvel East &amp; West</td>
<td>***</td>
<td>10.0</td>
<td>1991</td>
<td>***</td>
</tr>
<tr>
<td>Khargar *</td>
<td>***</td>
<td>30.0</td>
<td>1991</td>
<td>***</td>
</tr>
<tr>
<td>Kalamboli</td>
<td>5,600</td>
<td>20.0</td>
<td>1991</td>
<td>***</td>
</tr>
</tbody>
</table>

* Sites visited for this study
***No data available

Source: World Bank Archives, Project Documents and interviews with project managers
Figure 2: Incrementally Built Multi-level Housing

Source: Kate Owens and Andrea Rizvi, Mumbai and Chennai, October 2015
3.3.2 The number of beneficiaries was greater than planned, and increased over time

At project close, the number of plots developed under the sites and services projects was 56,970 in Chennai and 90,000 in Mumbai. Assuming each plot was acquired by a single household with an average household size of 4, this translates to 227,880 beneficiaries in Chennai, and 360,000 beneficiaries in Mumbai. These numbers exceed the project targets set at inception. In addition, project evaluators concluded that about 60-70 percent of the beneficiaries were indeed low-income families (World Bank 1986, 1990, 1992 and 1997).

We find that the number of beneficiaries has continued to increase over time. The incremental development process and flexible planning regulations allowed additional vertical levels that added rental units and expanded the number of households with shelter. Across almost all 15 of the sites and services locations visited during our fieldwork, the smallest low-income plots were densely populated with
evidence that many of these plots provided housing for multiple families. Based on visual observation of
the extent of vertical development across different project sites, we estimate that the number of
beneficiaries increased roughly 75 percent in Chennai and 100 percent in Mumbai – reaching
approximately 400,000 and nearly 830,000 respectively.4

The expansion of project benefits beyond original projections also implies an increase in the overall
density achieved and a higher rate of return for the project. It is important to note that many of the
additional units constructed are small and are generally rented out, implying that the added stock
contributes to the affordable rental housing supply. This type of housing is exactly what the original
program aimed to create and continues to be in short supply in both cities. Though units are small, and
overcrowded by regulatory standards, they have the advantage of being fully serviced and can be easily
upgraded due to the regularity of the neighborhood layout created by the sites and service programs.

3.3.3 Cost recovery was achieved

Cost recovery was an increasingly important goal of sites and services projects, particularly as the India
portfolio matured. Given the demonstrative nature of sites and services projects, there was an effort to
prove that the instrument was financially sustainable and, therefore, replicable and scalable. Over time,
the focus on cost recovery increased, partly in response to emerging criticism that repayment rates for
sites and services projects were low (Laquian 1983; Laquian 1977; Laquian 2002; Keare and Parris 1982).

These concerns were mirrored in India where initial projects aimed to achieve cost recovery by project
closing. In particular, as implementation experience was incorporated into project design, cost recovery
became a central goal of site design and project operations. By the time the Mumbai project was designed
– towards the tail end of the sites and services initiatives in India -- it was critical to most design decisions
(interview with project designer Dr. Phatak, Oct. 2015).

Projects in both the Mumbai and Chennai succeeded in achieving full cost recovery before the project
closed. In Mumbai, the project had a surplus. Specifically, in Mumbai, plot payments were used to create
a revolving fund that was fully operational at project close with INR 320 million that was expected to fund
future sites and services investments (World Bank 1997). The Chennai projects also achieved full cost
recovery with very high annual rates of return of 15 percent because the demand for serviced land grew
faster than delivery (World Bank 1990). These successful outcomes in Mumbai and Chennai were an
important achievement and stand in sharp contrast to critiques that have highlighted financial failure of
the model.

---

4 Estimates of the additional beneficiaries are developed from individual sites, drawing on site occupancy data and observed
conditions. For instance, in Arumbakkam there were 2,334 plots with 100% build out and an observed 2.5 households per plot
resulting in 5,835 beneficiary households. Meanwhile at Manali I only 10% of the 2,625 plots were built out with a single unit
resulting in 263 beneficiary households. A more accurate assessment of beneficiaries would require a detailed socioeconomic
household survey that was beyond the scope of this study.
3.3.4 Summary

In sum, by the time each of the four projects in Chennai and Mumbai closed, they had achieved some of the key project-level targets. Plots in these neighborhoods had been developed and sold to the targeted number of beneficiaries, the majority of the beneficiaries were low-income, and cost recovery had been achieved. Accordingly, project evaluations rated these projects as satisfactory. But at project closure these sites were mostly empty and it has taken many years for these projects to deliver concrete “proof of concept” – that is, to demonstrate that people would indeed come and invest in building their own housing. Now, more than 20 years after project closure, we find that the vast majority of these sites are now fully occupied and densely populated with housing. The size of these houses and the level of household investment in them continues to grow, as does the total number of residents in these neighborhoods.

4 By design: Planning and infrastructure features that worked well

What made the sites and services projects in these two cities succeed over the long term? In this section, we identify and discuss the design, planning and infrastructure features – some of them innovations at the time – that played a key role in achieving success. These include layout decisions concerning plot size, diversity of plot sizes, as well as planning initiatives directed at reducing site development and infrastructure costs and encouraging mixed use.

It is important to note that the idea of delivering serviced sites where people would build their own houses was not new in India. However, this approach — used by both private and public-sector developers — had managed to deliver housing plots only for middle and high income families (Pugh 1990). Designers of the Mumbai and Chennai projects believed that the prevailing infrastructure and planning norms were too high and unaffordable for the majority of urban residents in the country. They wanted to demonstrate that by reducing planning and infrastructure standards to more appropriate (lower) norms, it was possible to also reach lower-income families. They wanted to show that it was possible to not only deliver affordable housing but to also fully recover development costs (interview with Alain Bertaud, Sept. 2016). The dual concern with financial viability of the project as a whole, and affordability for lower-income households meant that costs had to be lowered. This, in turn, drove several of the important design decisions that ultimately contributed to the creation of successful neighborhoods.

4.1 Small plot sizes

A key innovation of the sites and services projects was the introduction of plots that were tiny compared to those ‘standard’ at the time. The smallest plot was 33 m² in Chennai and 21 m² in Mumbai, as compared to minimum plots of about 175-200m² in other housing developments in these cities. The

---

5 Alain Bertaud served as a member of – and urban planner on – the World Bank’s project design teams for these two projects.
underlying idea was that these small plots would be affordable to low income groups and would fill a longstanding market gap, allowing low income households to enter the real estate market and build equity for the first time. This strategy did work, as we will discuss in later sections of this paper.

The small plots persist twenty years later and are testimony to the sustained demand for this product. As part of our research we compared the current layout of sites and services neighborhoods with adjoining privately developed communities. The range of building footprint sizes across both types of neighborhoods is large due to a variety of building types and housing units. Nevertheless, the median building footprint in our sample sites and services locations is significantly smaller – almost one-third to one-fourth of that in neighboring privately-developed sites (Figure 4 and Table 3). In Mumbai, the median footprint in sites and services neighborhoods was 32 m2 compared with 140m2 in private developments. Likewise, in Chennai, the median building footprint in project neighborhood was only 46m2 compared with 147m2 in private developments (Table 3).

Further, there was very little evidence of plot consolidation over time. In our field research we did not encounter instances where individual owners or real estate developers were attempting to assemble plots into large sites for redevelopment. Several households indicated cooperative action where they jointly developed rental units on upper floors or invested in roofs together but the land and ground floors were still held by individual households.
Figure 4: Current Building Footprint

**Mumbai: Charkop**

```plaintext
Sites and Services
```

**Chennai: West Magopair**

```plaintext
Sites and Services
```

- Source: World Bank Archives, Open Street Map, Google Earth and author’s calculations

---

**Table 3: Building Footprint Comparison (m2)**

<table>
<thead>
<tr>
<th></th>
<th>Mumbai</th>
<th>Chennai</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S&amp;S</td>
<td>Private</td>
</tr>
<tr>
<td>Average</td>
<td>70.3</td>
<td>175.8</td>
</tr>
<tr>
<td>Median</td>
<td>31.6</td>
<td>139.9</td>
</tr>
<tr>
<td>Max</td>
<td>1370.0</td>
<td>857.4</td>
</tr>
<tr>
<td>Min</td>
<td>10.7</td>
<td>9.2</td>
</tr>
</tbody>
</table>

- Source: Open Street Map 2015, Google Earth, World Bank Archive data and authors’ calculation
4.2 Range of plot sizes and prices to target different income groups

An important design feature was the inclusion of a range of plot sizes to attract different income groups. In Chennai the plot sizes ranged from 33m$^2$ to 223m$^2$, and in Mumbai from 21m$^2$ to 100m$^2$. This design purposely aimed to create a mixed-income community, with lower income families occupying smaller plots, and middle income and high income families occupying larger plots.

The plot pricing and payment plans also explicitly targeted and accounted for different income groups. They were based on analyses of prevailing household incomes and affordability. In Mumbai, for example, given that small plots were targeted at low-income buyers, they were to be paid off in monthly installments over a period of 20 years (see Figure 9 for an example of the variation in pricing and size). By contrast, buyers of the largest plots were expected to be well-off and were therefore required to pay the full amount upfront in a single cash payment.

This approach worked. As project evaluations show, in the short term—during the life of the project itself—this approach enabled cost recovery. In addition, lower-income households benefited. As noted earlier, at the time of project closure, the majority of beneficiaries were assessed to be low-income families. Specifically, at the close of the Chennai project, more than 70 percent of beneficiaries were low income. Though there was some subsequent transfer of lots to higher income households, generally the well-being and income of beneficiaries was improved through the program (World Bank 1986, 1990, 1992). Likewise, in Mumbai, approximately 60 percent of residents at project close were low income with initial estimates that 15 to 20 percent of sites were resold (World Bank 1997).

Our site visits more than 20 years later suggest that the initial success of the strategy has been sustained over time. In both cities, these neighborhoods not only continue to serve low-income families but, as per design, also are home for families from a broader range of incomes. On the larger plots we found relatively large and well-appointed houses often with cars in front, clearly signaling higher and middle income status. Smaller plots housed smaller structures with cheaper building materials and more basic toilets and kitchens; instead of cars these families had either bicycles or two-wheeler scooters or motorcycles.

In our interviews, we found both the original allottees and new residents. The original allottees are now elderly, often with grown children and extended family. New residents, who had purchased plots more recently, often have young families, entry-level professional jobs and, at times, small home-based businesses. These residents indicate that at least some of the housing stock remains targeted at lower income residents and that these homes offer an entry point into the housing market for new households.

Our research suggests that the small plot size—combined, as we will discuss shortly, with reduced infrastructure standards—was effective in dampening enthusiasm of higher income groups for lot purchase, ensuring the majority of these small plots were purchased and retained by the intended lower
income beneficiaries. The inclusive neighborhoods that evolved – with the blending of high and low income households – is an impressive and highly sought outcome that has historically eluded many different types of urban planning projects, designs and approaches.

4.3 Planning decisions and infrastructure standards that lowered costs

Another innovation was to explicitly opt for planning norms and infrastructure standards that were seen as more appropriate and affordable to the local context. Several of these were deliberate “violations” of existing planning requirements, and project planners had to negotiate exemptions from government to use them.

4.3.1 Increasing density and maximizing sellable land

Project planners aimed for significantly higher population densities than were prevalent at the time. The key reason for doing so was to use land – a scarce and expensive resource – more efficiently. Higher densities would also contribute to the objective of lowering costs and enhancing affordability. Accordingly, the Mumbai project planned for a population density of 145 households (725 people) per hectare—58 percent higher than the density of 92 households (414 people) per hectare that was common in India’s largest cities at the time (Gupta 1985; World Bank 1985). In Chennai, the initial planned population density of 70 households (423 people) per hectare was much lower than Mumbai but marked a massive increase—almost 600 percent—from existing city norms of 10 households (60 people) per hectare (World Bank 1977 and 1980). The originally projected density in both cities is higher than other major cities on average (Figure 5). This doesn’t account for the additional units constructed over time on many sites that our calculations suggest may nearly double the original projections.

To achieve higher densities, the planners designed site layouts that maximized sellable land, especially for residential uses. For this, planners worked hard to develop layout options that reduced the total site area allocated for circulation (streets) and open spaces—to about 30 percent in Mumbai, for example—compared to the prevailing norm of 50–60 percent frequently seen in other developments in urban India at the time.

We took a closer look at land use distribution across a sample of four project sites and compared it with that prevalent in urban India at that time. The results, presented in Figure 6, show that the proportion of sellable residential land was 45-62 percent in project sites relative to 35 percent in comparable developments. In these four sites, then, the sellable residential land area was 10-27 percent higher.

By using these planning innovations, these sites and services projects not only achieved targeted densities but exceeded them. Over time these neighborhoods have continued to densify. We estimated current densities of selected sites and services neighborhoods.6 At Charkop in Mumbai, we estimated more than

---

6 Our estimates are based on the number of buildings per km2 and observed household size. We estimated the number of households per plot using sample sites in Mumbai and Chennai where nearly all small plots had more than one floor in our sites.
1,100 people per hectare – adjusting for today’s reduced household size this translates to 284 households per hectare. At West Mogappair in Chennai we estimated even higher densities, with more than 1,200 people or 318 households per hectare.

Figure 5: Average Population Density in Select Cities and Project Sites

Source: Bertaud and Malpezzi 2003 and project appraisal documents

4.3.2 Introducing hierarchy and a “sliding scale” of standards

Site layouts also aimed at reducing the cost of infrastructure and site development. To achieve this the planners deployed two complementary strategies. They strove to reduce the total length and/or area of network infrastructure – such as roads, sewers and water lines – required to serve the neighborhood. This was achieved, for example, by reducing the street frontage of plots. At the same time, the planners deployed a hierarchy of streets and open space to match the hierarchy of plot sizes. Thus, small plots had narrow access roads and no parking. At times, the small plots opened onto small open spaces shared with neighbors and, at other times, the streets themselves served as community spaces. By contrast, the biggest plots were along the widest access roads, were easily accessible by car, and had provision for parking. Similarly, the bigger parks were located near wider roads and bigger plots.

visits in October and November of 2015. We assume that each structure accommodates six people in Mumbai and eight in Chennai where we saw more vertical development.
This hierarchy is well illustrated by the site plan for the Charkop neighborhood in Mumbai, presented in Figure 9. In Charkop, almost all of the plots along the primary arterial road (18m) were 750m² or larger, and were sold to housing cooperatives to be developed as multi-story apartment buildings, each accommodating 10-15 high-income families. Such major roads had sidewalks as well as adequate car parking allowances for residents and businesses. Within the interior of the same project site, the smaller 25m² plots were densely clustered and opened either on to pedestrian paths that were 3-4.5 meters wide or onto common courtyards 10 m wide. The clusters were accessed by 9 m wide roads, but the individual plots did not have direct vehicular access and no parking allowances; these plots were explicitly targeted to low income families.

4.3.2.1 The affordability and targeting payoff
Together, these innovations – maximizing sellable land, optimizing layouts to reduce infrastructure and site development costs, and adopting a sliding scale of standards based on plot size – helped enhance affordability. The fact that the smallest plots also had narrower streets and smaller open spaces, meant that the total unit development cost (USD per meter square) was significantly lower than that for larger plots. The sliding scale of standards allowed all sizes of plots to be sold at prices that allowed full cost recovery, and that too without cross subsidization (Bertaud et al. 1988). It also improved targeting because plots with reduced road and open space allowances were less attractive to higher income groups while being affordable for low-income families. In this manner, the sliding scale of standards was effective in not only reinforcing targeting but also introduced a self regulating mechanism.

4.3.2.2 The livability payoff from the hierarchy of streets and open spaces
To enhance land use efficiency, the planners opted to increase the total amount of land allocated for streets, mostly by reducing the share allocated to open spaces (Figure 6). This led to a reduction in open space (which includes vacant land and parks) from the national average of 19 percent to 7 to 12 percent. At the same time, land for circulation increased from the national average of 11 percent to a range of 14 to 24 percent. The largest change in land use was the amount of land for residential uses which was 36 percent on average across urban India and ranged from 45 to 63 percent of the sites in Chennai and Mumbai. The increase in area allotted to streets combined with the hierarchical and grid layout has resulted in a spatially well-structured neighborhood fabric that offers good access and connectivity to all homes. This is not always the case in housing or real estate developments in India, as can be seen in Figure 7. The figure compares the street layout and density in two sites and services locations with that in adjoining privately developed communities. In sites and services neighborhoods, the street pattern is regular and penetrates deep into the development. By contrast, sites developed privately are less spatially organized with irregular provision of roads and large variation in distance between buildings.
Figure 6: Land Use Distribution in Site Design

Source: Author’s calculations based on World Bank Staff Appraisal Documents and Urban Housing in India 1986
We also compared road density—measured as the share of space allocated to roads—in sites and services neighborhoods with that in their parent city as a whole and also with other large cities in the world. Figure 8 presents these data on road density. It shows that both Chennai and Mumbai fall among the lower third of the cities for which we have data. The cities with even lower road densities—such as Dhaka and Dar es Salaam—are among the least planned and most sprawling of those measured. Specifically, the city-wide road density in Chennai is 8.7 and that in Mumbai is somewhat higher at 10 percent.

---

7 Our analysis followed the methodology developed by UN Habitat using Open Street map categorizations and measurements of road widths using Google Earth satellite imagery.
Our GIS analysis reveals that the current road density inside sites and services neighborhoods is higher than the average for their parent cities, reflecting the tight road grid incorporated into the design (Figure 8). In Chennai sites and services neighborhoods have a slighter higher road density than the city overall, reaching 9.1 percent. Nevertheless, these Chennai neighborhoods are still among the bottom third of the cohort of cities examined. Mumbai's sites and services neighborhoods do much better on this metric. Not only is their road density of 13.9 percent significantly higher than that of the city as whole, but it also comparable to that in many planned cities such as St. Petersburg and Auckland. Overall, the higher road density on all sites and services project locations is indicative of better planning and a built form that is easier to upgrade.
Figure 9: Site Plan at Charkop, Mumbai

Source: Alain Bertaud

Figure 10: Site Plan Mogappair West, Chennai

Source: World Bank Archives
Parks and open spaces also had a hierarchy, similar to that for streets, and it was matched to plot sizes. The smallest plots opened onto small open spaces and parks – often in the form of a community courtyard or garden shared by a cluster of households. At times, there were no open spaces immediately adjacent to the small plots; instead they would have access to open space or a park a block or two away, but within the neighborhood. The Site Plan for Charkop in Mumbai shows the hierarchy of open spaces and roads as highlighted in yellow in Figure 9. Meanwhile, the Site Plan for Mogappair West in Chennai reveals less hierarchy of open spaces and no internal courtyards (Figure 10).

Unlike roads, the total allocation of land to open space was lower in sites and services schemes compared to the 19% average in other developments in urban India (refer Figure 6). This variance required regulatory exceptions and was somewhat counterintuitive given the priority that was placed by designers on the importance of green space. However, by offering a well-maintained and heirachicial network of open spaces the designers were able to develop a highly efficient and effective solution for enhancing the neighborhood fabric. They provided a range of green spaces, from large multi-block sites that include playgrounds and community buildings to very small communal courtyards shared by several households (Figure 11).

The result is a hierarchy of open spaces similar to that observed within the street network. This hierarchy seems to be as important to creating livable urban fabric as the total area of open space, because it provided for a variety of community and household level uses. These needs would not be served if the green space was bundled solely into large park parcels or alternately if green allotments were limited to small areas without sizable space for groups to gather. In the sites and services schemes we observed, the smallest spaces were shared on average by thirty households. These spaces compensated for the very small plots sizes which otherwise lacked private open spaces or gardens. Without these semi-private communal spaces the plots alone would have been far less livable. These communal spaces, combined with the larger hierarchy of open spaces were critical to the liveability of the settlements and development of the thriving urban neighborhoods we observed.
Figure 11: Rights of Way and Community Space

Chennai

Chennai

Mumbai

Mumbai

- Source: Kate Owens and Andrea Rizvi, Chennai and Mumbai, October 2015

4.4 Mixed Land Use: Planning for Commercial and Social Services

Another important design decision was the explicit adoption of mixed land use. Instead of focusing solely on housing, the planners developed site layouts that integrated commercial areas (shops), amenities (schools, health clinics), and, in some cases, even plots for light industry – indeed, as much as 10-15% of land area was allocated to commerce and industry.

Site visits reveal that this mix of residences, businesses, services and amenities has indeed been achieved. The co-location of these different uses is also contributing to street life and enhancing the vibrancy of these neighborhoods as a whole. People in these communities have easy access to shops and jobs. They can and do operate businesses out of their homes or in their neighborhood. Figure 12 depicts the mixed use that is typical across the sites and services projects we visited. The retail and commercial spaces on
high streets are large and continuous while the retail stores are smaller and more intermittent on the interior streets.

**Figure 12: Mixed Use Neighborhoods**

![Image of mixed use neighborhoods in Chennai and Mumbai](image)

Source: Kate Owens and Andrea Rizvi, Chennai and Mumbai, October 2015

The treatment and layout of non-residential land use was different in Chennai and Mumbai and has led to noticeably different long-term outcomes. In Mumbai, mixed uses permeated the layout with an ample supply of residential, commercial and industrial space incorporated along arterial and secondary roads, while internal courtyards were exclusively residential. This design provided ample retail space and flexibility so that the original layout remains relatively intact and highly operational with high occupancy throughout the retail space. Chennai’s provisions of commercial and industrial uses were primarily along major thoroughfares and designated industrial areas of the settlement. The interior was primarily residential with very few mixed-use spaces. Over time, residents have modified their houses to incorporate shops and other businesses, often on the street level, and have, thereby, modified the nature of the residential zones. The converted commercial spaces are dispersed throughout the settlement, just
like in many other urban neighborhoods, and often are right off the street without sidewalks for pedestrian access or parking for customers who drive up to these shops.

The site plans in both cities had designated space for social services and community facilities. This included allotments for schools, health clinics, community halls and, at times, for amenities such as cinema/theater. These facilities have indeed been built. For instance, we found many schools operating in these settlements. These facilities provide crucial public goods that contribute to vibrancy, functionality and livability of these neighborhoods.

5 Neighborhood location: City connection and relative land values

This section examines site selection and location decisions and how they look post-facto, in a scenario of urban growth. Our analysis finds that the criticisms concerning poor and remote siting of projects were – and in fact continue to be – focused on too narrow a time frame. This reveals a conflict that occurs when population growth is rapid, but physical urban development is slower with full benefits or losses only revealing themselves over a generation or more. Our findings are a crucial reminder of the importance of anticipating future growth or shrinkage rather than just reacting to current needs.

In the discussion below, we examine: (a) how the sites fit relative to the current footprint of the city; and (b) how the various sites have fared, in terms of land value appreciation, over time. An understanding of the financial return at various sites is useful because it reveals relative demand, but also shows that some sites continue to be affordable even as they are built out.

5.1 Planning for growth: Site selection that envisaged an expanding footprint

At the time that these projects were designed, affordable land was not available in the existing central business districts. In both cities, most of the available sites were at a considerable distance from the city center. In the selection process, priority was accorded to sites that were in near proximity to other existing, albeit smaller, residential and commercial clusters where trunk infrastructure was available (e.g. major roads, water supply lines, and public transportation). Because sites and services projects were typically part of larger urban development projects, it was often possible to select locations that seemed peripheral but were close to proposed investment corridors. Critics argued, however, that such sites would not work because their remote location would limit jobs and income generation opportunities and make them unattractive to the poor (Laquian 1983; Peattie 1982).

Our observations suggest that selection of non-CBD sites did not detract from the long-term viability of the projects. For the most part, growth materialized in these regions as anticipated and the sites were subsumed into surrounding development. In both Mumbai and Chennai the visited sites are now largely well integrated into the city with ready access to schools, shops and public transport connections. They are located in close proximity to primary roads in both cities, and are well-absorbed into the metropolitan
footprint (Figure 13). Many of those sites that had been on the urban periphery have excellent locations now, as the city has grown towards and beyond them.

As shown on Figure 13, the once-peripheral sites are now almost fully occupied and built out. Of the 19 sites for which data are available, 17 sites have 90-100% “build out” – i.e. less than 10% of lots are vacant (Table 2). Only two sites—Manali I and II in Chennai—have low build outs of 10 percent and 50 percent, respectively. This is despite the fact that these Manali sites are well within the built up area of Chennai city, with a decent location and adequate infrastructure. The low build out in Manali demonstrates that the sites and services approach is not a ‘one size fits all’ solution. In other words, provision of neighborhood infrastructure is not a sufficient condition to guarantee success. Yet, overall the sites and services approach allows for long term strategic planning that makes success more likely through the provisions of land and housing services targeted to a wide range of urban residents.
Figure 13: UrbanExtent 2010 with Sites and Services Locations

Source: Nightlights Data 2011 processed by Katie McWilliams, World Bank Archives, Chennai Planning Office
5.2 Land value increases: Which sites did better?

In order to better understand the relative desirability of and current demand for various neighborhoods, we examined changes in land values across project sites in Chennai. This analysis also offers one way of assessing financial (rather than economic) returns on these investments. For the analysis, we obtained current land values from city officials and private developers. Our calculations show that the 2015 values are on average 1,300 times higher, in nominal terms, then the INR 4/m2 – INR 8/m2 that original buyers paid the government between 1980 and 1994. Figure 14 shows these figures adjusted in real terms, and presented as a land value multiple – measured from the time the sites were conveyed to project beneficiaries to the time of our field work in 2015.

Figure 14: Land Values Multiples for Project Sites in Chennai

The land value multiples across the 11 sites in Chennai yield variable results, but overall they demonstrate demand for these types of land parcels. The results show that 8 of the 11 (72 percent) of sites have a multiple larger than the break-even threshold of 1.0 – i.e. they retained or increased their value against inflation. For the most part, land value increases for ‘central’ sites (i.e. between five and fifteen kilometers from the city center) reflect healthy returns in the order of what private developers might expect. The clear outlier is Velachery where returns are more than 4.0. This site benefited from the development of a new employment hub and a luxury housing center directly abutting the project. There would have been no way to predict this type of increase and this land value multiple reflects, more than that for the other sites, the lottery- like outcomes of any long term real estate investment.
The three sites below the positive return threshold demonstrate that not all sites result in wealth creation for their owners. Interestingly, this is not always an obstacle to demand or build out over the long term. As mentioned earlier, the Manali sites have low occupancy rates despite their relatively close proximity to the traditional CBD. The low demand for this site, combined with low land values and financial profitability confirms the failure of the Manali site to date. However, the other two sites where land values increases have not kept pace with inflation are Ambattur and Avadi; here, the low returns present an alternative explanation. These sites are some of the largest in Asia and are the furthest from the CBD but they are fully occupied—their build out is at 100 and 90 percent. This reveals the demand that exists for affordable housing, even where the financial rate of return is not high enough for private real estate investors. Land values at these sites are likely to continue increasing as the city expands. In the meantime, the experience at Ambattar and Avadi suggest that in some cases the sites and services approach can provide an affordable and desirable entry point into the housing market for households, but the asset value appreciation may require a much longer time than expected.

We can conclude from the data that land investments generally retained or increased their value in real terms resulting in asset accumulation and wealth creation for the majority of plot purchasers. Further, the increase in land value demonstrates the demand for these developments and is a good indicator of the desirability of the product.

6 Creating the foundations not only for housing but also for inclusive neighborhoods

In the paper thus far, we have examined different aspects of the sites and services projects in Chennai and Mumbai and have identified some features that have worked well. Although the goal of these projects was to deliver affordable housing while recovering costs, over the longer-term they seem to have achieved more than that. In this section we use a broader framework—the Living Conditions Diamond—to assess project results.

The Living Conditions Diamond framework posits that living conditions are a composite of four dimensions—the unit, infrastructure, tenure, and the neighborhood (Gulyani and Talukdar 2008; Gulyani and Basset 2010; Gulyani, Bassett and Talukdar 2012). It also posits that these dimensions interact with each other, such that a change in one influences changes in other dimensions. We find that the projects in Chennai and Mumbai ended up delivering—advertently or inadvertently—on all four dimensions of the Living Conditions Diamond.

First, in a departure from many housing programs that focus on delivery or financing of an affordable unit, the sites and services projects delivered mostly plots (sometimes with a core unit) anticipating that households would find capital to invest in building their own houses. Although it took time, people did invest and the housing units have steadily improved in size and quality over time. Overall, unit quality is now rather good.
Second, as evident from the term “sites and services,” these projects explicitly aimed at delivering basic infrastructure and services. Now residents do have access to good and well-maintained infrastructure—water, electricity, paved streets, drains, sewerage, street lighting—throughout these neighborhood. This is quite an achievement, given that many housing programs either fail to deliver infrastructure or fail to keep it operating and maintained (World Bank 2016).  

Third, in terms of tenure, these projects focused on delivering secure and formal ownership to all beneficiaries, including lower-income households. Today, these settlements have a healthy mix of owner-occupied and rental housing, because owners have built additional floors with independent units that they rent out.

Fourth, project-level decisions directly shaped the neighborhood by determining location, physical layout, land use, and socio-economic structure. Over time, many of these sites have become thriving neighborhoods, with several highly desirable features. The neighborhoods are efficiently planned, with a dense grid of hierarchical streets and range of open spaces. They are mixed-use in that they have not just housing but also social and commercial facilities—schools, clinics, shops, offices and, at times, industrial areas. Importantly, they are inclusive in that they are home for families from a significantly broad income spectrum. In terms of location, although sites were carefully located near trunk infrastructure and future transit stations, they initially seemed remote. However, with the immense growth of the city footprint in both Chennai and Mumbai, many of these neighborhoods are well imbedded within the expanded city and are well-connected to it. The neighborhoods are also in demand, as is evident from the high occupancy rates and healthy land values.

It is their success in creating desirable neighborhoods that makes the Chennai and Mumbai projects especially worthy of attention. The package of design decisions in these projects created, perhaps inadvertently, the foundations for inclusive and livable neighborhoods. Now these projects help illustrate how planners can deliberately aim for and create neighborhoods that are mixed use, mixed income, compact, highly livable and desirable.

The findings in Chennai and Mumbai underscore that many urban development processes – such as incremental housing – take time and premature judgment should be avoided. This finding applies to many development initiatives but has particular relevance to sites and services schemes targeted at the poor. The poor have lower rates of saving and it is inevitable that more time will be required for them to build on their plots. Unfortunately, this consideration was overlooked in the initial evaluations of sites and services projects. Although initially decision-makers were concerned with occupancy, taking too long on many sites, these projects did largely deliver on their vision over the long term. This demonstrates that, in certain cases, it is insufficient to evaluate projects only at the time of closure. It may, in fact, be crucial

---

8 For example, between 2006 and 2011, Mexico’s housing subsidy program helped increase supply of low-cost housing by around 1 million units each year. However, the emphasis was on the housing units and the majority of these were delivered, by private developers, without basic infrastructure (World Bank 2016).
to periodically revisit at least a sample of closed projects to assess how they have fared overtime and to distill lessons for future initiatives.

7 Conclusions and implications

At inception of the sites and services initiatives in Chennai and Mumbai, project designers set out to demonstrate that it was possible to deliver serviced house plots that were affordable to lower-income households, that these households would pay full cost-recovery level prices to government, and that they would also build their own houses. By the time of project closure, serviced plots had been delivered, the majority of these had indeed been purchased by lower-income households, and cost recovery had been achieved. However, there was no housing at these sites and there was uncertainty about whether it would be built and who would benefit.

More than 20 years later it is clear that these projects have worked. People did settle on these sites and have invested incrementally to expand and improve their units. The Chennai and Mumbai projects demonstrate that incremental housing can work, and also provide insights into the nature of process and its timeline. More important, however, is the fact that these projects have delivered important results that go well beyond their original and relatively narrow goal and are, we argue, worth emulating. They introduced a unique product – small serviced plots – that was and is not typically available in the formal sector but has been critical in broadening access to the housing market. By including not just small plots, but a wide range of plots sizes, the projects created mixed-income neighborhoods. The varied service and planning standards created a hierarchical street grid and open space network that in turn improved walkability and the quality of life in the neighborhood. The decision to have mixed use neighborhoods—with space for schools, clinics, and shops—further enhanced convenience and livability. Finally, these projects were sited close to large trunk infrastructure and public transit investments in anticipation of city growth. Over time, these strategic locations have indeed allowed access to job markets to improve and ensured a variety of housing products throughout the city’s built up area. Cumulatively, these design decisions were highly successful at achieving a more human scale urban fabric that enhances street vitality, and generates a greater sense of ownership and community. In other words, the package of design instruments and decisions promoted thriving and inclusive neighborhoods.

The experience with sites and services in Chennai and Mumbai suggests that we have in our hands a tool that can be deployed both for creating affordable housing and managing urban expansion. Governments and private firms can increase the supply of affordable housing by scaling up delivery of small housing plots and allowing families to build incrementally. Coupling this incremental development process with neighborhood planning has the potential to deliver on the elusive goal of inclusive and livable neighborhoods. This may require adopting some or all of the innovations outlined in this paper – incorporating a range of plot sizes to reach different income groups, increasing density, developing a hierarchy of road and open space layouts, incorporating mixed use by allocating space for commerce and social services, and strategically selecting sites. Planning for such neighborhoods in advance can not only help guide urban expansion but also has the potential to make our urban future more inclusive and livable.
References


Limited.