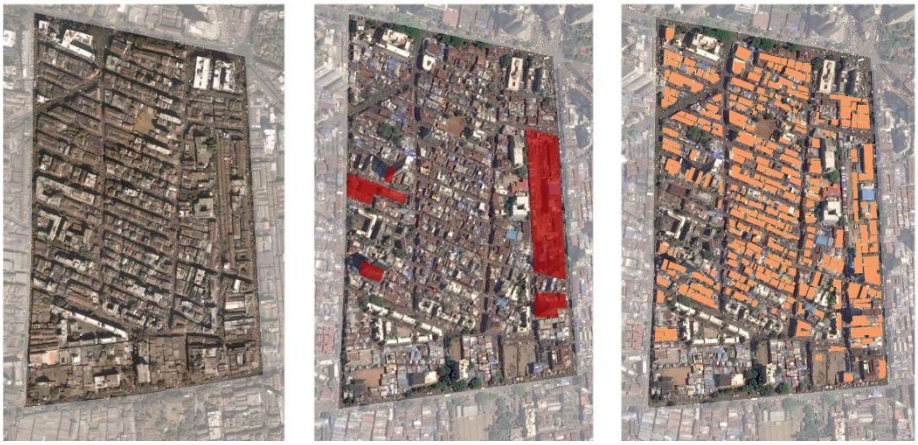
Mapping Report: Mumbai

People, Places and Infrastructure: Countering urban violence and promoting justice in Mumbai, Rio, and Durban

Himanshu Burte

Nisha Kundar



March 25, 2016

Centre for Urban Policy and Governance

School of Habitat Studies

Tata Institute of Social Sciences

Mapping Team

Himanshu Burte

Nisha Kundar

Purva Dewoolkar

All maps in this report are by Nisha Kundar unless otherwise indicated

Case Study Team

City Building and Regime Creation in the Peripheries of Mumbai
Lalitha Kamath and Radhika Raj

The Place of Spatial Justice, Jogeshwari-Vikhroli Link Road(JVLR) and the transformation of an Informal Urban Landscape
Himanshu Burte and Shruthi Parthasarathy

Transforming the Slum through creation of Property Market: A Case Study of M-ward in Mumbai
Amita Bhide and Durgesh Solanki

Changes, Continuities, Contestations: Tracing the contours of the Kamathipura's precarious durability through livelihood practices and redevelopment efforts

Ratoola Kundu and Shivani Satija

This work was carried out with financial support from the UK Government's Department for International Development and the International Development Research Centre, Canada. The opinions expressed in this work do not necessarily reflect those of DFID or IDRC.

Canada

Table of contents

List of Figures

1 Introduction

Over the last few decades urban studies has experienced a marked spatial turn. Yet, maps are generally absent from the core of urban research methodology that focuses on the social dimension. The research project on socio-spatial transformation of Mumbai – especially with its interest in spatial justice and violence – offered a good opportunity for exploring the potential of spatial mapping as an important method in urban research[1]. Spatial justice was an important conceptual point of departure in the research, with socio-spatial transformation being the empirical object. Both demanded close attention to spatiality, and the use of various modes of representing it. Thus, maps and the process of mapping added significant value to the research process and outcomes of the case studies conducted under the study. Maps prepared for research have been integrated into the case study notes prepared for this project. But it is believed that the process of mapping itself was important enough to merit separate attention. Therefore, this report documents key aspects of the process and reflects on the experiences of the multi-disciplinary research team working on the Mumbai part of the project in order to identify challenges, opportunities and lessons for integrating spatial mapping more effectively in future research, teaching, and advocacy. Given the challenges and opportunities involved in collaboration between researchers trained in the social and spatial disciplines, it is hoped that the report would contribute at least as a record of one experience of such collaboration, the first for at the Centre for Urban Policy and Governance.

It should be noted that mapping relied on the intuitive spatial understanding of the researchers, and the basic spatial and map-making skills of the architects on the team. Only widely accessible conceptual and technical tools (like drawing and rendering software, Google Earth etc) were used, and not more specialised ones like Geographical Information Systems (GIS), since relevant expertise for the latter was lacking in the faculty team. Given that these limitations are widespread among urban researchers, however, the experiences of this interdisciplinary collaboration, might be widely relevant. The report tries to attend to conceptual, methodological and practical aspects of the process of integrating mapping into urban research, since they are interrelated.

[1] This was part of a larger project titled ‘People, Places and Infrastructure: Countering urban violence and strengthening peace in Mumbai, Rio and Durban’, funded by IDRC, Canada.

The report is divided into three sections. The current introductory section briefly outlines the objectives, methodology, tools and resources that mark the mapping process for the Mumbai part of the larger research project. The next section describes how mapping was approached and conducted in each of the four case studies, including broader reflections about its methodological position in the broader research frame; the actual processes of conceiving and conducting mapping research in the field, including case specific challenges; the experience of translating field data of spatial and non-spatial kinds into various kinds of maps; and the ultimate role of maps in each of the cases. The final concluding section tries to integrate these scattered insights into a broader analysis that can inform future research.

1.1 Mapping in the project

'Mapping', in this project (and report), specifically refers to spatial mapping. Mapping was used to address the spatial dimension of the transformations, hierarchies, stakes and objects of contention, struggles, in Mumbai that the city profile (Bhide, 2013) and each of the four case study focused on. Case studies spanned a range of scales and locational characteristics.

The original project proposal had envisaged a web based participatory mapping platform building on the Observatory of Urban Conflicts, IPPUR's program of tracking and mapping protest and conflict across the city of Rio de Janeiro[2]. Community ('barefoot') researchers were to be trained to upload data about violence and conflict in phase 1 of the project, to generate a profile that would guide choice of case studies. This strategy had to be abandoned primarily because coordination between cities became very difficult since work on the project took off later in Rio de Janeiro and Durban than in Mumbai due to institutional challenges.

The Mumbai team then initiated an intense, researcher driven, and partially participatory spatial mapping process and integrated it into the research methodology for the city profile and especially for the case studies. This drew on the fact that the transformation that was being studied was simultaneously social and spatial. A greater emphasis than before in the team's research work on spatial mapping, it was felt, would open up newer ways of

[2] Last accessed on April 29, 2016 at http://www.observaconflitosrio.ippur.ufrj.br/ippur/liquid2010/home.php. IPPUR is the abbreviation of Instituto de Pesquisa e Planejamento Urbano e Regional, da Universidade Federal do Rio de Janeiro.

documenting, understanding and communicating the findings and analysis. The process of mapping and the map outputs were also expected to deepen the understanding of our field collaborators and respondent communities, strengthening their activist and other collective practices. Maps and the mapping process were to converge with regular qualitative research methods in producing socio-spatial documentation and analysis of ground realities in the case studies. As the research evolved mapping became more researcher driven while retaining participatory mapping in the set of research methods used. This report focuses on the experience of using mapping as a research method in the case studies.

1.2 Mapping Mumbai's transformations

The research project sought to focus on the spatial injustices, and the violences accompanying the dramatic socio-spatial transformation Mumbai has undergone since the 1980s. The increasing influence of the economy and the logic of the market over governance, social life, and urban development was identified as a key feature of this period in India and Mumbai particularly. Following a review of the trajectory of urbanisation in Mumbai captured in the city profile undertaken in the first year of the project (Bhide, 2013), four very different field sites that had experienced socio-spatial transformation that were potentially unjust and involved different kinds of violences traceable to state actions in favour of market objectives were identified for detailed case studies. The set of four was marked by significant internal variation in terms of spatial extent, location within the city, the nature of the state or market intervention and the transformations caused, and the kinds of violences experienced by poor populations. The four sites were Kamathipura (a small historic sex work district in the Island City covering sixteen short streets), Jogeshwari Vikhroli Link Road (a 11 km long road built in the mid-1990s through a suburban natural landscape and its informal settlements), M Ward (the most deprived ward of the city in terms of the Human Development Index, 80 percent of whose half a million plus population lives in badly serviced slums) and Vasai Virar (a separate municipal corporation at the periphery of the metropolitan region, and known for the consolidation of a regime founded on the capacity for violence, through its infiltration of the state).

1.2.1 The process

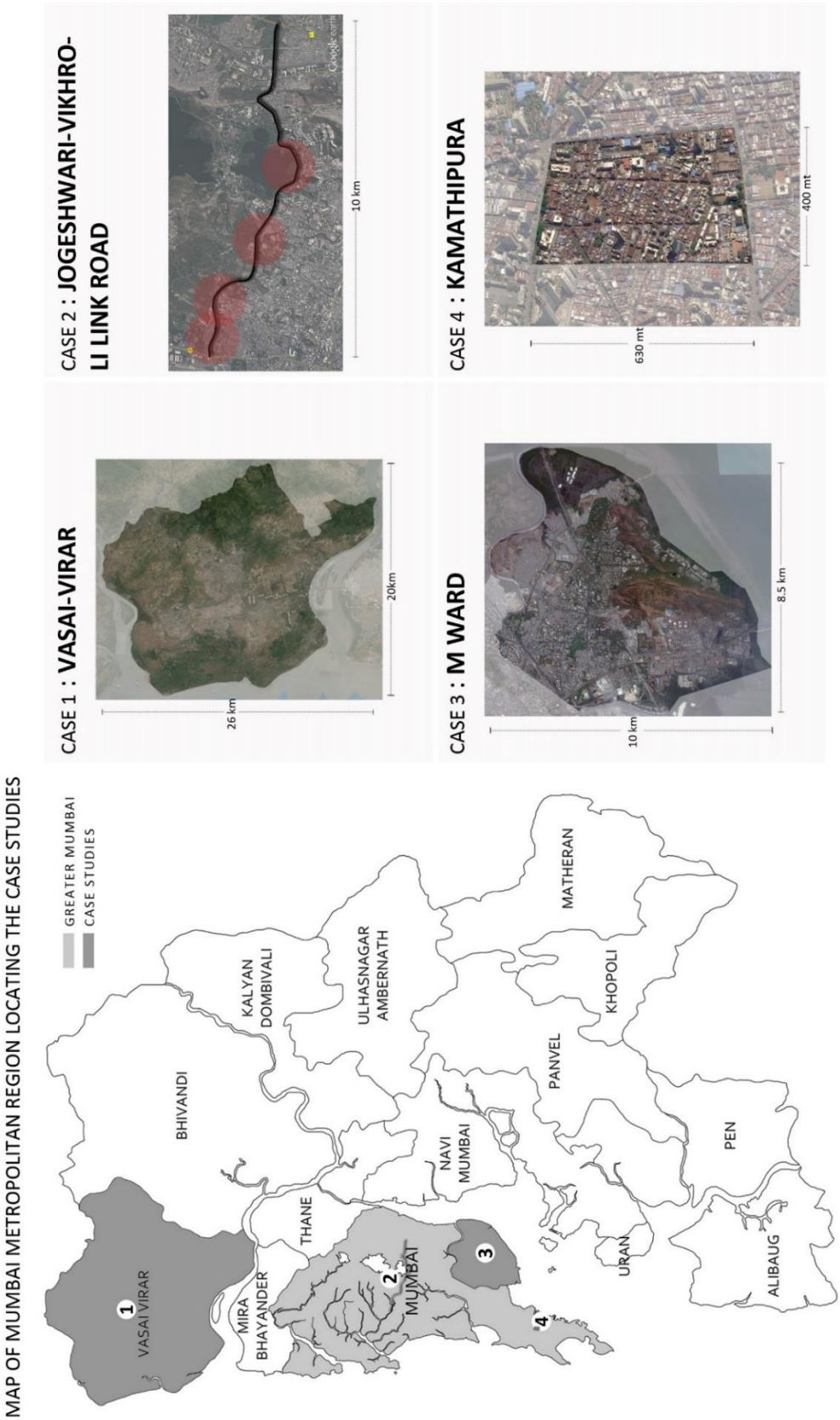
One mapper (with a Master's degree in Urban Design and relevant experience and interest in mapping social dimensions of urban phenomena) worked actively with the case research team. A faculty member with an architecture background guided the process. In general, the mapping process for each case study was an iterative process involving secondary and primary map and field data. Secondary map data was identified and collected from a variety of sources – books, official reports – and then either modified or juxtaposed to illustrate or yield data and analysis. Primary mapping was the bigger task. Typically the process involved continuous discussions between the case research team and the mapping team to conceptualise the mapping strategy; visits to the field of each case by the mapper; discussions between the mapping team and case teams to finalise and refine relevant map outputs.

Each case study progressed at a different pace for a variety of reasons, many related to the complexity, size or distance of the field work sites chosen. The field in two of the cases – Vasai Virar and Kamathipura – was fraught with a culture of violence, which made field work very challenging for the case team, but also for the relatively unprepared map-maker since her few visits suddenly turned out disturbingly dramatic.

Map making for each case first involved preparing base maps by referring to a range (and sometimes, a combination) of sources. This involved various tasks including stitching fragmentary Development Plan 'sheets' or satellite images into continuous base maps specific to a case study. Sources included: Google Earth, the Existing Land Use Plan and Proposed Land Use Plan of Mumbai prepared for the Draft Development Plan 2014-2034 by the Municipal Corporation of Greater Mumbai (MCGM)[3], as well as other case specific secondary map data. The last included historical maps (usually scanned versions of hard copy reproductions in books and official reports), brochures, official project drawings, among other things, sometimes acquired from respondents in the field or in official agencies. . There was no effort to geo-reference base maps, since the research objective did not require such accuracy.

[3] The Development Plan is the master plan that is prepared to guide and regulate development in Maharashtra's cities. Existing Land Use plans are prepared by the municipal corporation to as part of an existing situation analysis. Last accessed on March 9, 2016 at http://mcgm.gov.in/irj/portal/anonymous/qlddevplan?guest_user=english

Figure 1: Case study sites



Teamwork across disciplines – especially involving mapper and social science (urban) researcher teams – involved challenging mutual dependencies. The mapping plan for each case evolved throughout the research process, but became more and more concrete near the end of the process. Along the way, mapping also helped clarify some ground realities of the field for the case team, the significance of the data, and aspects of analysis for different cases to different extents. The dynamic evolution of research questions over time, was a practical challenge. The translation of research intent into a relevant primary map depended significantly on the interaction between the research officer working on a case study, and the mapper. An added layer of complexity was that in the last year, the mapper was working on four case studies moving on an unpredictable time table and almost parallelly. Every attempt was made by the mapping team to ensure that each case study got equal amount of time from the map-maker. However, the differential progress of each case, the varied demands of the mapping tasks from each case on the map-maker's time, and the variability in the communication between case and mapping teams were important challenges in ensuring such parity, except at the broadest level.

Given that faculty members (leading the case and mapping teams) could only devote part of the time to oversee nitty-gritties of the mapping process, the practical progress of mapping work depended a lot on the initiative and imagination of the mapper and the research officer working on a particular case – as well as their team work – in conceptualisation, data collection, and taking mapping trials ahead.

The interdisciplinarity of the exercise had its own challenges. The four faculty members, each leading one case study, were from diverse backgrounds: social work and housing rights activism; economic development and urban planning research; sociology and urban planning research; and architecture. The architect was entrusted charge of overseeing the mapping work, and of mediating the interdisciplinary dialogue and decision making it involved. All four were comfortable, either because of training or experience, thinking socio-spatially. On the other hand, research officers working on cases were all recent Master's graduates from the social sciences (except the mapper) with minimal to no exposure to systematic work with maps and visual representations in general.

The usual challenges of working across disciplinary frameworks emerged in the mapping process. Differences in casually used technical terms (e.g. 'site' for the urban designer, was 'field' for the social science researcher) complicated communication more than expected in the early phases. But the key challenges were substantive. Since each case

investigated phenomena whose social and spatial dimensions were intertwined and equally significant, mapping was considered a very important method by each team. At the same time, the translation of some empirical realities and their analysis into maps could be achieved more easily in some instances than in others. Thus, the thesis that M Ward had been treated as the city's dump yard with all undesirable activities and populations consistently transferred there over decades, could ultimately be shown with a series of maps covering different historical periods. However, the Vasai Virar team wanted to show maps highlighting effects of dereservations of reserved plots (from Green to Urbanizable Zone) over several Development Plans, where people were resisting these, and how this looked spatially, but were limited both by the availability of data and a lack of time. This difficulty symbolises the substantive challenge of mappability. The spatial is always clearly entangled with the social, but not always in ways that are easily amenable to cartographic representation. The next section elaborates on the process and experience of mapping across the case studies in pursuit of insights for work to follow.

2 Mapping in the case studies

There was a wide variation in key characteristics of each case: spatial extent of the field; its historical evolution, social, political and economic structure, and dynamics; the actual socio-spatial transformations to be studied and their suspected drivers; the emerging analytical themes; the most affected social groups; the ease of doing field work, among others. The research questions too varied broadly, and also evolved during the research process. Along with other practical constraints, these factors shaped the specific approach and experience to researcher driven aspect of the mapping. Though participatory mapping was not an equal mainstay of the research strategy, it was adopted variably across cases. Where it could be employed its results informed the data collection and analysis, and also contributed to specific maps. Different aspects of the conceptualisation and implementation of mapping in the case studies are outlined in more detail below. The discussion is organised thematically, with case experiences and insights

2.1 Mapping approaches and experiences

The process of mapping and map outputs had an important, though variable, role in the mix of methods adopted in each case study. Maps were expected to help researchers locate, document, understand, and communicate ground realities including spatial and land use transformations, population shifts, social practices, resources, and outcomes of various kinds, in terms of their spatial attributes including location, extent, distributions, adjacencies, distances, layout, etc.

Maps showing important spatial relationships related to an issue (like fear), before-and-after map series showing particular transformations, maps representing other kinds of thematic analyses were conceived and prepared. Maps of multiple scales were conceptualised and prepared depending on the scale at which the issue was best represented. The scales ranged from the metropolitan to the interiors of individual buildings. Across case studies a range of secondary maps were identified and used to construct base maps, with each case actively constructing a historical trajectory of socio-spatial development partly through maps to understand the research context better. The maps complemented the written narrative of the analysis in the various presentations and writing of the case study. The following section provides an overview of the specific mapping approaches and strategies adopted in each case study.

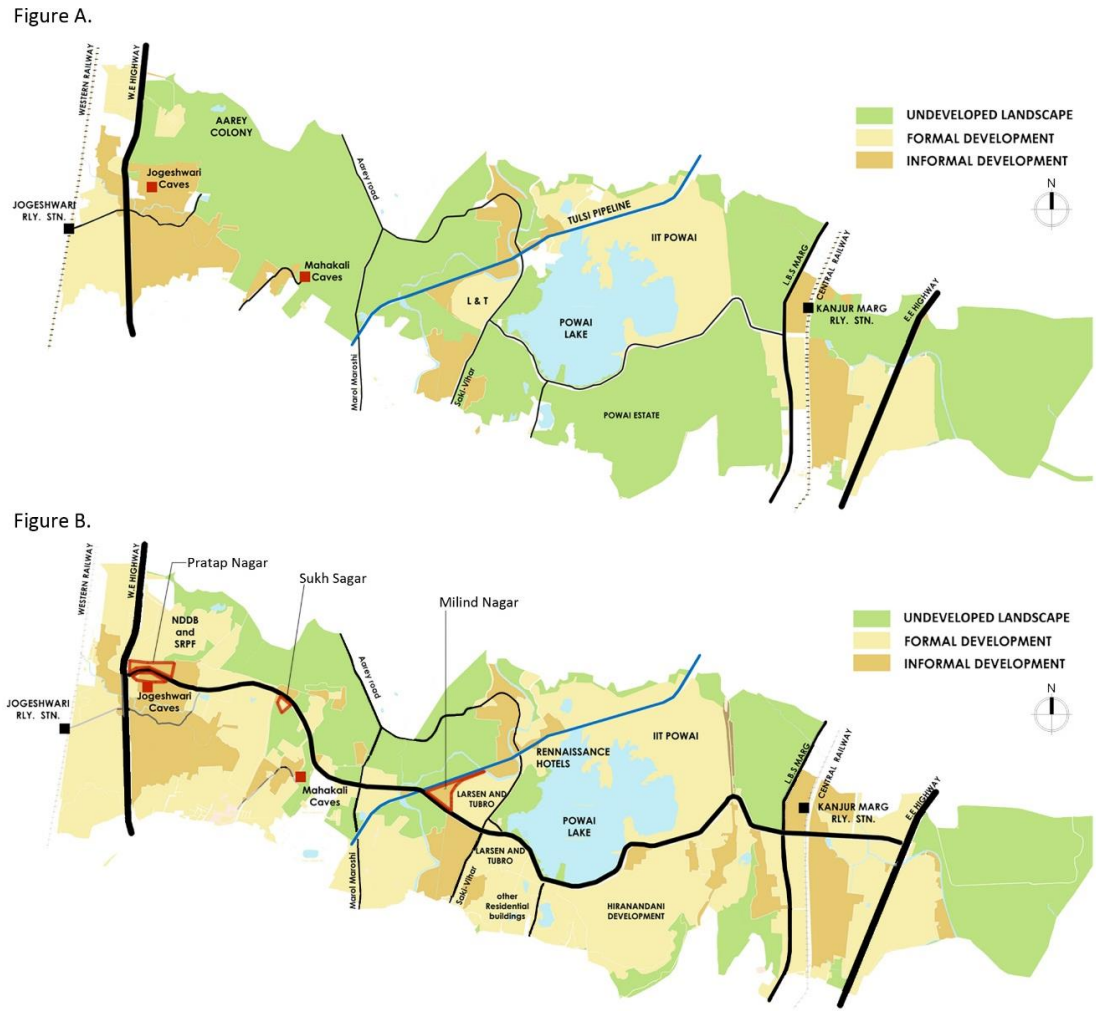
2.1.1 Role of mapping and strategies in cases

JVLR

As with other cases, secondary maps, as well as primary mapping exercises, performed different functions in the JVLR case study. In the initial stages, secondary maps of various kinds, from Google Earth to Development Plan map data from 1964 and 1991, was used to understand the project landscape in terms of its important features, components, and linkages to a broader landscape. Project drawings (obtained from a key local activist and respondent) allowed an understanding of the distribution of informal housing in the path of the road. Another drawing, a site plan of the R & R colony, helped round out the base line description of its space.

Some important insights emerged out a study of secondary maps. The Proposed Land Use maps of the Development Plans of 1964 and 1991 indicated designated land use patterns in the landscape to compare with actual land uses mentioned in the oral interviews and contemporary satellite images of the landscape on Google Earth. These maps also revealed that though in project terms, JVLR was only a road connecting the Eastern to the Western Express Highway, it was always envisaged as a segment in a longer road that extended West over the railway line towards the western extremity of the city. The Comprehensive Transportation Survey (LEA International Ltd, 2008) commissioned by MMRDA further revealed that the road was supposed to also extend to the East across the Thane Creek to meet an arterial road in Navi Mumbai at Kopar Khairane. This juxtaposition of the two secondary maps thus helped confirm the argument that the project ought to be seen as part of a larger scaled road network upgradation exercise. This argument was emphasised by preparing an inset map of the road from Mumbai to New Delhi to highlight the significance of a statement in a project related document that JVLR was likely to speed up goods travel between Mumbai's port and other cities like Ahmedabad and New Delhi. Some secondary maps also provided crucial historical data, enabling a before-and-after analysis. One historical map fragment revealed the settlement layout of Pratap Nagar as it was before the construction of JVLR, and was invaluable in analysing and depicting two things: the evolution of the morphology of the settlement by comparing with a contemporary Google Earth image; and significance of the erasure of part of the settlement

Figure 2 : Transformation in Land Use along JVLR stretch



by the road. Interestingly, while the provenance of the map could not be established, the comparison with contemporary reality visible on Google Earth did help establish the veracity of the spatial information through the continuities in built form and settlement structure.

Primary maps were prepared in relation to these base maps to understand the nature of the spatial transformations caused by the road project. A before-and-after JVLR map of the landuse was created based on a range of data, and depicted the extent of landuse transformation caused by the road. Another interpretive map provided a vivid

understanding to the researcher, and hopefully to readers, of the idea of 'place maiming'. This map represented the continuity of pedestrian movement across the intricate, informally produced grid of lanes in the community, and showed how an erasure of a band of this grid effectively interrupted the easy continuity of pedestrian movement and 'maimed' the socio-spatial web of 'place'.

Figure 3 : Place maiming at Pratap Nagar

Vasai Virar

The Vasai Virar case study started with mapping the major zones as designated in the Development Plans – 'Urbanizable' and 'Green' – at the regional scale. The team then mapped a new zone within the GZ (called plantation zone) in the DP approved in 2007 which was created due to contestations over these zonal demarcations. This helped

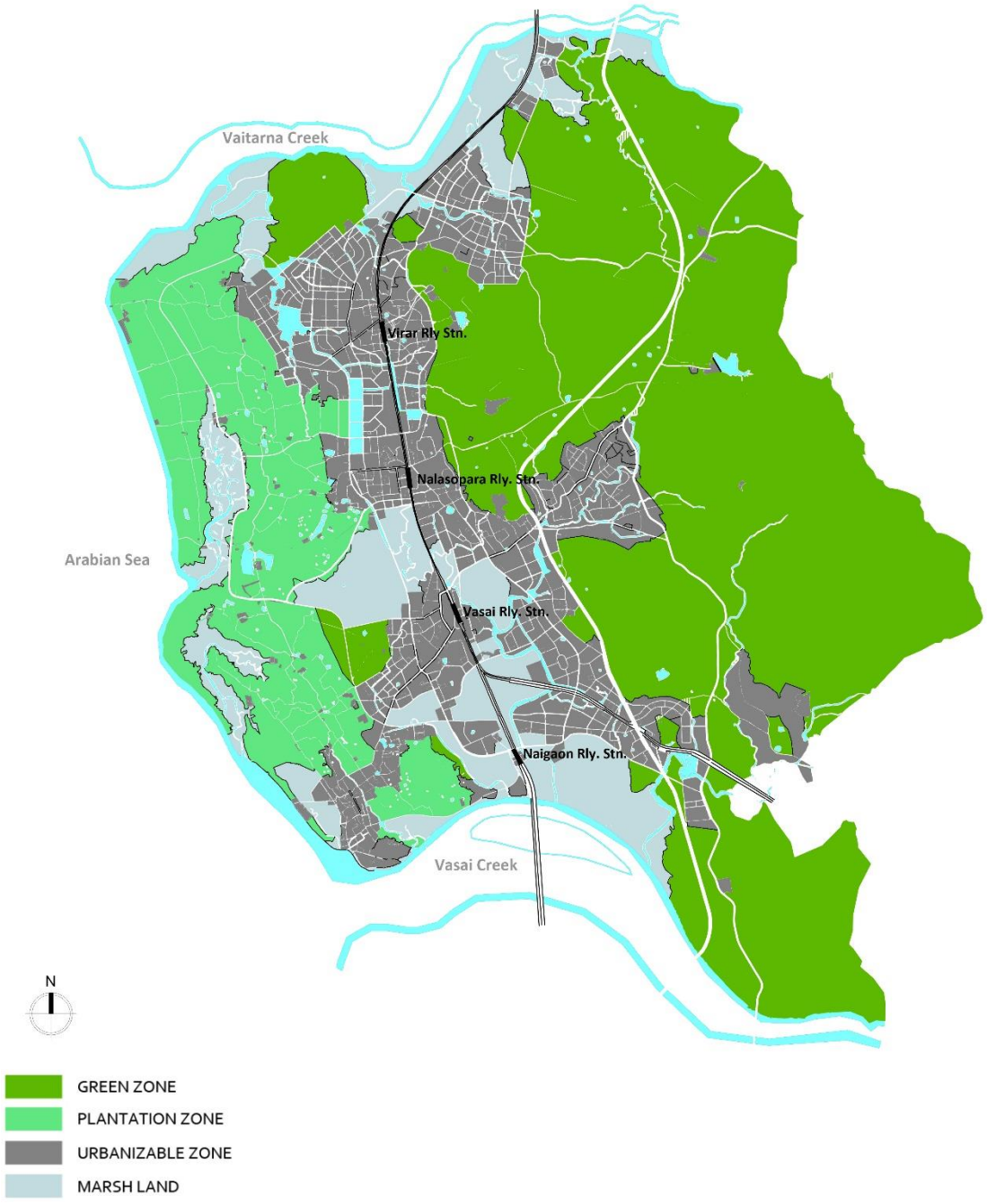
differentiate each of the zones and also situate them in relation to each other. For example, the Urbanizable zone was situated in between the plantation and Green zone and has had a huge impact on the other zones. Thus, the later maps representing informal urbanization over time, shows incursions into G zone at particular places- especially around the areas of industrial estates. The Development Plan was initially focused on because it was an important site for deliberate deregulation by the state because the demarcation (and manipulation) of Urbanizable zones dictated the potential for 'legal' development that commanded a higher price over 'illegal' developments in zones not marked for urbanization, such as the green zone. This map helped the team understand and represent the contested nature of the top-down 'expert' planning process of the Special Planning Authority, CIDCO, as it was opposed by local groups who mobilized to amend it by modes of politics and struggles from the ground up. Figure 4

The team also contrasted the Vasai Virar Development Plan (2007) with early maps of the region showing the topography of the land. The exercise also showed how land use was tied to agriculture and a range of occupations like fishing, salt making and toddy tapping and village-based settlements. This helped understand how different territorial and social identities were associated with different places (eg the village or town) and how planning had served to shape the notion of the 'city' of VV: the move away from rurality and shift toward 'dormitory' towns and then opening up for large parts of the region for development and informal urbanization.

Mapping at the regional scale also helped understand how the particular spatial location of Vasai Virar in the Mumbai Metropolitan Region had also shaped its development. For example, the Urban Land (Ceiling and Regulation) Act, 1976, was applicable only upto the Vasai creek[4]. This meant that the city of Vasai Virar was free of the restrictions imposed by ULCRA. Thus secondary maps fulfilled a variety of functions in the Vasai Virar case.

[4] This act gave the state power to acquire land over a prescribed ceiling limit owned by a private party for public purposes. It was repealed recently.

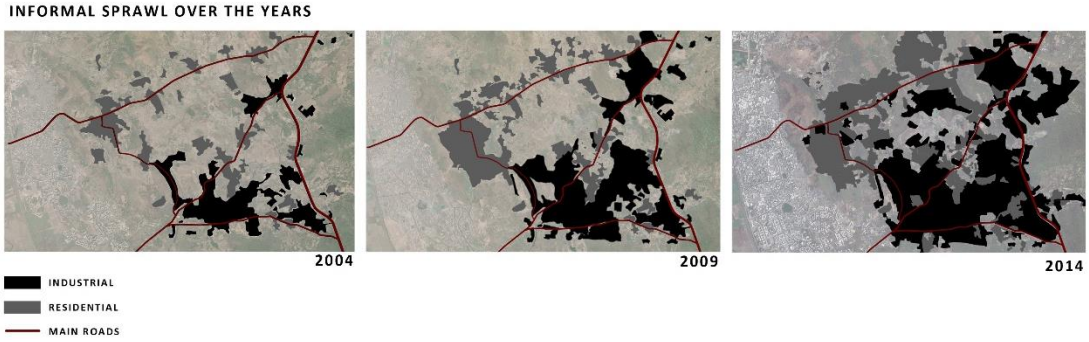
Figure 4 : Different Zones in Vasai Virar



After mapping at the regional scale, primary maps were embarked on. First, settlement level maps were done to visualise variation in settlements across zones, focusing particularly on those settlements identifed for territory level studies. Different features of built form were mapped as well as growth in population over time. The team strategically identified three time periods - 2004, 2009, 2014 during which to map population growth – these approximated with before, during and after the formation of the Vasai Virar

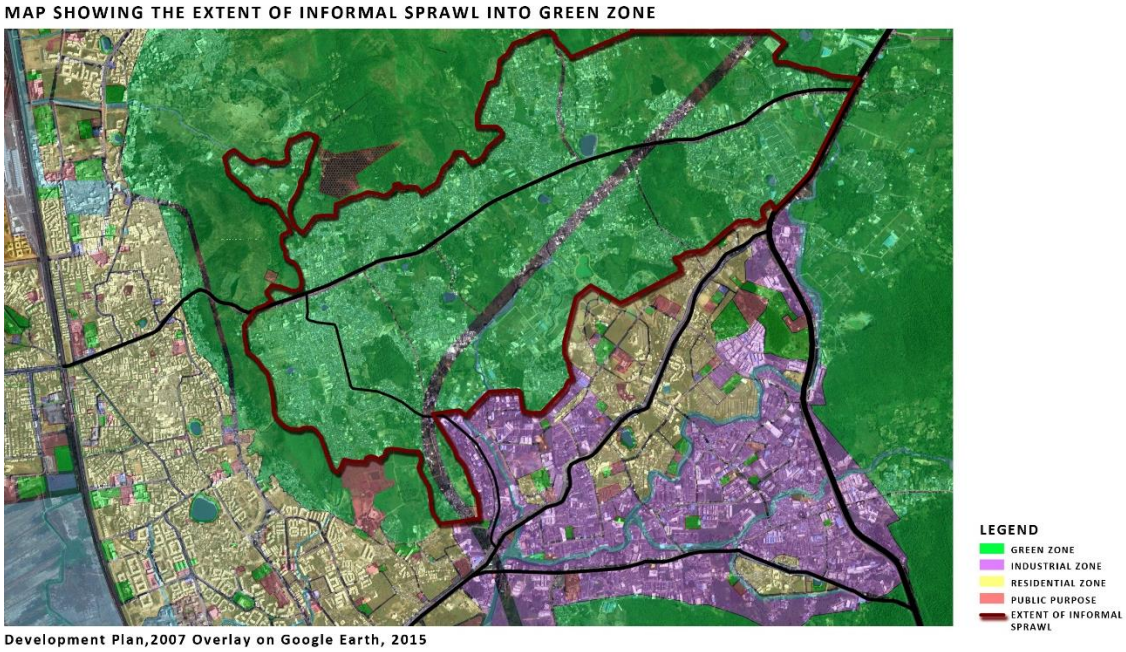
Municipal Corporation. These three maps in these time periods were enormously helpful in analysing how different settlements had grown over time and how the VVMC seemed to be implicated in this. It also highlighted and quite precisely dated the recent nature of this growth (post 2002) by using Google maps and this helped us tie it to a series of massive evictions in Mumbai. This complemented the narratives from our informants about moving to this location because of evictions. Settlement maps revealed how chawls had been built-haphazardly without a grid pattern of roads because these had been fields earlier. This yielded fresh insight into how the landlords built the chawls they rented out around their houses so they could control and keep an eye on their 'migrant' tenants. It also revealed how civic amenities like roads and open spaces were not provided in this kind of informal urbanization. This complemented and strengthened ethnographic explorations of the territories.

Figure 5 : Informal sprawl over the years



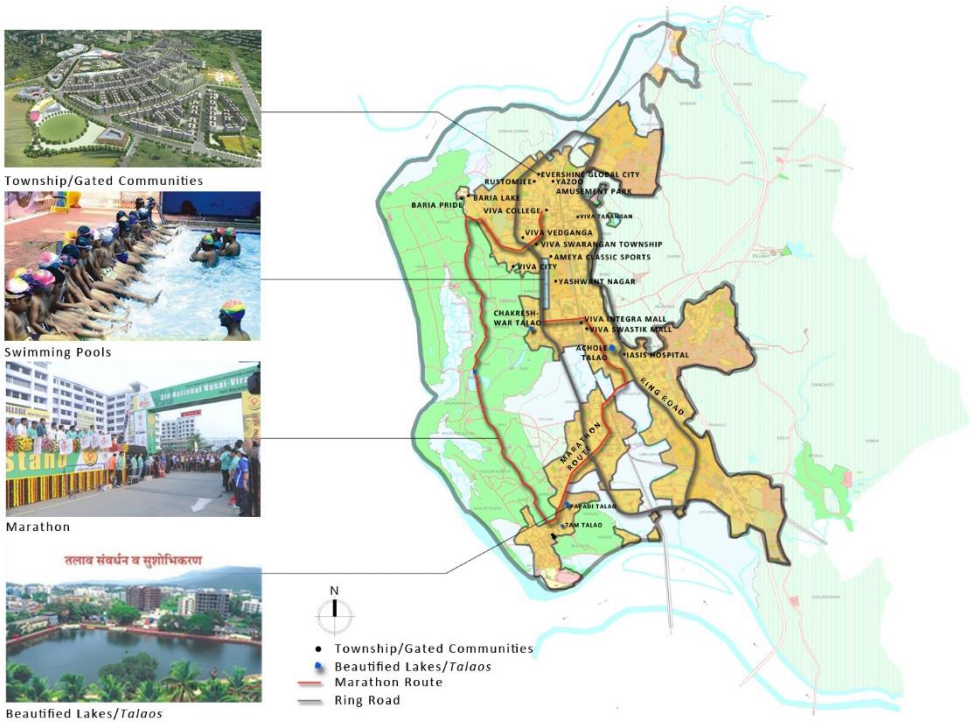
Once the team realised that 'produced informality' was a mode of expansion in the Vasai Virar region, it focused on those areas that had seen a considerable amount of informal urbanization: this was the region around the industrial estates of Waliv, Sativali and Gokiaware in the Green Zone. This was at a larger scale than the territory maps and provided the context within which the territory level studies could be located. It also revealed how a prime impetus for informal settling were the jobs provided by the industrial estates.

Figure 6: Extent of informal sprawl into green zone



Mapping was also done to study how certain *imaginations* were being constructed for Vasai Virar as a whole while also being clearly targeted towards different communities, customers and markets. This was achieved through infrastructure projects and cultural and sports programs like the marathon and these were represented by mapping. Since these involved alignments and routes in and through places, they helped understand the pattern of their distribution and who and how claims were being made.

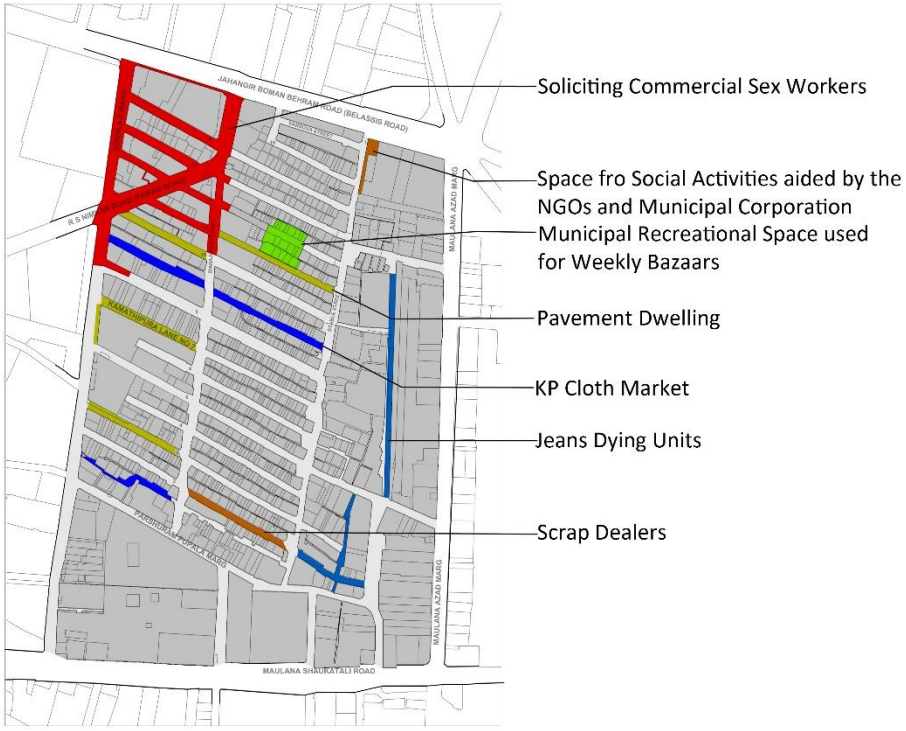
Figure 7: Future Imaginations



Kamathipura

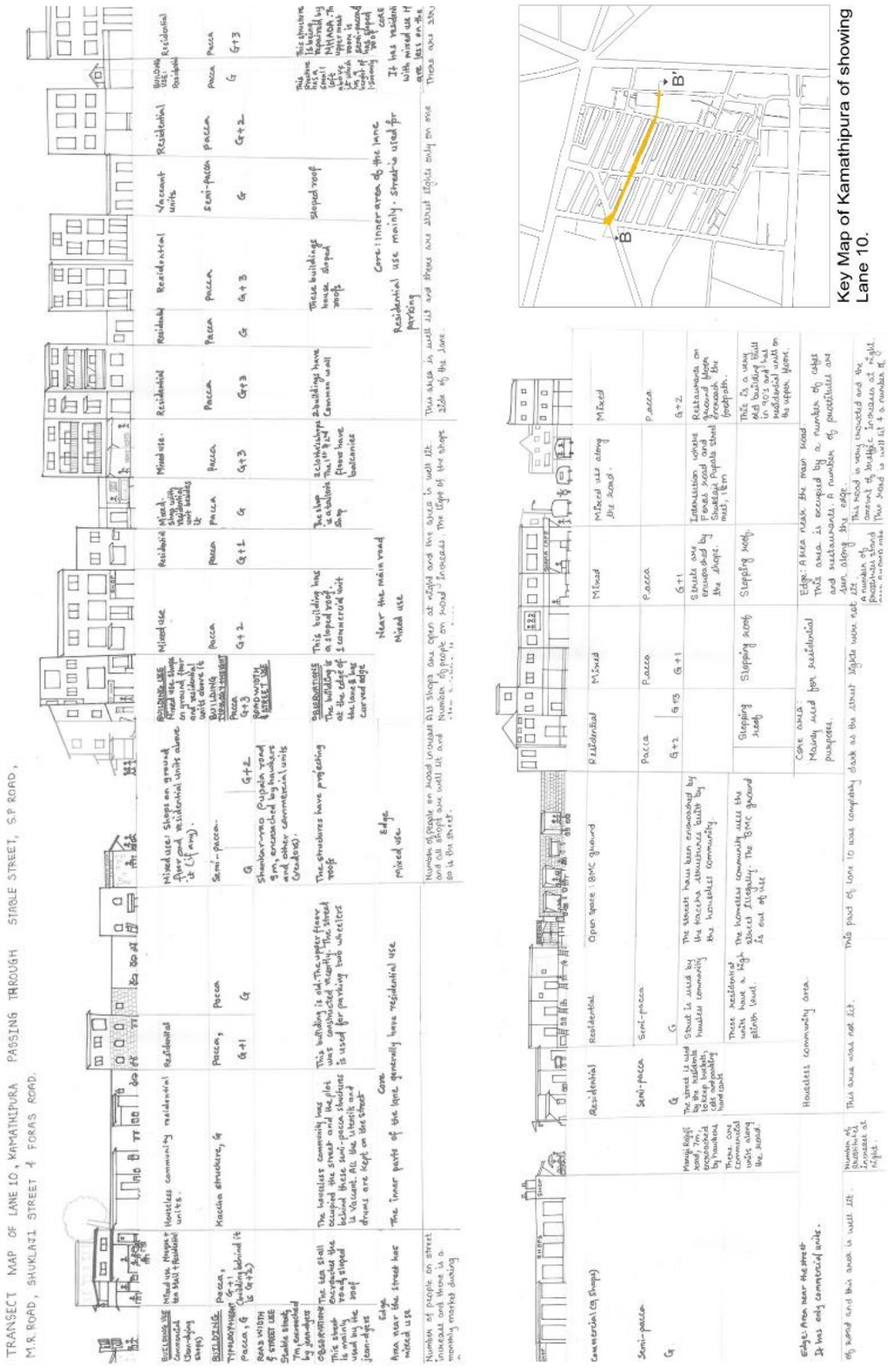
Keeping with the case study's focus of understanding the spatial imprint of formal and informal livelihood practices in the red light district, mapping in Kamathipura started with a lane-by- lane spatial documentation of livelihoods activities.

Figure 8: Livelihoods at the street level



Next, with the help of two interns, a transect and livelihoods maps at street level and at different times of the day were prepared (See Figure 9). The Development Plan of 1991 was compared to the Existing Land Use Plan with what exists on the ground in the 16 lanes - especially with respect to open spaces, social amenities, police chowkies, etc. This was the most labour intensive exercise as the interns went documenting the informal activities lane by lane. It established a) the centrality of Kamathipura as a neighbourhood in terms of easy access to bus stops, train stations, South Mumbai, erstwhile mills and port, colleges, schools, hospitals b) the existence of several neighbourhood level municipal amenities such as schools, hospitals, and 2 tiny open spaces, nearness to police station, public housing c) it also revealed how most of the DP proposals had not been realised on the ground due to the calculative informality of the State in allowing certain unauthorised land uses to continue unabated. It also brought to light the failure of BMC to redevelop Kamathipura and provide open spaces, redeveloped housing etc due to fragmented nature

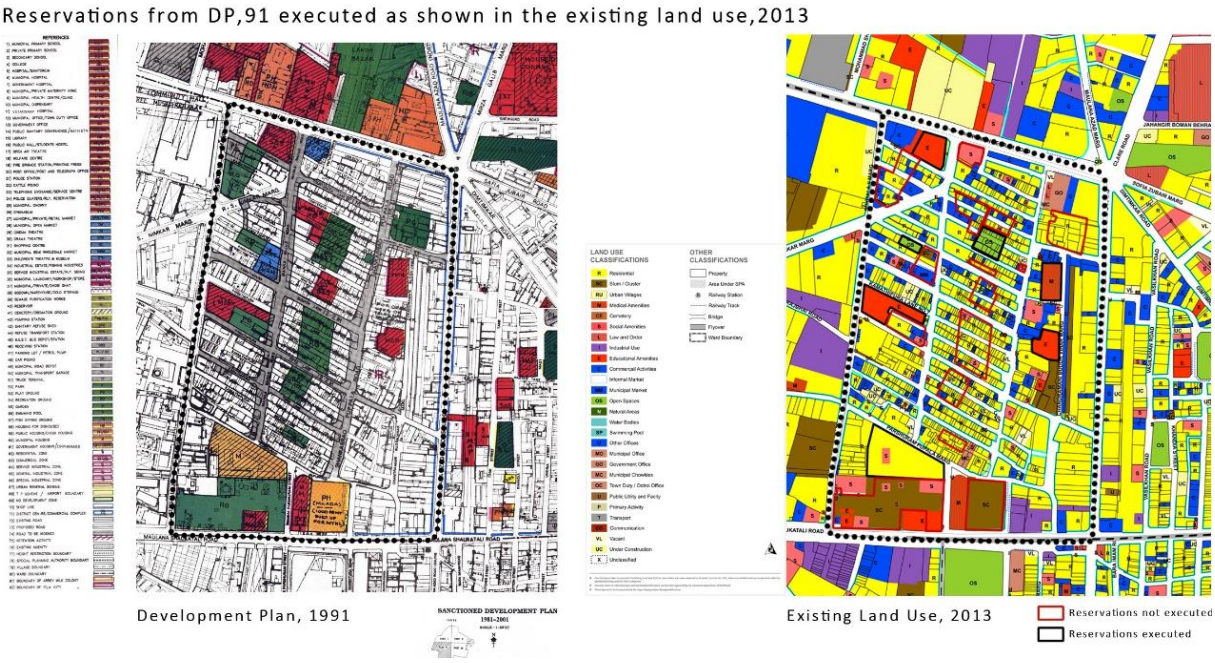
Figure 9 : Transect through Kamathipura



Drawing By : Devashree Ragde and Apurva Gandhi

of the State itself and resistance from the multiple sovereigns on the ground.

Figure 10 : Comparison of the previous development plan to the existing land use



Parallel to this process, the mapper began work on secondary maps and data in order to document how redevelopment had changed the neighbourhood built form at different points of time starting in the 1990s. As more data from the field observations and interviews trickled in, the physical area of research expanded, and the team began to map the outer edges of Kamathipura, particularly tracing the spread of the original 'vice' district all the way up to Kennedy bridge and Grant Road station. This helped to understand the macro spatial context of sex work (at the local urban scale), as well as its rise and decline over time and space. In addition to the above, the mapper mapped the internal spaces of brothels supported by observations from the case research team which has strengthened the analysis of the built environment and perceptions of safety. See Figure 11.

A particular instance of the use of mapping reveals its interactions with other methods and the value it added to the case study. Social and spatial transformation in Kamathipura were sought to be traced through a convergence of qualitative research and mapping. Social transformations were traced through interviews and historical written accounts, while spatial transformation was traced through the older maps and photographs. In the absence of relevant secondary maps, a combination of information available in maps and direct observation in the field, helped trace important contours of change. Historical maps

Figure 11 : Map showing the shrinkage of the Vice District

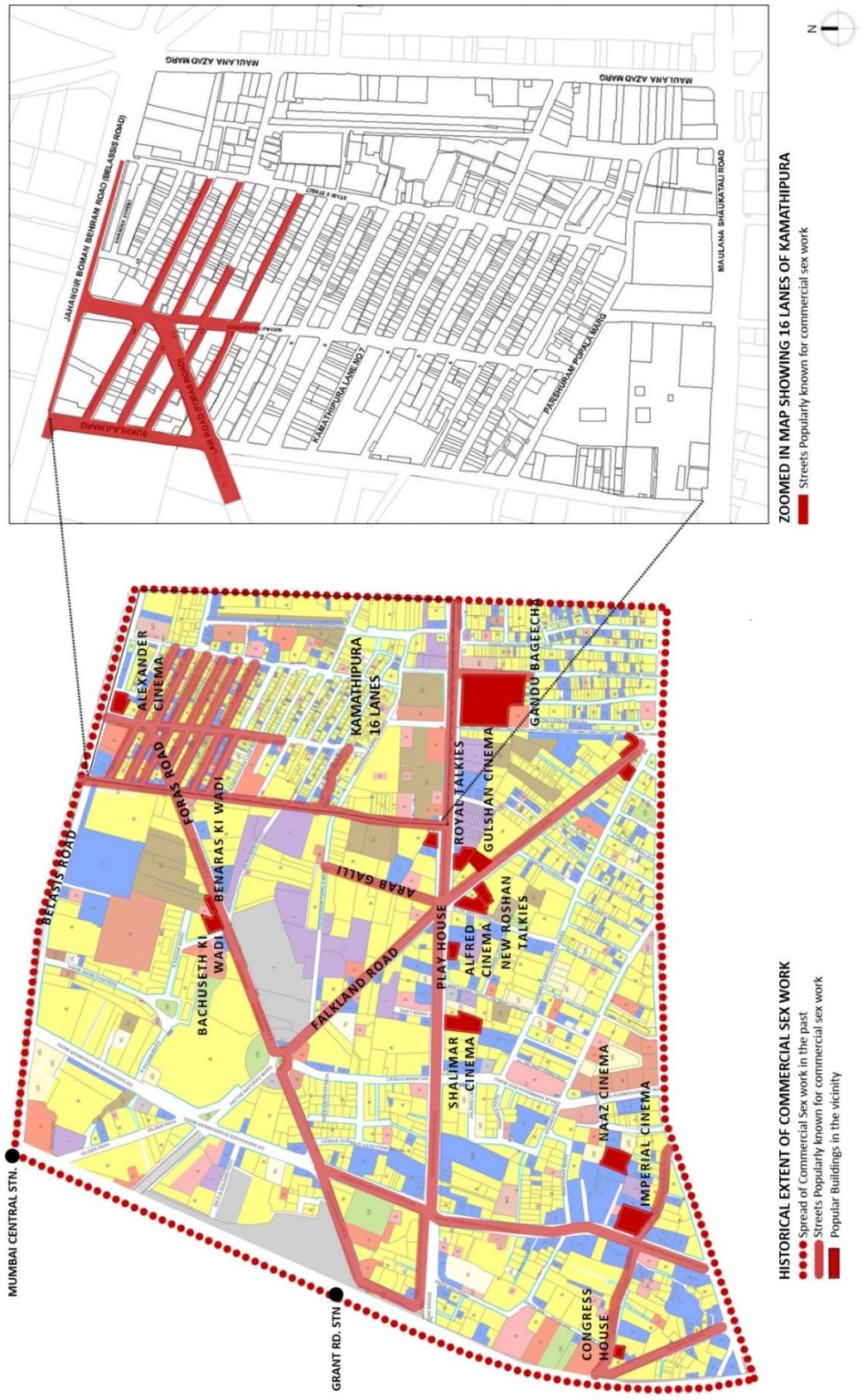


Figure 12 : L-Housing typologies typical to Deccan region; R-Jain *Derasar*

Figure 13 : Condition of Dilapidated Buildings

revealed that the sizes of plots have been smaller in Kamathipura than in the rest of the Island City, indicating that original residents were relatively poorer.

Against this background, a comparison of the small plot sizes on the old map, the photographs of the built environment and its various typologies, and the Existing Land Use Plan prepared for the Development Plan 2014-2034 led to some useful early conclusions about the ground realities:

A) The area has a diversity of plot sizes, with a preponderance of really small plots – because in the colonial era, landlords were subdividing plots to maximise on the rental potential of buildings they constructed on the plots.

B) Different communities and castes have made Kamathipura their home since the 1800s showing the mixed character of the neighbourhood. See Figure. 12

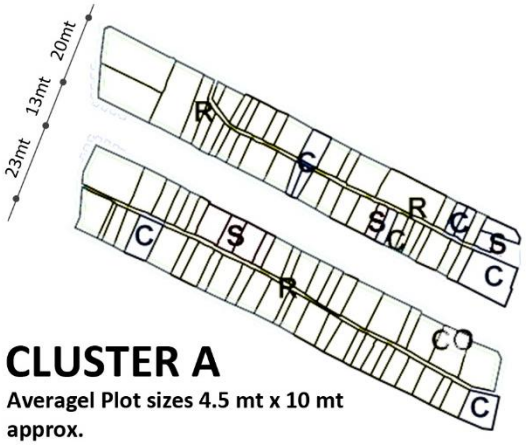
C) Buildings are extremely dilapidated because of rent control at and neglect by landlords and poor tenants who don't have the stake or the means to redevelop the buildings . In fact almost 90% of the buildings here are under Cessed building category as the mapping revealed. The data source for this was MHADA.

D) It is hard to carry out redevelopment given the small size of plot, the way the buildings occupy every inch of the plot, the high number of tenants, the narrow lanes which adjoin the plot making redevelopment not profitable even with increased FSI.

E) Redevelopment can only take place on larger plots or when plots are merged or clustered for us to be able to provide space for amenities and also adhere to Building construction bye-laws and Regulations of the Development Plan.

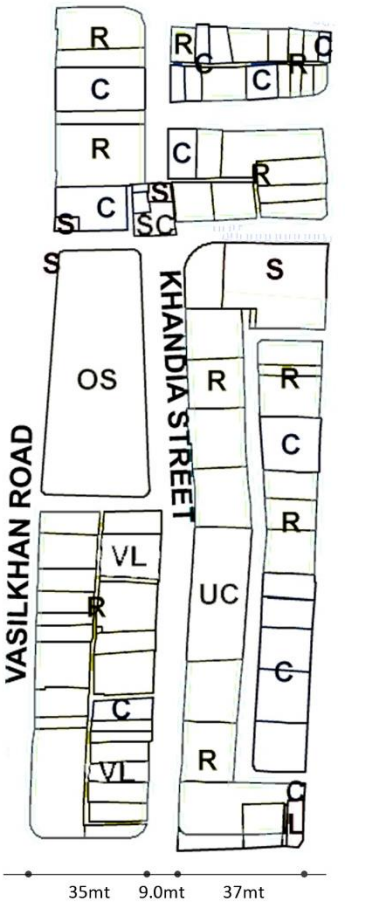
Figure 14 : Redeveloped building over an amalgamated plot

Figure 15 : Comparison of Plot Sizes within and outside Kamathipura



CLUSTER A

Averagel Plot sizes 4.5 mt x 10 mt approx.



CLUSTER B

Averagel Plot sizes 12 mt x 17.5 mt approx.

scale : 1:10000

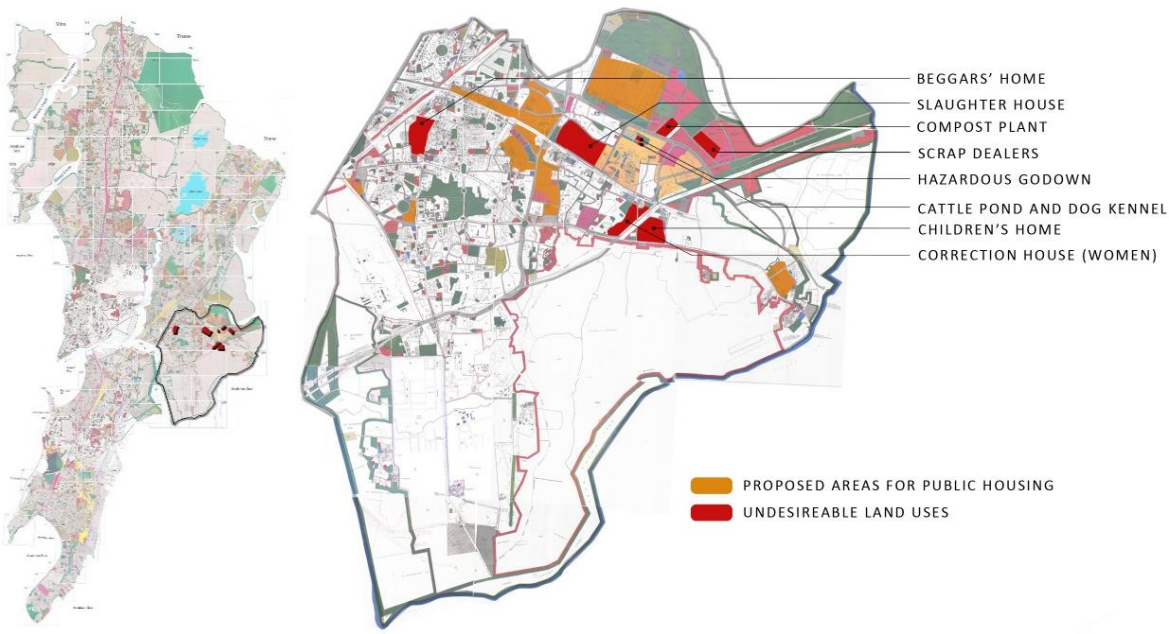
Figure 16 : Location of Cessed Buildings in Kamathipura

M Ward

The M Ward case study built on the maps already made as part of the ongoing Transforming M Ward project of TISS. These included the baseline survey report and maps made in the survey which mapped the slums in the ward. The maps prepared to support the activist campaigns related to the ongoing Development Plan process, such as those recording existing land use, proposing new uses as well as spatial studies of schools and toilets in a few pockets were also used. The objective of further mapping was to move this to a different level to reflect spatial organization, interactivity of spaces at the ward level, and understand the significance of the redevelopment regime.

One useful mapping exercise used some of the earlier mapping work to construct a map based argument showing how the ward had been treated historically as a dump yard for functions and populations considered undesirable in the core city. The earliest understanding of the ward was built out of the topography map of 1926 when the ward had few villages and some planned housing colonies for Syrian Christians. Likewise, a comparison built based on the PLU maps of 1964, 1991 and 2014 respectively, were used to triangulate oral

Figure 17 : Left-Development Plan of Mumbai, 1991; Right- Undesirable land uses in M Ward



histories and secondary analysis suggesting that the ward has been treated as a dumping site for the city's waste. The earliest location of the dumping ground was seen in the topography map of 1926 which seems to have been retained till date. Not only has it been retained but also through an analysis of the kinds of land uses proposed following its

earliest location, the dumping ground has had severe implications on the land uses proposed ever since. This was understood through a detailed study of the land uses proposed particularly in the year 1981, which has been the most influential in shaping the existing land use distribution in the ward.

The fact that the poor were also considered 'waste' to be relocated to M Ward was also sought to be mapped. This was substantiated by the google earth satellite images of the immediate past showing a parallel growth of both slums as well as resettlement colonies at a rapid pace. The resettlement colonies that cover a large chunk of land dedicated to formal housing in the ward are used to rehouse the project affected persons in the process, displaced in the process of city building or to house the homeless from the other parts of the city. Both were rehoused under the same resettlement schemes miscalculating the difference in the rights of the two groups in discussion. Therefore the state's blanket policies can be proven instrumental in the violence being inflicted upon people to deny spatial justice.

To further elaborate the denial of spatial justice by the state to its subjects, a second level of comparative study which was earlier conducted was used to compare with an older settlement to substantiate the above. For instance a comparative built form study of Ayodhya Nagar settlement which is relatively an older settlement to the resettlement colony or 'transit camp' as it is called, proved that a transformation subtle forms of spatial injustice to be more direct and deliberate forms of violence.

Further to the research a study of growth of informal settlements over the last decade showed another changing stance by the state towards the poor. A rapid development of informal housing clusters is seen to have been taken place and an analysis of the satellite images obtained from Google Earth history tells more in detail than just an incremental growth of the settlements. For example, it clearly has captured the state's presence during the development of the settlements in one particular case of Mandala informal housing clusters while it has remained silent in other parts of the ward. Such selective intervention by the state can be seen as an attempt to allow settlement in certain areas with a promise of redevelopment as such land cannot otherwise be encroached upon.

In order to authenticate this, another map was generated based on the data procured from the Slum Rehabilitation Authority (SRA) on the sanctioned redevelopment projects in the ward. The report shows in all 120 redevelopment projects sanctioned by SRA spread

across the ward. Moreover, a look at the latest development plan shows how the coastal regulation zones have been modified to accommodate new SRA projects.

Figure 18 : Slum Redevelopment Projects sanctioned by SRA

Base Map: Google Earth Satellite Image

Maps at a settlement scale were also important. An important exercise built on the research work by an NGO called CORO that had conducted localised surveys to list spaces in M Ward that women reported to be threatening. Some of these spots in Vashi Naka were on important pedestrian routes that young girls and women had to use for everyday functions. CORO's research had revealed that the reasons for the space to feel threatening to women was the presence of small but significant 'magnets' for male youth to loiter around along the path. These spatialized sources of threat were mapped along with the fear spots. The maps reveal that sources of threat and discomfort to women (and other vulnerable groups) may occupy very little space while affecting their lived experience of a larger large geography, especially if multiple pedestrian routes in the same locality have such identified threatening spaces.

2.1.2 How mapping process shaped the research

The process of mapping involved multiple activities with secondary and primary mapping data for case researchers as well as the map maker. Secondary maps were studied individually and in combination to understand the broad spatial, landuse realities, and where appropriate, policy prescriptions. Primary mapping research itself had many steps: familiarising oneself with the spatial layout of the field and its various sites, understanding the distribution of resources, demographic groups, activities within it, as well as their spatial interrelationships, among others. Field notes for this usually involved notations on printed base maps (prepared in advance for the field visit) or on sketch base maps prepared by hand, sometimes on the field. Field map sketches also emerged during the course of interviews with spatial data being shared by respondents. The translation of field notes and sketches into map documentation and then into analytical maps involved a fair amount of deliberation within and between the case research and mapping teams.

Reflections related to the JVLR and Vasai Virar case studies indicate the different kinds of value that the mapping process brought to case research. Mapping helped the JVLR team to imaginatively reconstruct the erased built form, as well as the possible spatial relationships of the old settlement with the surrounding landscape. These reconstructions provided an anchor for reflections about the lived experiences of residents in the informal settlement of Pratap Nagar before it was partially erased. They also provided a basis for comparing the spatiality of the informal settlement with the new Resettlement and Rehabilitation colony called Sukh Sagar. At another level, the process of preparing the 'before and after' map of the 11 km long landscape through which the road passes, helped reimagine the actual state of connectivity to the city that different informal settlements in the landscape enjoyed (or suffered from) before JVLR.

Maps helped the Vasai Virar team in piecing together their argument in a large and volatile territory which was hard to cover in a relatively short time period. It also helped to situate places in relation to each other- this was important to understand the nature of differentiation (of governance, land values, building type etc) and contribute to the argument that this differentiation was produced and caused exclusion of certain groups and areas. It also pointed out future areas/relations to study or pay attention to during the course of the research. For example, seeing the empty space around the gaon (village) helped researchers to tie this to interviews that had said that illegal settlements hadn't been allowed there by land owning Patils who controlled those areas and didn't want 'migrants'

to enter. Other things like understanding which lakes had been picked up first for beautification in relation to their particular location on the map enabled us to realise that lakes in villages that had been 'resisting' the merger with the Vasai Virar Municipal Corporation had been selected for beautification quite strategically by the municipal body.

The maps also significantly helped in understanding the growth of the informal sprawl temporally, which wasn't very easily done through fieldwork. Hence, the team could compare their spatial extent in 2000 with that in 2009 when the municipal corporation first came into being. This suggested that the growth of the informal settlement has been closely tied to the rise of the regime. The maps also helped identify new building typologies in Vasai Virar that look like resettlement colonies.

The team also benefited at a very practical level from the process of making and discussing maps. For instance, during a conversation over a newly prepared base map, the research officer on the team suddenly understood for the first time, the overall geography of settlements she had visited and was familiar with on ground: 'Oh, that place is behind this one?!'

2.1.3 Maps that could not be made

The maps that were envisaged but could not be made are as much a part of the story of mapping on this project, as those that were made. They reveal important aspects of the relationships between other methods and realities of urban research and the making of maps for it. The key factors include the difficulty of negotiating the mappability of phenomena across disciplines, the constraints of field work, and the sheer time that the drawing of maps requires.

In the JVLR study, case researchers wanted to make a map that showed the greater openness of homes in the informal settlement to public space in comparison to those in multi-storey towers in the resettlement colony. Similarly, field interviews had indicated that the landscape around the informal settlements had once had the characteristics of a sacred geography for the city at large, with important religious and heritage spaces. Thus, a spatial representation and analysis of such a sacred geography and its transformations by the new link road was planned. Another map showing the locations and agendas of various protests and conflicts along the road was planned. These could not be undertaken because of a lack of time.

The challenges of acquiring the relevant data prevented the Vasai Virar, Kamathipura and M Ward teams from preparing some maps. The Vasai Virar team wanted to prepare maps to show the impact of electoral ward delimitation and how this has been used as a deliberate strategy to weaken political mobilization around land. Related maps to track changes in electoral patterns over time- highlighting the 'hotspots' of trouble and centres of resistance in 2009 and how these were tamed in 2015 – were also planned, but data for both these was difficult to procure and the plan was dropped.

Similarly, the Kamathipura team wanted to map and analyse how rents and price per square foot of built up space dropped as one moves towards the centre of Kamathipura. But could not acquire dependable data for such an analysis. The M Ward team too wanted to prepare maps recording spatial changes (built form, open spaces, path networks and landuses) at the settlement level during the study period. However, settlement maps from before 1995 were not available for the settlements being studied in detail (though they were available for others).

2.2 Overall experiences, fulfilment of expectations, challenges

As mentioned earlier, mapping was one of the methods employed in the research project. It complemented other traditional social science research methods. By and large mapping was found to be a very useful exercise, and maps prepared specifically for the case studies helped document, analyse and communicate the spatial dimension of phenomena being studied. However, not all the expectations above were realised in each case due to a variety of practical and conceptual reasons. These relate to key issues related to: the peculiarities of a case study (like a tense field situation); challenges of interdisciplinary work (translation of central research concerns into ‘mappables’, varying capacities for it in team, additional burdens these put on typical challenges of interpersonal aspect of team work); and time (mapping takes a lot of time and interdisciplinarity adds to this time).

In Vasai Virar, apart from data gaps, one challenge was that the research team needed to get a sufficient understanding of the entirety of what was going on before they could decide what to map and how to go about it. This meant mapping could begin only after some amount of field work and data analysis was complete. As in the Kamathipura case, planned processes of participatory mapping also proved difficult in spite of several attempts because of the pervasive conditions of suspicion, volatility and surveillance in the field. Given this, maps actually helped the team piece bits of the puzzle – ‘snapshots’ of

reality gathered through interviews and conversations– together. Thus, researcher driven mapping helped overcome the very constraints that blocked participatory mapping. Simply, maps helped situate and corroborate data, and also construct the larger picture.

3 Conclusions

Mapping can and does contribute significantly to socio-spatial research. Mapping can aid the analytical process, especially because spatial representation gives a very different perspective and set of insights than may be obtained purely from qualitative social research. Among such insights are those related to the spatial extent of the field (in itself and in relation to other places) and its internal and external spatial relationships. However, the value of mapping can be tapped only if certain key challenges of integrating mapping into the social research process are met successfully.

Mappability

Determining and securing the mappability of social phenomena is perhaps *the* key challenge for interdisciplinary work like the present project. Translating temporal changes, or certain socio-spatial phenomena into maps can be a major challenge. A major lesson is the importance of conducting a series of well-timed meetings or short brainstorming sessions between, minimally, the mapping and case research teams when they are separate. While meetings and discussions did occur from time to time, a more structured workshop would have helped in overcoming problems of mappability that cropped up at different times in different case studies.

Maps need lots of Data

An apparently simple analytical map often requires a lot of data. Many maps in each case study were conceived but ultimately abandoned because they required extensive field work, or other secondary data that was difficult to gather to the level of comprehensiveness required in a map. At the same time, maps that document existing conditions simply for helping the researcher understand the field better, themselves can become important data for future research that tracks transformations.

Visual representation

An important lesson from the JVLR case study relates to the challenge of arriving at an appropriate system of visual representation, even though the faculty researching this case as well as the map-maker are both architects. It took a lot of time, and much reworking of the same basic interpretive map about ‘place maiming’ to arrive at an internally consistent, unambiguous, and easily communicative map. Approaches and preferences related to

visual style can vary significantly even between two professionals from the same spatial discipline.

Time

Mapping takes much more time than is expected. Timing is also important. As the case studies revealed, the mapper may only be able to get to work after some primary data has been collected and processed. This is particularly true where mapping is being approached as a tool of socio-spatial analysis, and there is little prior knowledge about the field. This is important to incorporate into operational plans of research projects to make best use of a mapper's time.

Field challenges

Where the mapper is not a primary researcher, and the field is a conflicted and dangerous social space, primary mapping research or even reconnaissance field visits for the mapper can be stressful, since he or she may not have an understanding of the context. Preparation in advance, and being accompanied by the case researcher, certainly help, but there is potential for stressful experiences nevertheless in such peculiar conditions. In more normal conditions, field challenges may involve dynamic decision making about the 'boundary' of the field to be mapped.

3.1 Mapping as methodology: a thought for the future

A final reflection might be of value for future research. Mapping was not the primary research method in the project, and the mapper was not a researcher on any of the case studies. This meant that the mapper and the mapping team's imagination was not completely integrated into the core of each case study. Rather, the mapping team interfaced with the research team from time to time, and helped develop ways of representing the spatial dimension that had been noted by the latter. The mapping team – with its spatial research orientation and expertise – was thus external to three case research teams (the fourth, JVLR, being led by the faculty in charge of mapping) and also worked on the very different cases. This was implicit in the original methodological framework – the research was a testing ground in terms of integrating mapping into the research process. The insights and value that mapping has yielded in some of the case studies may well suggest that future projects of socio-spatial research consider integrating a mapper

into the research team more centrally, but always keeping in mind the challenges of additional expenditure, and of interdisciplinary team work.

4 References

Bhide, A. (2013). *The City Produced: Urban Development, Violence and Spatial Justice in Mumbai.* Mumbai: Centre for Urban Policy and Governance, TISS.

Base Map References

Figure 1: Case study sites

base map-

a.http://epaper.timesofindia.com/Repository/getimage.dll?path=TOIM/2007/09/21/4/Img/Pc0040600.jpg

b. Google Earth satellite image

Kamathipura

Figure 8: Livelihoods at the street level

base map – Primary mapping done by Devashree Ragde and Apurva Gandhi

Figure 9 : : Transect through Kamathipura

Figure 10 : Comparison of the previous development plan to the existing land use

base map – a. Development plan, 1991

b. existing land use, 2013- http://www.mcgm.gov.in/

Figure 12 : Map showing the shrinkage of the Vice District

base map- a. existing land use, 2013- http://www.mcgm.gov.in/

Figure 13 : Comparison of Plot Sizes within and outside Kamathipura

base map- a. existing land use, 2013- http://www.mcgm.gov.in/

Figure 16 : Location of Cessed Buildings in Kamathipura

base map- a. google earth satellite image

b. https://mhada.maharashtra.gov.in/

JVLR

Figure 2 : Transformation in Land Use along JVLR

base map- a. development plan 1991,

b. topography map 1926, *courtesy* : Andre Baptista, Archaeologist

c. existing land use, 2013- http://www.mcgm.gov.in/

Figure 3 : Place maiming at Pratap Nagar

base map – a. city survey map 1967, *courtesy*: Ghanshyamdas Mishraji, Lawyer

b. google earth satellite image

Vasai Virar

Figure 4 : Different Zones in Vasai Virar

base map – a. development plan 2007 - Radhika Raj, Resource Officer

Figure 5 : Informal sprawl over the years

base map – a. google earth satellite image history

Figure 6: Extent of informal sprawl in green zone

base map – a. google earth satellite image

b. development plan 2007

Figure 7: Future Imaginations

base map – a. development plan 2007

b. Images - Radhika Raj, Resource Officer

M Ward

Figure 18 : left-development plan of Mumbai, 1991; Right- Undesirable land uses in M Ward

base map- development plan 1991

Figure 19 : Slum Redevelopment Projects sacntioned by SRA

base map- proposed land use, 2014