BEYOND THE EDGE
COMPLEXITY APPROACH TO URBAN FRINGES
Colophon

Title: **Beyond the edge:**
Complexity approach to urban fringes

Reshu Gupta
reshurgupta@gmail.com

Delft University of Technology,
Faculty of Architecture and the Built Environment,
European Post-mater in Urbanism (EMU).

Mentors:
Egbert Stolk, TU Delft
Steffen Nujhuis, TU Delft
Paola Viganò, Università IUAV di Venezia

Readers:
Kelly Shannon, KU Leuven
Joaquin Sabate, UPC Barcelona
BEYOND THE EDGE
COMPLEXITY APPROACH TO URBAN FRINGES

Reshu Gupta
CONTENTS

PREFACE
ACKNOWLEDGEMENTS

CHAPTER 1 ................................................................. 001
Introduction
1.1 Urban growth of Pune 006
1.2 Urban fringe lands 009
1.3 Problem field 013
1.4 The approach 016
1.5 Problem statement 016
1.6 Aim 016
1.7 Research question 016
1.8 Structure & methodology 017
1.9 Study area 019
020
CHAPTER 2 ............................................................... 035
Urban fringes in context of complexity theories
2.1 In context of complexity theories 040
2.2 Learning from other cities 041
2.2.1 Case of Antwerp, Belgium 041
2.2.2 Case of Mendida, Ethiopia 045
2.2.3 Case of Addis Ababa, Ethiopia 045
2.3 Inferences 046
2.3.1 Lessons from Belgium 047
2.3.2 Lessons from Ethiopia 047
048
CHAPTER 3 ............................................................... 049
City's contemporary urban form traced from its past
3.1 Historic evolutions 054
3.2 The core 057
3.3 The Peshwai city of peths 059
3.3.1 Shet Mahajan’s system 059
3.4 The cantonments 060
3.5 Towards a metropolis 063
3.5.1 PMC and PMR established 065
3.5.2 Industrial Pune 065
3.6 Inferences 067
071
CHAPTER 4 ............................................................... 073
The current state of Pune’s urban fringes
4.1 Pune city and urban fringes profile 078
4.1.1 Social, economic, cultural, spatial profile 078
4.1.2 Environmental profile 081
4.2 Current planning approach 084
4.2.1 Background 084
4.2.2 Urban fringe land’s governance today 084
4.2.3 Current vision for Pune’s urban fringes and limitations of the current planning approach
085
CHAPTER 5 ............................................................... 087
CTC approach to mapping of Pune’s urban fringes
5.1 Family portraits 092
5.2 Values and Trends 108
5.2.1 Socio – spatial trends 108
5.2.2 Morphological trends 108
5.3 Illustrations, scenario 0 111
CHAPTER 6 ............................................................... 115
CTC approach to urban design
6.1 Case of Sus village 119
6.2 Three locations 127
6.3 The strategy 138
6.3.1 Culture center 141
6.3.2 Learning center for construction, afforestation and urban agriculture practices 163
CHAPTER 7 ............................................................... 183
7.1 Reflections and future recommendations 188
Appendix
Image credits
Bibliography
This thesis research work is entitled ‘BEYOND THE EDGE’. The ‘edge’ suggests the administrative boundary of the traditional top-down system that is followed by centralised authorities for planning urban development and a city at large. The ‘beyond’ suggests urban-fringe-lands in an abstract notion.

Fringe lands interface is little understood. Around the world, these are observed as available extended lands that accommodate a city’s urban growth. As such, in India urban fringe lands are the most sought-after areas. These often urbanize in an unpremeditated manner. The spatial-environment and everyday quality of life of people from the fringe regions and the entire city system get marginalized in the impromptu process of urbanization. This seems inevitable in the current top-down planning system, which tends to prioritize the city. Moreover, the current approach disregards the fringe land’s contextual social, spatial and cultural characteristics. Over a period of time, when eventually these lands are merged with the city, several nature-plausible potentials of the fringes not only remain untapped but deteriorate in quality.

We address this subject focusing on a specific theoretical framework – Complexity Theories of Cities (CTC). Herein, the city is viewed as a complex system, one characterised by dynamics from the bottom-up that continually keep the city system out-of equilibrium. With this perspective, the proposed complexity approach examines the city at multiple scales and interprets how its various spatial systems function as a whole. We proceed further with a conceptual hypothesis, ‘for a growing city, examination of the urban fringe lands and their micro dynamics would reframe the planning and design strategies for a contemporary built-environment’. This approach encourages design analyses to start from the micro-scale dynamics. Once the nature of networks and processes is identified and the unique character of the site surfaces, the potentials from site is used as a tool for future spatial growth. Thus, the approach ensures and incorporates the local values at an early stage of design. This serves as a catalyst toward an inclusive and coherent process of urbanization.

Pune, the subject of this thesis, is the city I grew up in. Keen observations of urbanizing fringe lands and a general familiarity with the city for over three decades proved vital while evaluating the city through the lens of CTC. However, inspiration for this work came from exposure to the European tradition at TU Delft and IUAV that considers urbanism as a socially responsible discipline. With this new knowledge towards urban planning and design, I am eager to open my work to all for further discussions and inputs.
ACKNOWLEDGMENTS

Foremost, I wish to thank my research supervisors Ir. Egbert Stolk, Ing. Steffen Nujhuis, and Dr. Paola Vigano for their inspiration, valuable discussions and useful critiques that helped me streamline the thesis. I would also like to thank external examiner Susanne Pietsch from TU Delft and readers Kelly Shannon from KU Leuven and Joaquin Sabate from UPC Barcelona.

I sincerely appreciate teacher Abhay Pawar and former state town planning official Dr. Ramchandra Gohad whose advice has enriched the thesis work. Thanks to the city-based NGO, Mashal, their executive director and Architect-Planner Mr. Sharad Mahajan who provided me with study materials and base drawings upon which I built the design proposals. A special thank-you to the families whom I interviewed on site – Parkhe family, Dhanashree Ranavde, Nanasheb Sasar, Bhintade family, Ghule brothers and Chandare family – whose first-hand information added value to my research.

I am very grateful to all the teachers at TU Delft and IUAV, particularly to the ever inspiring professor Late Dr. Bernado Secchi and the very encouraging Ir. Daan Zandbelt. I am thankful to my classmates in EMU, especially Anastasia Chranioti and Miao Zhang.

I wish to thank all my friends who supported me in this endeavour. Thank you to Koshish Dhoot who helped me collect the thesis materials and Sachin Navalkar whose suggestions have helped refine the report.

Above all, I would like to express my deepest gratitude to my friend Harsh Jauhari and my brother Manoj Gupta for the unconditional support all through the course.
CHAPTER 1
INTRODUCTION
1.1 URBAN GROWTH OF PUNE

Pune has grown to be the seventh most populous city in India and second largest in the state of Maharashtra. During the process of urbanisation the city carried various titles - *Cultural capital of the state, Oxford of the East, Detroit of the East, Pensioner’s Paradise*. Presently, Pune is being explored as a cyber-city – a potential Information Technology (IT) hub. With the IT policies for the state of Maharashtra the sector has grown from INR 25 million to INR 650 million (Kshirsagar 2010). Moreover, the city hosts 9 universities and 23 government and private sector research societies and academic institutes of higher learning like the University of Pune and Bhandarkar Oriental Research Institute. Several prestigious scientific institutes in astrophysics, advanced computation, bio informatics and virology are established in Pune. In addition, the city has had an industrial economy since the 1950’s that continues to grow. The city is also known for an automobile manufacture sector. Besides, the city offers a variety of prospects for artists and patrons of theatre, music and literature. Since the opening of the Expressway in 2002 (6 lane concrete high speed roadway) the travel time between the financial capital of the nation, that is the city of Mumbai, and Pune have reduced to approximately only two hours. Once Pune merges with Mumbai it will be part of the Mumbai-Pune megalopolis, that takes Pune onto the global stage (Benninger, 2010).

In this perspective, along with urban living comforts and fundamental necessities like access to health care facilities and services for water, sanitation and relatively less important, though desirable, leisure and entertainment centres, Pune brings wide-ranging choices from job opportunities in varied sectors to education options for different age groups. At the moment, it is one of the most preferred destinations for not only the people from the state of Maharashtra but also from other states of India. With its popularity today, only in a decade Pune city’s population has increased from 2,538,473 inhabitants to 3,115,431 in 2011. Statistics show that over 1000 IT and ITES units employ around 220,000 people, 60 per cent of which is migrant population (MCCIA 2009). Migration to the city also takes place from the adjoining rural areas. The population in Pune district rural areas was 3.687 million inhabitants, which has declined from 41.92 per cent in 2001 to 39.11 per cent in 2011 (Census India, 2011). In addition, the city attracts students and professionals from South East Asia, the Middle East and Africa.

The Government of India census 2011 announces Pune as an urban agglomeration (UA) coming under the category of million plus UA/city. By 2031, it is projected that the population of Pune city will reach 5.657 million (Census India, 2011). As the population grows it is likely that the needs for housing and supporting facilities will increase. Pune city’s population densities are already high; that is for core I, 618 persons per hectare and estimated to be 908 persons per hectare (PMC, 2007). Therefore, the surge in demand of urban land is catered to by the successive annexations of peripheral areas. Thus, large areas of urban fringes are under high pressure of urbanization.
An embryonic Kasba Peth has today developed to become the city of Pune which spreads over 243.84 km² area. The city that enclosed 166.11 km² in 1991, merely in a decade acquired 77.73 km² of its peripheral areas. In the last annexation of 1997, 23 villages with an area of 97.84 km² were added to the city. On 29th May 2014 the State Urban Development Department (UDD) issued a notification to bring an additional 34 fringe villages into PMC limits. If approved, Pune civic body’s geographical area would increase to over 500 km², more than that of Brihanmumbai Municipal Corporation, which is at the moment the largest civic body in Maharashtra state covering an area of 480.24 km². Thus, the trend of annexation of fringe lands is gaining momentum.

Figure 2: Successive annexation of peripheral wards of Pune.
Source: map by author, data used from PMC.

Figure 3: Chronological expansion of area under PMC is presented in table while the graph illustrates the exponential growth of the same.
Source: PMC data.
Figure 4: PMC population density map.

(Pune district’s population density has increased from 462/sq.km in 2001 to 603/sq.km in 2011).

Source: map by author, data used from PMC.
1.2 URBAN FRINGE LANDS

This research is primarily focussed on and limits its scope to urban fringe lands. Several definitions exist for urban fringe lands. “The term urban fringe land suggests a borderline case between the rural and the urban, and actually lies on the periphery of urban areas, separating it from the truly rural countryside. Urban fringe lands are also described as the rural lands with urban phenomena.” (Ashutosh, 2008, p. 75). T.L. Smiths’ discussion of the urban fringe around Louisiana in 1937 marked the first use of this term signifying ‘the built-up area just outside the corporate limits of the city’ (Pryor, December, 1968, T.L.Smith, 1937). For this study also, urban fringe lands are regions adjoining the city and are located beyond the city’s current administrative limits. The term current administrative limits imply that urban fringe lands shift over time as cities expand outward.

In context to the case-city Pune, the urban fringe encompasses low density urban regions in moderately thick-vegetated lands with agriculture as main economy. Landscape elements comprise of scenic hills, lakes and green fields. In the large spreads of forest lands certain areas are demarcated as biodiversity parks. Besides the traditional villages, the settings also include information technology parks (Hinjewadi area), ceramic and glass manufacturing units (Wagholi area), culture centres, leisure parks and several religious places. The industrial twin town Pimpri Chinchwad Municipal Corporation is to the northwest, while the Pune airport is in the northeast. Most recently, several small large residential schemes have come up in the area.

The following pages illustrate the various landscapes in Pune’s urban fringe lands.
At present, Pune fringe lands area begins just beyond the contiguous built up urban area and extends 10 km from the historic core of the city.

The land that can be characterized as urban fringe lands shifts over time as cities and the transition zone itself expand outward.

Figure 5: (a and b), Geometrically drawn urban fringe land extents and distance from historic core for a mono-centric case city Pune.

(c and d), Pune urban fringes as defined for this thesis work.

Source: map by author, data used from PMC.
(top and right) Landscape qualities of Pune fringe lands
(bottom) Traditional alley fabric Sus village
Urbanizing Pune’s fringe lands

(left) Part of Mula River that flows through north-west fringes of Pune
(bottom) Farmlands of Sus village

(left) Low rise low density traditional urban regions embedded in densely vegetated fringe lands
(right) Multistoried new residential developments
1.3 PROBLEM FIELD

Located within the tremendous influence of urban sphere, all fringe lands over a time transform from rural to urban character. Pune fringes developed primarily due to functional transformation of the city and the related increase in population. From an education and culture centre the city gradually became a hub of large scale manufacturing industries (Ashutosh, 2008). As Pune region seeks a contemporary way of living, the challenge it faces is that of incoherent growth. As mentioned before, in purview of the information-technology industries boom, Pune experienced exponential urban growth in the past decade. This surge in urban demand is being catered to by the successive merger of surrounding villages into the city. The merger brings more construction to the fringe areas. New development follows the norms and policies as recommended for the city by top-down planning system. It divides the territory broadly into residential, commercial, recreation and conservation zones and sectors and develops under generic rules and policies. The probable consequence of this newly devised segregation system (which ignores the contextual dynamics of the site) is an increased socio, economic and environmental complexity and territorial incoherence. This thesis investigates three of these aspects – (a) incoherence in the existing and the new development, (b) incoherence in the local and the regional priorities where often city is prioritised over fringe lands, and (c) incoherence in the relationship between the urban and the natural systems. More specifically;

Large scale and fast pace of migration is rapidly reshaping socio-spatial values and culture in fringe villages. Refer section 5.2. In order to meet the needs of extreme population growth, construction projects by private developers are proceeding at a fast pace. Besides, the developed communities are large and gated. This trend may be perceived as a threat as the process leads to selection and enclosure. Gated communities have displaced many traditional households and affected the lifestyle of locals adversely. Unaware of the potentials of their lands, several farm owners and other locals sell all their fields to real estate developers at a unfairly meagre price. Most concerning for this study is the latest response to urbanisation, in which several farmers are themselves becoming developers as they join hands together with existing small/big local contractors in the area around. Of these most are uneducated and unaware of the long term impacts of their actions.

Pune’s fringe lands are marked with various natural features that not only have aesthetic values but also define in a broader regional context significant ecological values. The surrounding fringe lands vegetation mainly comprises of forested hills. They have a very high value as they harbour various indigenous plants and species of medicinal and economic importance. Forests also offer some potential to be managed as a carbon sink, that is, to promote net carbon sequestration. Together with agriculture fields these play the role of a green belt for the city. However, forests are being degraded by grazing, fire, timber extraction and fragmentation. A few local volunteers and NGOs work towards rainwater harvesting and tree plantation on hills. Nevertheless, a central conscious effort to regenerate the forest is missing. The total forest area of Pune is 338.64 Ha of which 47.06 Ha is encroached upon (Warran A, 2008, p. 11). Also, large parts of the hills are being developing as residential schemes. Only elite groups can afford homes in these schemes and therefore access to these premises. A common resource – the hill – is restricted to serve only a part of the society.
Latest land-use survey and analysis report by PMC states that about 52.71 per cent of land is under agricultural or open category of which about 15 per cent of the area is fertile land. However, all this area is now available for new development (PMC, 2000, p. 41). About 1140 hectares of land is proposed to be converted from agriculture zone to residential zone (PMC, 2007, p. 12). Such large scale reshaping of land-use patterns has undesirable effects on the environment. Environment Status Report (ESR) of 2010 has long ago identified that the air and water pollution levels in the city region are on the rise and are higher than the safe permissible standards.

So far, Pune’s fragmented situation may be related to the top-down planning system which does not read and incorporate local identities. The diversities of village cores, their contexts and unique qualities get eroded while the city caters to its needs at a regional scale. The probable consequences of disconnected plans for different parts of the city are fragmented development of fringe lands, declining agro economy, substandard and generic spatial forms, degrading environment, air pollution, unjust socio-spatial hierarchies and low quality of life which are becoming urgent problems associated with Pune’s fringe areas. The challenge is to find an approach to integrate solutions for the existing & new development at local & regional scales, and a right balance between urban & natural systems.

Pune city’s top-down system of urban planning, effects of merger on the fringe lands, socio, spatial and environmental aspects, local cultural values and current trends are further analyzed in detail in chapter 4 and 5.

![Figure 6: Pune land cover map](http://www.ijirset.com/upload/july/13_%20THE%20PLANNING.pdf last accessed on 30-03-2015)
Figure 7: (a and b), Village Balewadi, Baner, (c), Draft development plan for village Balewadi, Baner.

It is one of the villages of Pune’s urban fringes of year 2001. On its merger with the city, Baner attracted real estate market for commercial and residential sectors. The village core is today settled as it is in a dilapidated state and most green areas have degraded.

Source: Google earth, PMC data
1.4 PROBLEM STATEMENT

Under the current planning model of development, rapidly urbanizing Pune causes village cores of adjoining fringe lands to lose their socio-spatial vitality and cultural continuity while the region suffers loss of its unique nature/physiographical qualities.

1.5 THE APPROACH

This thesis explores a complexity approach. The current planning system is largely top-down. For a regional scale of natural and urban resource management it plays a significant role. Conversely the city is constantly being modelled by dynamics driven from the bottom-up. Recognizing the city as a single entity and acknowledging both, top-down and bottom-up dynamics, the study here identifies and analyses the bottom-up dynamics, so as to integrate these with the visions on large scale infrastructures managed by top-down system, thus gearing up towards being an aware and educated participant in the process of emergence.

With this, the approach believes and so aims to bring territorial coherence in the urban and the natural systems of the city. This approach is explicitly discussed in chapter 2.

1.6 AIM

The thesis aims to explore an alternative planning approach for Pune based on theory; in particular Complexity Theories and Complexity Theories of Cities (CTC) that promotes ways of achieving socially, spatially and environmentally integrated urban conditions.

1.7 RESEARCH QUESTION

With this thesis work, we hope to offer some suggestions for the following research question.

How can complexity approach to urban fringe lands contribute towards coherent growth of Pune city and the region around it?

1.7.1 SUB RESEARCH QUESTIONS

The main research question is further divided into sub research questions and an attempt is made to answer these in following chapters.

1. What is complexity approach? What principles from complexity theories can serve as a basis for an alternative understanding of urban planning and design?
2. What is the current system for development of the urban fringes of Pune?
3. What are the various bottom-up dynamics in Pune’s fringe lands? What drives these dynamics? What are the existing values and trends in Pune’s urban fringes?
4. How can bottom-up dynamics be potential catalysts for a coherent urban growth?
5. What are the spatial implications necessary on Pune’s urban fringes for a coherent development?
STRUCTURE & METHODOLOGY
1.8 STRUCTURE & METHODOLOGY

In chapter 1, with a brief introduction of the case city Pune, the study begins with the main research question which investigates the complexity approach. Follows is the theoretical framework for research which is studied in two separate parts. First part in chapter 2 studies other cities for eco-city, porosity, mixite, educity and proxemics design guidelines. Part two in chapter 3 reviews path dependency, one of the concepts of complexity theories. Herein the Pune region is seen in its historic context. It brings insight into the social, economic, spatial and physiographical trajectories that Pune city followed since its origin.

The research further examines the current state of Pune’s urban fringes and how are they governed today in chapter 4. By means of micro-stories the study maps micro dynamics, traditional values and prevailing trends in the form of ‘family portraits’ in chapter 5. Empirical data, statistical analysis of available secondary data, interviews, sample surveys, field studies and direct measurement of data are synthesized at this stage.

Chapter 6 includes local scale analyses. Case of Sus - a village which has been under high influence of urbanization and in purview of being merged with the city limits is selected. It spreads over an area of approximately 25 kilometres square. To assess the site dynamics, this fringe territory is divided into a grid of 1 kilometre x 1 kilometre squares. For detailed analysis three case locations are chosen. Further, for Sus village design suggestions are made.

The thesis concludes in chapter 7 with personal reflections on the research and design framework and the difficulties for prediction that are intrinsic to this view of cities and their planning.
019

Complexity approach
*Urban fringes in context of complexity theories*

Learning from other cities

Pune city
*A growing metropolis*

Path dependency
*City's contemporary urban form traced from its past*

Research question (RQ)

City and Urban fringes

Problem Field

Incoherent Development
Analyses

Satellite image mapping
Statistical review
Field work
Generating a *biography of the region*

---

Dynamics and Scales

Top-down & Bottom-up
Macro & Micro

---

Design proposals

*Visions*
*Action plans*

---

Reflections

future recommendations

---

Values and Trends

CTC approach to mapping

---

Case locations

The village core
The quarry site
The abandoned school

---

Design Proposals

1. Culture center
2. Learning center

Tool kit
design principles

---

Figure 8: Graphical representation of structure and methodology.

Source: made by author
1.9 STUDY AREA

For micro scale analyses a case of Sus village in Mulshi taluka is considered. It is located in the north-west of PMC limits. The main feature of this village is its setting in the rich natural surroundings. Due to its elevated location in the immediate territory, the village until now has remained rural in character. However, with the new development of Infotech Parks at Hinjewadi, like most surrounding villages that are developing for residential use, Sus area is also currently preferred for residential development, mainly for people working in information technology industries. Simultaneously, the village is under consideration for being merged with the city limits.

Within Pune’s urban growth influence, Sus village’s socio-spatial structure of community is rapidly changing, as are its economic trends. The research area of Sus village and Pune region are analyzed at various scales in chapter 4 and 5. Figure 10 shows the regional plan zoning for Sus village. Broadly the region is divided in four main zones - residential, public and semi-public, agriculture-no-development and green belt and forest or hill top slopes zone.

While the thesis primarily analyses the fringe lands in the north-west of the city and reflects the conditions specific to this quadrant, it is possible that conclusions drawn and design strategies proposed for this area could be applicable to similar situations in the city.
Figure 10: Regional plan of Sus village

Source: Town Planning and Valuation Department, Pune
Social anchors like temples and traditional congregation squares have lost their meaning in unplanned rapid urbanization.
The new western models of multi-storied condominiums of globalized architecture abutting the traditional housing typologies generate social divide at subtle levels.
Large agriculture parcels are converted to residential and commercial use.
Landscape qualities are simply neglected in new developments.
In the last decade, large areas of Pune fringe witnessed rapid urbanization. The countryside landscape and indigenous vibrant village life transformed to be urban blocks of substandard and generic spatial forms.
Fragmented urban development in Pune fringe lands.
CHAPTER 2

Urban fringes in context of complexity theories
THEORETICAL FRAMEWORK
2.1 IN THE CONTEXT OF COMPLEXITY THEORIES

The application of complexity theories in the domain of urban design and planning, has led to a family of Complexity Theories of Cities (CTC). For an overview and discussion, see Portugali et al (2012). The theoretical framework for the research that follows is mainly based upon,

“Our argument that the original view that cities might be understood and modelled as general systems from the top down, where the focus is on simulating the system in equilibrium, has radically shifted to viewing such systems as being continually out-of-equilibrium with a dynamic driven from the bottom up”. (Marshall, 2012, p. 21)

Introduced by the British in the 1820s, a clearly differentiated land use approach has gradually built up to be the current planning system of centralized perspective for Pune. This is explicitly described in chapter 4. Additionally, for a detailed historical progression of Pune’s planning system the reader is referred to chapter 3. In the context of complexity theories, Pune region is a complex system and characterized by an interaction between bottom-up and top-down forces. These top-down forces might be imposed on the system, or might be the results of a process of bottom-up emergence. Also, Pune region is ‘far from an equilibrium state’. Although Pune region might seem stable over some time, it is important to realize, that this seemingly steady state condition does not equal an equilibrium. Furthermore, the future is uncertain and requires flexibility for optimal evolution. It may be supposed that more than an envisaged vision, ‘optima’ is a process.

Given the exponential growth, both in population and the size of the city, the built form of Pune is set to change dramatically. The situation of highest concern for urban designers, planners, governing bodies and various stakeholders is, how can this exponential growth be managed? If we consider the case of Pune from CTC’s perspective, we can achieve a new understanding of urban planning issues. In particular, the above insights from CTC have important implications in the following study in which we explore an approach – complexity approach – for Pune’s urban fringes and the coherent growth of contemporary Pune region. The attempt is to recognize a balance of both – top-down and bottom-up.

Figure 11: A tree and semi-lattice structures of sets.

Source: from paper, A City is not a Tree. Pg 80
2.2 LEARNING FROM OTHER CITIES

The theory studies two cities, Antwerp-Belgium and Addis Ababa, and a rural town namely Mendida, Ethiopia. These are studied as successful examples that incorporate the dynamics from the bottom-up into the planning process by means of a large number of micro stories. For each of them, the future growth proposal is not a product of traditional analytic top-down methods and therefore not a project, but rather a study that evolved in a process. The build scenarios access problems and opportunities, with a purpose to interpret the territory in a manner so as to gain new insights, to use them within new frameworks and come as close as possible to an anticipated vision. The final outcome of it is not only a flexible plan for future growth but a plan that evaluates political, technical, economic and other feasibilities for a coherent development. The Complexity approach that we explore in this thesis also builds upon similar lines. Towards the end of the chapter as inferences, general spatial principles are derived from each of the cities so as to use them as design tools for Pune region. However, contextual discrepancies are also noted here.

2.2.1 CASE OF ANTWERP, BELGIUM
(eco-city, porosity\textsuperscript{2}, mixite\textsuperscript{4})

Antwerp as ecostad, an eco-city

Antwerp as ecostad examines the options of reformulating and redefining the role, function and character of the city’s ecological infrastructure. Pre-existing green parks along with other public green spaces and available open patches are redefined with an aim to reinforce ecological and social connections. The eco-city concept builds upon the scenario growing-nature to study the diversity of landscapes. It highlights the Scheldt and water system that form the major vehicles for landscape diversities. Nevertheless, the parks, castle domains and historic military structures and the small woods form the micro landscapes. Together these occur in a dense and dynamic network. The approach proposes strategic spaces and actions that reinforce the links between them on different scales thus supporting the systemic character of existing green areas.

Antwerp as poreuzestad, a porous city

Various kinds of porosity exist. For the case of Antwerp, the three aspects of porosities studied are – the relationship between open and built spaces, different densities and the relationships between different land-uses. Within these, the ecological porosity\textsuperscript{2} reflects on the “in between city”\textsuperscript{3}. Playgrounds, small patios, gardens, hedges, rows of trees, open green areas and remains of agricultural patches are some elements that show the potential as ecological-porosity of urban fabric. These can confer continuity onto the various grains and facilitate links between built fabric and open space besides restoring large areas of ecological importance at city scale.

Garden cities rich in private open spaces often have little public spaces. The modern city’s open spaces do not invite its inhabitants as much. As opposed to this, the porous city theme encourages infrastructure and facilities for improved sociability by creating appropriate open spaces and micro fabric of links for bicycles and pedestrians. However, the percolation of social activities might find more resistance than natural ones; therefore accessibility and connectivity of different places will
Legend
- tree lines
- woodlands and forests
- bushes
- pasture and non-cultivated lands
- arable lands
- grasslands
- existing valuable and protected green areas
- other existing green areas
- agricultural landscape to preserve and valorise
- potential city and regional woods
- overflowing wetlands for zones
- links to the Scheldt

Figure 12: (left), Reinforcing heterogeneity. (bottom), Eco-city as guideline.

Source: from book Antwerp, territory of a new modernity. pg 42-59
have to be made easy.

The porosity² concept believes, if agriculture activities cease, “re-use of agricultural areas depends on the evolution of farming as an economic activity; the highly fragmented patches could be the beginning for investigating a new role for agriculture in contemporary urban space meaning neither large scale cultivation nor richer and smaller parcels sustaining a family but perhaps urban agriculture that participates in the rhythms and practices of the urban populations.” (Bernardo Secchi, 2009, p. 109)

Antwerp: villages and metropolis

In a metropolitan two kinds of facilities play roles: local and global. These facilities are linked by one or many ways. To create a new dynamic and competitive urban environment that contributes to renewed welfare these facilities can be imagined as working together. This all-inclusive approach is explored in the concept of villages and metropolis. It constructs two scenarios, one in which villages and metropolis are merged together in public facilities. The second scenario builds upon policies that increase mixité⁴. Large parts of the city lack social and functional mixing. With the concept of mixité applied, the design encourages mixing and clustering different kinds of facilities from sports to culture so as to create more efficient urban areas alongside a social balance.

Figure 13: Porous-city as guideline

Source: from book Antwerp, territory of a new modernity. pg 92-111
urban centralities
urban district
districts in the tussenstad
new cultural and recreative clusters
reserved areas for cultural and recreative clusters
existing recreative facilities to requalify
possible locations for new cultural and recreative facilities
main commercial spaces
commercial streets to requalify
existing commercial areas to improve
new commercial areas to develop
activity areas to requalify
activity cluster to requalify (diamonds)
cultural centralities to link to economic sector and tourisme

Figure 14: (left and bottom), Village and metropolis as guide-city

Source: from book Antwerp, territory of a new modernity. pg 112-133
2.2.2 CASE OF MENDIDA IN OROMIYA, ETHIOPIA

(Educity)

Mendida is a village located in Oromiya where *educity* stimulates the city growth. The concept of *educity* focuses on education as a fundamental factor of development. It is combined with other fields of development like energy, ecology, and economy. Through the distribution of education networks, a system is established by means of which community growth and sustainability evolves. The first phase of city development starts with the establishment of a vocational school. These as main centres of the settlement promote further expansion of the neighbourhood. Combined with other city activities, a programmatic interface is established for the city’s residents, who get involved in the learning process while the school grows to become a social space for the community.

Figure 15: Overview of interface between the school campus and city

Figure 16: Plan of agricultural schools

2.2.3 CASE OF ADDIS ABABA, ETHIOPIA

(Proxemics®)

The project investigates the tool of proxemic urbanity. “It is argued that proxemic urbanity as a cultural strategy is capable of engendering spatial, social, and cultural intersections for a group of users.” (Marc Angélil, 2010, p. 55)

The model uses the instrument of social networks to blur the existing sharp divide in urban structure. The primary idea is to integrate public spaces and indistinct private spaces in a collective system to define urban networks of key nodes (areas of high density). These are further equipped with dual purpose facilities such as schools, churches, markets and other social infrastructure so as to create a dynamic polycentric conglomeration of social functions. Instead of being based solely on centrality, multiple-accessibility anchors become strategic locations from where further development spreads. Current mass-development is countered by empowering people with education. Further this is combined with Ethiopian traditions and community culture to create a distributed social network.
2.3 INFERENCES

2.3.1 LESSONS FROM ANTWERP

**Eco-city**

- The fact that each area is a part of larger system is taken into consideration. Therefore, missing links are indicated and integrated in strategic areas of transformation.
- Existing green structures are linked to form a continuous ecological system that maintains the possibility for permanence of an evolving nature in the metropolitan region.
- Large collection of small landscape elements of forests, tree lines, hedges and other quality landscape areas can contribute to high ecological value of the city region.
- Searching for short-term local actions that lead to long-term regional benefits; several abandoned, decommissioned and polluted areas along the river could be introduced into a system of recreational areas.
- Residual agriculture lands can be transformed into public gardens, individual flower and vegetable gardens, small scale areas to house private animals, and or create children farms.

**Porosity**

- Morphology of high density areas is the first step to start reflecting on *porosity*. There, open spaces comprise of interior gardens, existing squares and paths. To explore new spatial configurations these should be made accessible and be integrated to its immediate urban context by introducing new functions and programs of mixite.
- Consider unused or under-used lands, vacant areas and existing natural patches to create continuous accessible open spaces in high density areas. Maintain ample open space in high density urban blocks.
- Re-use vacant areas and empty buildings.
- Integrate existing natural corridors to slow-mobility infrastructure (bike paths and pedestrian streets).
- Introduce agriculture as contemporary living urban activity.

**Mixite**

- Integrate local and metropolitan facilities to create a multimodal metropolis. Local facilities consider factors such as accessibility, parking availability, environmental quality and proximity to other facilities on same level.
- Mix local facilities with those of a higher level in such a way so that they can enrich the city as a whole.
- Increase *mixite* in single-function areas by integrating land use functions and space where different activities (living, work, leisure) coexist.
- Small recreational areas and local facilities such as playgrounds are distributed all over the
urban fabric and main facilities are concentrated along public transportation lines.
- Maintain social and functional mixite in neighbourhoods by clustering different facilities like sports and culture, playgrounds and education institutes.
- Social mixite facilitated by providing safe public space as the principal place for meeting of differences in an atmosphere of conviviality.
- Create quality living environment for people of different age groups and social classes.

2.3.2 LESSONS FROM MENDIDA AND ADDIS ABABA

**Educity**

- Provide an easy access to education. This may be done by proposing vocational schools, community learning centres.
- Involve a large part of the society in the learning process by means of programmatic interface, which could be established by combining education centre with other city activities like library, dormitories, auditoriums, public sanitation points, street markets.

**Proxemics**

- Overlap public and private occupations. Promote land-use mixity, mixed density and a combination of spatial typologies.
- Incorporate plots for upgradeable urban agriculture. Decentralized network – connect markets, schools and other sub-centres to fringes and proposed upgradeable agriculture plots by means of roads and accessible green corridors.

Definitions,

1. Ecology
   “Etymologically, the word ecology refers to relationships between species, including the human one, and their habitat.” (Bernardo Secchi, 2009, p. 43)
2. Porosity
   “Porosity is a material condition; it describes the propensity of a material to become subject to percolation and infiltration. Porosity is not a static condition; it is related to different phenomena that can modify the way urban space reacts over time, to practices and movement, pressure and abandonment.” (Bernardo Secchi, 2009, p. 93)
   “A porous-city is an urban space where voids will play an important role. Voids are not only open spaces but they are also areas with no role or use.” (Bernardo Secchi, 2009, p. 103)
3. In between city
   “The socio-spatial landscape what we call the “in between city”, includes that part of the urban region that is perceived as a not quite traditional city and not a quite traditional suburb.” (Sieverts, 2003)
4. Mixite
   Mixite means a mix of functions, but also a mix of low income and private housing, small and large houses and a variety of urban forms. (Bernardo Secchi, 2009, p. 129)
5. Proxemics
   Coined in 1966 by the anthropologist Edward T. Hall, the term proxemics is defined as the study of the cultural, behavioural, and sociological aspects of spatial distances between individuals. Proxemics defines more than just distance: it acknowledges varying social interactions within different types of space. It refers to physical closeness and contact as well as the absence of contact. (Marc Angélil, 2010, p. 55)
CHAPTER 3

City’s contemporary urban form traced from its past
PATH DEPENDENCY
3.1 HISTORIC EVOLUTION

“Most generally, path dependence means that where we go next depends not only on where we are now, but also upon where we have been” (Liebowitz S, 2000, p. 981).

Every city is a complex system. Complex systems over time are assumed to be ‘path dependent’ to a certain extent (Martin and Sunley, 2006). In other words future developments build on historical developments and are partly determined by resulting conditions (Juval Portugali, 2012, p. 216). This concept of path dependence in the context of Pune’s urban growth is reviewed in this chapter. Since its origin several events have transformed the city’s morphogenesis. Critical reading of the historic layers uncovers the various natural and urban processes that succeeded over others in its path towards current urban form. From history we know – What has been the reason of growth of the city? What worked in the city? Why is the city the way it is today? The study gives insight into how formal and informal events and norms have evolved, thus illustrating the shifts in planning. The study not only builds the contextual background for the city but also provides information about trends that moulded society’s response to different issues, transitions in social environments and processes in the forming of the city.

The city of Pune has a long history and tradition. However, we structure the chapter into four distinct periods. These are based on ‘Pune’s urban personality’ as it evolved and changed through time and in space written by the authors Jaymala Diddee and Samita Gupta in their book Pune: Queen of the Deccan.
Figure 19: Historic evolution of Pune.

Source: map by author, data used from PMC.
The Core \textit{(Before 1820)}

The Peshwai city of \textit{peths} \textit{(Before 1820)}

The Cantonments \textit{(After 1820)}

PMC \textit{(1950s)}

PMR \textit{(1970s)}

Figure 20: Scales analysis.

Source: map by author, data used from PMC.
3.2 THE CORE
(Before 1820)

The current core is known to have existed as a town since 758 AD. Originating as a hamlet at the confluence of two rivers, Mula and Mutha, the city grew very much like today - through the process of taking in lands at the periphery and more villages as need arose. The four settlements, the main Kasba, Shahapur around the Nageshwar temple, Murtazabad along the river and the chiefly low-class community located in the land beyond Nagzari and between Shahpur and the river appear to all have been ancient settlements. Fishermen and farmers and a few households that belonged to Brahmin community comprised the original nuclei. Since traditional times, industries associated with pollution, may it be noise, smell or smoke, would be set up on the outskirts of the settlements. Therefore, the potter’s colonies that require kilns and produce smoke, marked the northwest boundary of Pune then.

During the times of minimal technical advancements, natural elements played a significant role towards structuring the city. First spatial developments were in the form of houses and shops with earthen terraces or tiled roofs. These developed as neighbourhoods but remained confined between the two streams Ambil and Nagzari that run in north-south direction. The main artery of communications in the city naturally lay north-south. East-west communications could not be established without re-fording the river. Monsoon floods in the Ambil stream in 1753 caused severe damages to wards and its inhabitants. To avoid recurrence of any such event in the future, the stream was diverted by the ruler. Only after the diversion of the stream, were more wards added to the existing ones. Over a period of time, due to the available flat land, the development spread in all directions and the city grew from a single centre outwards. Nevertheless, at a regional scale the settlements and wards developed only to the south of the Mutha River.

For its strategic location, the city and its surroundings have often been an administrative centre of various dynasties. Throughout the 17th century, Pune (then Poona) was a centre for military base. This led to the settlement and residence of important political personages and officials and brought in the retinues and the trade that went with such settlements. The city’s easy access to Bhor pass gave it economic benefits. As the city lies in the rain-shadow region of the Western Ghats it suffered from irregular rains. Therefore, the area frequently experienced drought and famine. The city depopulated and repopulated regularly for these times and also in times of political troubles. However, the city continued to grow.

Figure 21: (a) The Core (Before 1820), (b) PMC administrative extent (2011)

Source: map by author, data used from PMC.
Figure 22: (left), Salt Henry: Poona, plate XIII, engraved by Daniel Havell 1785-1826 (1809) – Watermark of natural landscape of Pune city core as in historic times. (center), The painting depicts a common scene on Sadar Bazzar Street where two social groups Hindu and Muslim work harmoniously. (right), One of the architectural prides of Pune, Visharam Baugh Wada façade in historic times.

Source: http://www.slideshare.net/avinash15/old-pune-2 last accessed on 20-11-2014

Figure 23: The historic core of Pune city.

Source: Drawn by author, based on theoretical descriptions from the books, Pune: Queen of the Deccan and Poona: A Socio- Economic Survey, Part II.
3.3 THE PESHWAI CITY OF PETHS
(Before 1820)

“The shrines and paars\textsuperscript{12}, little cul-de-sacs, sudden widening of tortuous lanes, trees, orchards, gardens, and above all, the inner courtyards and outer angans, small yards, created an integrated and spontaneous townscape” (Jaymala Diddee, 2000).

The fortune of the city changed dramatically during the Peshwas rule when they made the city their capital. They gave stability and direction to the city, catalysed music, dance and drama and transformed the place into vibrant community planning units from where the city grew and national culture flourished. This era is considered to be the golden era of the city during which urban growth experienced centralities of orchards, gardens and temples and developed specialized economic alleys. Other public amenities like water tanks, gymnasia and ward offices and police posts were also provided for.

The social structure was reasonably heterogeneous. Although there were caste-based localities, total segregation by caste or class was absent. Religion was fostered by the building of temples and mosques and these at certain places still stand in same neighbourhoods and make evident religious tolerance in the diverse community.

Each peth\textsuperscript{11} was a walk-able, human scale and mixed use spatial setting which included some manufacturing and commerce and micro-scale planning principles.

\begin{figure}[h]
\centering
\includegraphics[width=0.8\textwidth]{figure24.png}
\caption{(a) The Peshwai city of peths (Before 1820), (b) PMC administrative extent (2011)}
\end{figure}

Source: map by author, data used from PMC.
3.3.1 SHET MAHAJANS SYSTEM

As the city expanded, clearly demarcated neighbourhoods were to develop under appointed caretakers known as Shet Mahajans with public amenities and paved roads built in given time frame. Specifically, he had to ensure the growth of the peth, and initiate economic activities by establishing shops and bazaars (markets) for both local crafts and imported goods. The system of land pooling, rearranging and aligning and redistribution through a system of pricing and collecting development fees from users was followed. All stakeholders would know each other by names and the system showed complete transparency and integrity.

“Thus the peths' development was a self-financing, joint venture, growing viable and integrated urban patterns, enabling access to urban services, amenity spaces and public ease of movement” (Benninger, 2010).
Figure 26: (right), Plan of Kasba peth as surveyed in 1997, (bottom), Pune of the Peshwas (1818).

Source: Drawn by author, Data used from the book, Pune Queen of the Deccan.
Figure 27: Growth of Pune peths (1300 - 1789)

Source: Drawn by author, Data used from the book, *Pune Queen of the Deccan.*
3.4 THE CANTONMENTS

(After 1820, Poona of Anglo Indians)

The on-going indigenous process of urbanization was interrupted when the British won Pune at the Battle of Khadki in 1818. Under the British rule the city saw a second major urban phase. The strong culture followed in the core of the city was problematic for British rulers. As the war had yet not ended it was only politically prudent for the new administration to set up outside the core. One cantonment\(^6\) was set up in extensive open area at the east of the core now known as Pune Cantonment or locally popular as Camp area and the other was established north-west of the core beyond the river course namely Khadki Cantonment.

Pune taken by foreigners’ rules of the society changed. The new system changed the city’s shape, economic centre, demographic structure, politics and social space. An authoritative centralised top-down system in urbanization was introduced. For the first time zoning by land use into military barracks, residential and market areas was implemented. Strict building rules were being enforced to limit heights of built structures. Double levels were permitted only for residential purpose dwellings. In an attempt to generate english-speaking working class British introduced their own education institutes. The city’s first library was established in 1823 for the employees of the East India Company. Along with British, other communities like the Jews, the Bohras and the Parsis moved to Pune. Formal Christian, separate Parsi and Muslim schools were started. Caste considerations were strongly evident in the society. Regional economies were facilitated over the local. During the Peshwas regime the streets that were naturally oriented north-south were now cut transversely to connect the port of Mumbai located westwards of Pune. With these east-west corridors major restructuring of streets and built spaces occurred. Several vernacular edifices, temples and social congregation squares that functioned as significant anchors during the golden period of the city were destroyed. Moreover, Pune’s architectural pride, the great wadas\(^{14}\) were transformed to now function as storage space, office structures and or army barracks.

Spatial distributions of structures in the cantonments all over India have uniformity except for variations of topography and climate. Compared to the core, the cantonments\(^6\) had a small population. Most of the population consisted of European army officers with families who lived in a typical secluded cottage like a bungalow each set in a garden plot. A large part of the canto-
-nment area developed in line with socio-cultural specificities of the colonial community. The type of development was low rise and low density and it followed strict hierarchical ranking system of the army. Protestants and later catholic churches were built as focal points for religious life of European troops and officers.

Figure 29: (a), Poona and Kirkee cantonments with city of Poona
(b), Poona cantonment, suburban municipality and city wards - 1937

Source: as it is from the book, Pune: Queen of the Deccan, pg 172 and pg 176.

Figure 30: The Cantonments

Source: mapped by author, based on above maps and theoretical description from the book Pune: Queen of the Deccan

Legend
- The Core
- The Cantonments
- Commercial Zone - Sadar Bazaar, about 1890
- Rivers or streams
- East-west regional road networks
- Railways
- Centralities - Churches, clubs, markets, hospitals
- Education institutes
3.5 TOWARDS A METROPOLIS

3.5.1 PUNE MUNICIPAL CORPORATION (PMC) AND PUNE METROPOLITAN REGION (PMR) ESTABLISHED

(Post-independence)

With independence, the cities in India had to be adapted and moulded to the new vision of nationalist India, a vision of modernism and secular nationalism. However, it largely followed the concept of path dependency. Traditionally an administrative, academic and military base Pune’s economy largely relied on activities connected to administration (for example Headquarters of the Revenue Department, State Legislature held here) and within a few years the city developed several education and research institutes (like Pune University, National Chemical Laboratory) and was selected to be home to the National Defence Academy. Only in the 1950s and 1960s Pune was preparing to change its role to that of an industrial city. Rapid upgrading of infrastructure, road construction and widening, public transport, drainage, sewage lines, removal of garbage and improvement in health care occurred. This was also due to the fact that in 1950 Pune from a Municipality was raised to the status of a Corporation.

The area within the municipal limits increased from 44 to 139 km$^2$. With the expansion of city limits and the unprecedented increase in population due to the sudden migration from rural areas and also of refugees after partition the civic body came under tremendous pressure to provide amenities and services which were beyond the scope of its resources. However, small but successful planned town planning schemes developed at Shivajinagar and Ganeshkhind. To ensure a planned development a comprehensive framework was articulated. The first Master Plan (1952) for Greater Poona framed norms for zoning and reservation of land for public use, building bye-laws, road widening along with traffic management and improved water services and slum situations. It suggested eight new Towns Planning Schemes (TPS) with provisions for residential, commercial, educational, amenity and green spaces and other services for water and sanitation. However, before it could be commissioned it was superseded by a new law – The Bombay Town Planning Act of 1954 which further was replaced by the Maharashtra Regional Town Planning Act of 1966 (MRTP). This was in response to the unrestricted industrial growth in the Bombay-Pune region. Later, for an integrated and coordinated development of the region

Figure 31: (a) PMC administrative extent (2011), (b) PMC expansion as proposed by PMC. Regional structure and population distribution (2011), Pune region showing outer ring towns (in green) and inner ring towns (in orange).

Source: map by author, data used from PMC.
it was understood that planning must consider not only the town but also the hinterlands. Therefore, the State Government established an area known as Poona Metropolitan Region (PMR) and set up a Planning Authority Board that prepared the first Regional Plan (RP) meant for PMR by 1970 which was sanctioned in 1976.
3.5.2 INDUSTRIAL PUNE

Industrial growth in Mumbai had reached a saturation point hence; further growth was restricted in Mumbai. In the region Pune was preferred over other cities for ease of access to the principal markets in western, northern and southern India. Other factors that contributed to this shift of industries to Pune were the available vacant lands at cheaper rates as compared to those in Mumbai, presence of a well-educated workforce and a large number of unskilled people who could be trained to become skilled industrial workers (Nath, 2007). Primarily, industries developed along the road and railway corridor connecting Pune and Mumbai and recent highways that radiated from Pune’s core to the other cities in the state of Maharashtra. However, eventually factories developed in a uniformly distributed manner on all sides of Pune. In the north-west of the city the Pimpri-Chinchwad-Bhosari industrial complex developed with over 7000 units. To the east lies the, emerging Ranjangaon Complex on the Ahmednagar road while in the south, industries are coming up along the Satara Road.

With the industrial developments Pune witnessed two types of migration, both in search of employment. Unskilled labour worked in factories or tertiary sectors. The second group of people were the highly qualified professionals who worked in sophisticated office environments. Some of the large scale industries like the Telco and Bajaj Auto developed a complete urban complex for worker’s housing, training and educational facilities. Hindustan Antibiotics was set up by Central Government that also built a housing colony for workers which also included shopping centres, gardens, schools, a hospital, a theatre, and a regular bus service to the city. Most workers from small and medium scale industries could not take such a holistic approach to industrial growth. Workers and their families settled themselves in familiar environments of shanty settlements that came up around the modern factories.
Figure 33: Industrial Pune

Source: map by author, data used from PMC

Legend
- IT industries
- PCMC
- Rails
- NH4
- Primary industrial roads
- Roads network
- PMC city boundary 2011
- Urban fringe admin-boundary 2011
- Rivers
### The Core

**natural systems**  
- rivers & streams  
- topography: plateau region, hilly terrain  
- rain shadow region

**social**

**economic**

**environmental**

**top-down and bottom-up dynamics**

**centralities**

**scales**

**spatial qualities**

### The Peshwai city of *peths*

**heterogeneous community of natives and locals**  
- Hindus, Muslims, Marathas, Malis

**no hierarchies**

**local economies - specialized economic alleys**

**centralities - orchards gardens**

**social anchors - Temples, paars, squares**

**water tanks  gymnasiums  ward offices  police posts  Temples  Mosques**

**culture flourished - music, dance, drama**

**small scale / local scales**

**high density**

**low rise**

**integrated urban patterns**

**pedestrian friendly, walkable, human scale**

**mixed use spatial settings**
### Towards a Metropolis

<table>
<thead>
<tr>
<th>The Cantonments</th>
<th>Pune Municipal Corporation established</th>
<th>Industrial Pune</th>
</tr>
</thead>
<tbody>
<tr>
<td>heterogeneous community of foreigners and locals Christians, Parsis, Bohras</td>
<td>heterogeneous community of locals and non-locals Brahmins, Sindhi, Punjabi immigrants</td>
<td>cosmopolitan society mixed community, urban and rural</td>
</tr>
<tr>
<td>hierarchies followed</td>
<td>- - - -</td>
<td>increasing awareness towards social equality</td>
</tr>
<tr>
<td>regional economies</td>
<td>national economies</td>
<td>elite class enjoy benefits</td>
</tr>
<tr>
<td>centralities - Churches clubs</td>
<td>centralities - historic structures, major urban nodes</td>
<td>national and global economies</td>
</tr>
<tr>
<td>social anchors - clubs, markets</td>
<td>social anchors - sports stadium (Nehru Stadium), auditorium (Bal Gandharva Rangamandir, Tilak Smarak Mandir), Temples and other religious structures</td>
<td>initiatives towards sustainable economies</td>
</tr>
<tr>
<td>markets hospitals Churches</td>
<td>social anchors - cinema halls, restaurants, shopping complexes, temples and religious structures</td>
<td>social anchors - sports centers, cinema halls, restaurants, shopping complexes, temples and religious structures</td>
</tr>
</tbody>
</table>

- large scale / regional scales
- growth of activities related with administration and education sectors, limitations - urban base do not favor fast economic development
- car based neighborhoods

- low density
- low rise
- segregated and isolated urban patterns
- grid pattern

---

Figure 34: Historical time line, Pune city.
Source: illustration by author.
3.6 INFERENCES

Pune city has experienced incredible growth in the last two decades. However, it still remains a place where the past meets the present. This is more evident in the core of the city where community life has not yet been fully sacrificed to the anonymity of modern cities, where one can still stroll through the narrow meandering lanes that are typical of the area and admire the timber framed *wadas* with planned, open courtyards and connected wells, where temples are still vibrant places for religious and social interactions, where *paars* continue to function as village squares. To sum it up together, the core has emerged such that the urban fabric is experienced as a unified space in spite of the many differences in the composition of the various blocks.

With the *path dependency* study about the making of the core, the socio-economic culture that developed in the existing geography is ascertained. The top-down planning system had yet not been framed. This phase may be paralleled to the concept of spontaneous towns or natural cities. Natural cities are defined by Christopher Alexander in his paper *City is not a Tree*. Clearly, throughout its emergence the core remained a strong magnet in the region from which the city grew. Today it defines a single center. Next followed the period of the Peshwai city of *peths* - the *peths* grew organically in spite of being officially ‘established’ by an individual at government initiative. The delicate balance of kinship and community networks, the creation of community spaces and the growth of an urban culture developed of its own volition (Jaymala Diddee, 2000).

The next urban phase was the emergence of the city under foreign rulers who built the *cantonments*. The industries came to Pune at a much later stage. The city started as an administrative, educational and cultural centre. Its administrative role started from the times of the Peshwas and continued during the British rule. The planned development during British rule defined the first steps towards a top-down approach for the city. Thereafter, alongside the advancements in technology, the regional scales became significant. Over a period, the top-down forces and bottom-up processes together emerged to establish the current approach to urban planning.

**Definitions**

6. Cantonments
   A cantonment is a military or police quarters. Many cities in the Indian subcontinent contain large cantonments of the former British Indian Army.

7. *Gaothan*
   Settlement/area of settlement (Jaymala Diddee, 2000, p. 301)

8. *Gram Panchayat*
   Local governing body.

9. Metropolitan
   In India, the Census Commission defines a metropolitan city as, one having a population of over 1 million and above. last accessed on 23-03-2015: http://censusindia.gov.in/2011-prov-results/paper2/data_files/India2/1.%20Data%20Highlight.pdf
10. Municipal Corporation
In India a Municipal Corporation is a local government body that administers a city of population 300,000 or more. It is responsible for roads, public transportation, water supply, sanitation that includes waste management, sewage, drainage and flood control, public safety services like fire and ambulance services, gardens and maintenance of buildings. The sources of income of the Corporation are various taxes. It consists of members elected from the wards of the city.

11. Peths
Peth is a general term for a locality in Pune. These were established and developed during the Maratha and Peshwa rule. Consisting of roughly seventeen peths now these are referred to as the old city.

12. Paars
Village squares - with a tree at the center a raised square platform used as seats.

13. Wards
In India, a ward is an administrative unit of the city region. A city area is divided into zones, which in turn contains numerous wards.

14. Wada
Typical Deccan mansion built of brick supported by timber-framing with one or more internal courtyard. (Jaymala Diddee, 2000, p. 301)

15. Natural cities
"I must first make a simple distinction. I want to call those cities which have arisen more or less spontaneously over many years, natural cities. And I shall call cities and parts of cities which have been deliberately created by designers and planners’ artificial cities." (Christopher, 1965, p. 377)
CHAPTER 4

The current state of Pune’s urban fringes
WHERE ARE WE NOW?
4.1 PUNE CITY AND URBAN FRINGES PROFILE

Constituted in 1967, Poona Metropolitan Region (PMR) today spreads over an area of 1605 sq. km. Refer figure 40. The region includes Pune Municipal Corporation (PMC), three cantonment boards of Pune, Kirkee, Dehu Road, three Municipal Towns of Talegaon Dabhade, Pimpri – Chinchwad and Alandi, and 127 villages. Of these 127 villages those which fall under the category of urban fringes (defined on page 009) have no ready data available for use. They are being currently surveyed. The process to prepare a base map, existing land uses and necessary area statements is in progress. The statistics referred to for this study are from a draft report prepared and made available for people in February 2000. These statistics may be old, however when combined with partial recent data acquired from PMC reports, town planning department records, newsletters, satellite image mappings and data procured on site by means of interviews, they give an overview of the fringe lands under scrutiny. Its social, economic, cultural, spatial and environmental profile is described in the next section.

4.1.1 SOCIAL, ECONOMIC, CULTURAL, SPATIAL PROFILE

According to the development plan report for the city of Pune, the population of fringe villages has been growing rapidly since 1971 and the growth rate has further accelerated from 1981 (PMC, 2000, p. 24). Sectors F and D are the fastest growing sectors. Refer figure 36 and 39. The population mainly consists of migrants, who choose to live in fringe areas due to the relatively low price of the rental properties/house plots. Also, for economic reasons about 63 % of the fringe lands inhabitants have migrated to the area from Pune district. Original residents form only about 27 % of the population. The average household size in fringe villages, as per the survey in the year 2000 was 5.2. Most households prefer private schools and private clinics. 54% of the students go to private schools. Among the non-school going age population, literacy level is high.

51.11% of the total population belongs to the income group category earning between INR 4000-7000 per month. As opposed to Pune city, the fringe area shows a predominance of the working class.

Figure 35: (a), map shows administrative boundary of Pune city as per year 2011.
(b), shows administrative boundaries of fringe villages under study.
Source: map by author, data used from PMC and Town Planning and Valuation Department, Pune
As per 1991 census data, household size,

<table>
<thead>
<tr>
<th>Area</th>
<th>Household Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban fringes</td>
<td>4.5</td>
</tr>
<tr>
<td>PMC</td>
<td>4.952</td>
</tr>
<tr>
<td>PCMC</td>
<td>4.559</td>
</tr>
<tr>
<td>Pune District</td>
<td>5.127</td>
</tr>
</tbody>
</table>

As per year 2000 development plan draft report for year 2021,

Education and literacy,

<table>
<thead>
<tr>
<th>Area</th>
<th>School-going age population (%)</th>
<th>Non-school-going age population (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban fringes</td>
<td>99.6%</td>
<td>88.4%</td>
</tr>
<tr>
<td>PMC</td>
<td>87.25%</td>
<td></td>
</tr>
</tbody>
</table>

Occupation sectorial classification,

<table>
<thead>
<tr>
<th>Sector</th>
<th>Urban fringes</th>
<th>PMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>9.67%</td>
<td>2.03%</td>
</tr>
<tr>
<td>Secondary</td>
<td>14.51%</td>
<td>27.10%</td>
</tr>
<tr>
<td>Tertiary</td>
<td>75.82%</td>
<td>70.87%</td>
</tr>
</tbody>
</table>

Occupation,

<table>
<thead>
<tr>
<th>Sector</th>
<th>Urban fringes</th>
<th>PMC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>5.0%</td>
<td></td>
</tr>
<tr>
<td>Self-employed (industry)</td>
<td>2.0%</td>
<td></td>
</tr>
<tr>
<td>Self-employed</td>
<td>19.4%</td>
<td></td>
</tr>
<tr>
<td>(commerce and trading)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial workers</td>
<td>5.5%</td>
<td></td>
</tr>
<tr>
<td>Government employees</td>
<td>5.0%</td>
<td></td>
</tr>
<tr>
<td>Other services</td>
<td>15.8%</td>
<td></td>
</tr>
<tr>
<td>House-wives</td>
<td>40.6%</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>6.7%</td>
<td></td>
</tr>
</tbody>
</table>

Pune metropolis population, 3,978,954
Urban fringe population, 43,1750
Sus population 4862

(Pune district’s population density has increased from 462/sq.km in 2001 to 603/sq.km in 2011).

Figure 36: (a), PMC population density map, (b), Map shows fringe lands population density.

Source: map by author, data used from PMC and Town Planning and Valuation Department, Pune

Legend

- below 5000
- 5000 - 10000
- 10000 - 20000
- 20000 - 50000
- 50000 - 100000
- above 100000
- cantonment areas (under military governance)
Travel patterns,
65.24% of the households own a cycle, 24.64% a two-wheeler and only 3.02% own a car. Most trips are on foot (49.8%) followed by bus (26%), cycle (11%), two-wheelers (8%). Only 1% travel by car. Of the students, 54.4% walk to their schools while 27% travel by bus. Predominant modes for students are on foot followed by bus. 38% travel to Pune city and 30% move within the village, while 11% visit neighbouring villages.

Spatial analyses (housing),
Of the housing units in the fringe areas, 12% are bungalows and the remaining are flats, chawls, semidetached row houses. 79% are owned by the occupying families.

Building materials,
The house walls are brick (86%), roofs are asbestos cement or tin sheet (49%) and floors are tiled (80%).

Building stolks,
20% (last 5 years),
30% (5-10 years),
39% (over 15 years),
10% (over 25 years)

Physical infrastructure,
Water, 82% of the population is dependent on the Municipal Corporation while 18% obtain water from wells, bore wells or tankers. However, the water supply is inadequate. (35-40 litres per capita, which in the summer, it is half the above figure)
23% (mostly original village residents) have no water closet facilities. Sewage disposal is done with septic tanks. With bio-gas plants installed, 0.07% of the households generate bio-gas.
About 44% households dump garbage on available open land. Others compost (6%), burn (2.5%) or dispose (3.5%) into road-side drains.
4.1.2 ENVIRONMENTAL PROFILE

Pune’s urban fringe topography consists of hills, undulated lands and river plains. A continuous hill range runs on the south of Pune. Of the total area of fringe villages that are newly added to the PMC limit, hills spread over an area of about 2356 hectares (PMC Volume II, 2000, p. 113). On the west the hill slopes vary from 6-12 %, 12-25% and more than 25% (PMC Volume I, 2000, p. 51).

The area under water bodies is merely 1.54 % (PMC Volume I, 2000, p. 42). The length of the river-front in the urban fringes is about 20kms. Flooding is not a problem in the region. For the case of maximum discharge from the reservoir, flood lines have been identified on both sides of the river.

The lands to the east of Pune region are fertile lands and have about 8 feet deep topsoil. These lands are suitable for agriculture. Irrigated agriculture lands are also located along the sides of Mula-Mutha River. The lands adjacent to the hills on the south of urban fringes are wastelands.

Suspended particulate matter (SPM) ranks exceptionally high in Pune. Of the surveyed locations Hadapsar area showed concentration of 1445.49 micrograms per cubic meter of air. Corresponding data for urban fringes are not available. The main source of air pollution in fringes is stone quarry sites. Other parts of fringes away from quarry sites and off traffic ways have good air quality.

Water quality in the Mula-Mutha has deteriorated. The rivers have become polluted as sewage is released into the streams (untreated in many cases). Industrial effluents are also released into the rivers. During summers the flow of fresh water is low.

The hills form a part of a large open space reservoir for the city. It has been estimated that over 75,000 people of all ages hike to the hill tops each day. This practice has developed into a socio-environmental institution particularly for the city of Pune (PMC Volume II, 2000, p. 98-113).
Figure 38: Map for Pune and fringe lands - marks village cores, hills, existing ecological corridors.

Source: map by author, data used from Town Planning and Valuation Department, Pune
CURRENT APPROACH
4.2 CURRENT PLANNING APPROACH

*Top-down urban planning model*

On the basis of geographical contiguity and natural barriers, the fringe villages have been grouped in the Regional Plan (RP) in 6 sectors – C, D, E, F, G and H. Refer figure 39.

4.2.1 BACKGROUND

In 1950 Pune Municipality was raised to the status of a Corporation. The first Master Plan for Pune (Greater Poona then) in 1952, laid down planning norms for the city which included zoning and reservation of lands for public use. Proposed development had to follow building bye-laws. It suggested the preparation of a Development Plan (DP) for Pune which would include possibilities for widening of roads and streamlining traffic, improve the supply of water and slum conditions. The DP was operative only after a decade in 1966. It dealt with the Pune old core separately from its adjoining villages and charted a hierarchical system of plans, programmes and town planning schemes. Only by the mid-19th century, contextual considerations arose and it was understood that planning must consider town and the hinterlands together. Therefore, in the following years the State Government established an area known as PMR and set up a Planning Authority Board that prepared the first RP by 1970 for PMR which was sanctioned in 1976.

4.2.2 URBAN FRINGE LAND’S GOVERNANCE TODAY

The current planning approach for the development of PMR is primarily top-down where in a three tier planning process is envisaged. In it, the Regional Planning Board (RPB) prepares the long term perspective plan for PMR and ensures a balanced and multi-sectorial growth in the region. The Regional Plan (RP) at the top lays down broad policies and directions of growth for all the lands in the region. The Development Plan (DP) for the Municipal towns in the

Figure 39: Sectorial divisions of fringe villages as in regional plans.

Source: map by author, data used from Town Planning and Valuation Department and PMC, Pune.
region forms the middle tier. It makes more detailed proposals for the towns. The Town Planning Schemes (TPS) forms the lower most rung which are action plans for selected sectors of the town.

Urban fringe lands fall under RPB and prior to its merger are merely divided into broad zones of residential, public and semi-public, agriculture and no-development, green belt and forest or hill top slopes. Refer to figure 10 in the introduction chapter. On its union with the city the PMC, along with consultants and a steering committee, monitors the plan making process and prepares a DP for the fringe villages. Statutory procedure as laid by the MRTP ACT of 1966 is followed to prepare and publish the DP in which existing land use (ELU) survey is done. In addition to ELU, other surveys include socio-economic aspects of the present population of the plan area, industrial survey, traffic and transportation survey. A draft DP is published for objections and suggestions for a period of two months. Once the DP is approved the new development follows the norms and policies as recommended for the city.

4.2.3 CURRENT VISION FOR PUNE’S URBAN FRINGES AND LIMITATIONS OF THE CURRENT PLANNING APPROACH

One of the objectives of the DP for Pune’s expansion is to develop a growth model which integrates the new developments with the existing developments and satisfies criteria of environmental sustainability. The present approach also emphasizes on equity and justice by means of distribution of public amenities (social and physical) among all segments of Pune’s population. The plan proposes to protect the existing water system and also weave the natural and cultural heritage sites into the urban growth. The newly added village settlements and particularly the village cores have evolved in an organic manner for over hundreds of years. After the inclusion with Pune city limits they could get swamped completely by city’s expansion. As per the Pune planning approach followed today this is unavoidable to an extent. Therefore, only distinguished heritage sites contained in them would be preserved. The large abandoned quarries which naturally hold water are suggested to be developed into gardens. The dry abandoned quarries and smaller quarries are proposed to be used for land filling (construction debris or normal biotic wastes). All hill tops and slopes with gradients greater than 1:5 are declared to be no-development green zones. However, a provision to construct 0.04 FSI (i.e., 4% of land area) is permitted.

Relating back to the theory of CTC, the Pune planning system is strongly driven by large scale - in both space and time. From a planning point of view, the ‘far from equilibrium state’ of the fringe lands and the whole of Pune region is not taken into account. Also, the inherent unpredictability of the development is ignored. The proposals are mainly top-down, based on projections made for in the future and derived from past trends. The plans are made for next twenty years. Furthermore, the current values and trends are by no means incorporated into development proposals. The Pune planning system disregards how the local environmental qualities of the fringe lands contribute to the region as whole and how local initiatives within these fringe lands might have a strong effect on the global whole.
Figure 40: Map for Pune Metropolitan Region as demarcated till 1997

Source: map by author, data used from Town Planning and Valuation Department, Pune.

<table>
<thead>
<tr>
<th>Region</th>
<th>area (in sq.km.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMC</td>
<td>139</td>
</tr>
<tr>
<td>Cantonments</td>
<td>64</td>
</tr>
<tr>
<td>Municipal Towns</td>
<td>75</td>
</tr>
<tr>
<td>Villages</td>
<td>1327</td>
</tr>
</tbody>
</table>

Legend
- PMC
- PCMC
- Cantonments
- Urban fringe lands 1991
- Urban fringe lands 2011
- PMR villages
- Rivers
- Other administrative boundaries
- PMR administrative boundary

Regional Plan

Development Plan

Town Planning Schemes
CHAPTER 5

CTC approach to mapping of Pune’s urban fringes
PORTRAITS
5.1 FAMILY PORTRAITS
(Biography of the region)

While exploring this alternate approach to urban planning the study maps ‘family portraits’ by means of micro stories. Micro-stories map processes. A number of families from Sus, Undri and Mohamadwadi villages were chosen for interviews. A few families were chosen close to the city’s edge and a few others were further away towards the rural lands. Some were located in the core of the sample village (Sus) while some others were on the primary road connecting the village core to the nearest urban center. Other families were located in the cultivable lands of the village. Besides the individual household’s everyday facts, the portraits include photographs, site sketches and maps, a detailed transformation of the farm lands and the site modification that has occurred in past twenty, forty and in some cases over more than sixty years. These can be read as the ‘biography of the region’ where the identity and strength of the villages are visible through three generations and also through time.

Figure 41: Map of Sus village, Pune where interviews were conducted.

Source: map by author
5.1.1 Dhanashree Ranavde

We are here from the beginning. I recall at-least three generations here. Sustenance is from farming. It is our main work. But it isn’t sufficient to sustain the family. So we also have dairy and poultry. We live close to the road. We also have a small garage. For cooking purposes, first we had chulha. Wood used to be burnt as fuel, only now is there this facility of gas stoves. The domestic gas cylinders are to be brought from the city and which is a commute of 4-5 kms from here. We are a big family. We need to bring cylinders every 15 days. We are three brothers staying together. Our house is a kacha house. But we have all facilities for our kids. We have a computer room. Television, fridge, sumo (SUV vehicle) are all so necessary in today’s times.

All the females take care of the farming. Although, we have the parcels divided amongst ourselves, we work on the field together. Each parcel of land is cultivated in turn. In our neighbourhood, there is a well from which water is pumped to everyone in the vicinity. MSEB provides the electricity. For sewage we have a septic tank. For most purposes, education, medical and purchasing we travel to the city. Safety is a problem here. My generation isn’t educated. My kids are taking studies as a priority. My son has all the knowledge of what could be added to the soil to get a good crop. He brings it all and tells us what to do. We just follow him. He has an interest in farming. The next generation, we cannot anticipate. It’s too early to say. We are still further far away from the main city.
Figure 43: Fields sketch 1, Sus village, Pune
Source: made by author

Figure 44: Farm animals, animal husbandry as secondary source of income.

Figure 45: Mapping dynamics from the bottom-up, land transformation illustration 1
Source: mapping by author on google earth image as base
5.1.2 Parkhe Family

My father possessed an agriculture land of about 10 acres (40,500 sq. mt.). Farming was my main family occupation; I and my four brothers have always lived in these fields. We know only farming and we love only farming. My children have studied 12th grade. I don't read or write. I have received a share of parcel which is about 1.5 to 2 acres of area. From my forefathers, I only have some knowledge of farming and small scale secondary businesses of animal husbandry. Farming is physical work. Often the produce is hampered by the unpredictable weather. The water in my well is declining. I now have a bore for my domestic purpose. First I lived in thatched roof houses. Later, in my young days, on the same land I helped my parents construct the mud homes for us. These are now store houses for my farm lands. Now, I have my own family which is further growing, my children are married. Including my grandchildren, we are 13 members in the family. We need more space to live. What is the alternative to improve our living? We try and accommodate ourselves on the same parcel of land from my father. We had this land. We made some savings. Now my children have built this concrete house. He hired a local contractor. We want to continue living at the same place for many reasons. We believe more in collective living. My brothers living on adjacent plots have similar stories to share.

I learn from my surroundings. Several tall apartments’ schemes are coming in the vicinity. It’s all a concrete jungle of buildings. Most of my farmer neighbours have sold their agriculture plots to the builders and moved to the city in the hope of better and as many say, trendy urban living. Of the few who are here, one’s son takes his herds of sheep to graze pasture lands in the hills around. Mix of urban and rural. I see my surroundings urbanising sporadically. Urbanizing is ok. But the process is important. The access road to my house is still a kacha (not tarred or built) road. It’s been over 40 years. It fills with water up to the knee during rainy season. The rain water run-off coming down the hill could be infiltrated. When the new international school 'Vidya Valley' came up here we hoped the road condition would improve. Many VIPs send their children to this school. We wait! We lost some part of the front in the road proposal, approximately 10 gunthas (1011 sq. mt.). One of the farmers here isn’t cooperating to give away his land to the road building in the hope to get a better deal. We understand. The waiting continues. If one has only that one part of the parcel, one fights to get the best deal. Sometimes some are unreasonable as well. We also had to sell one part of our parcel in the hills to a private industry under family disputes. Anyways, for that land, the soil quality was declining and the yields weren’t profitable. We let it go.

We don’t comprehend architecture and art. But where is the comfort?! The “ward sevak” (administrative person) changes, so does the vision for the neighbourhood. For medical services, for gas cylinders and for shopping, we manage to travel to the city. There are enough members in the family to work this way. All the females take care of the household and farming. Only men go out for service purpose. For any medical or other emergency we use private vehicles. Otherwise we commute by bus or auto-rickshaws. My children travel to the city for service on their motorbikes. My grandchildren are more inclined to getting education. They have a private bus to school. We spend INR 600 per child per month for this commute. Not all can afford this. It is approximately a distance of 10 kms. Almost an hour’s rough ride!
“The PMC has no mechanism to create basic infrastructure within its own limits. How is going to help us?” asked the villagers.
Figure 49: Fields sketch 2, Sus village, Pune
Source: made by author

Figure 50: (left), Cow dung used as a fuel, (center), Family owned well, (right), Private Temple built for family use.

Figure 51: Mapping dynamics from the bottom-up, land transformation illustration 2
Source: mapping by author on google earth image as base
5.1.3 Chandare

I am the only child of my father. From him, I received an acre land. We grew Jowari and Groundnut on the parcel. Cow dung as compost, we never used chemical fertilizers. The water in the well is declining. Only a part of the parcel is cultivated now to provide for our family’s annual requirement. If excess is produced we take it to the market to sell.

I was on the committee in the Gram Panchayath (local governing body) before. My wife is from the city. She knows nothing about farming. We first lived in chawls half a kilometre from here. My family was growing. The chawls area was small. We shifted to this parcel when we got this bungalow constructed here. It is 7 years ago now. The chawl is now made available on rental basis to students and workers from IT Hinjewadi area around. However as the quality of space is not good the rent fetched is for a short period and low; mostly the rooms remain empty throughout the year.

We have some habits from our life as a farmer. All farmers would have cows in their backyard and milk and milk products used to be consumed in high quantity in those days. Maintaining a cow is difficult in today’s life style. Today the backyards are serving parking space for my car and my son’s beloved bike. So, we get milk from a milkman. The packed milk bags are not good. Most of the farmers around have sold their lands to the builders and moved to the city. I stay here to be a developer one day. On one of my plots, I developed a residential tower of four floors. It has 22 flats of 1BHK and 2 BHK. The parcel was a triangular plot. So we had only 40 per cent share in it. The builder holds 60 per cent share and takes care of the complete project development. Land remains ours. The project is developed in the name of the builder. This benefits both the parties involved. On completion I would rent these flats. There are many nuclear families that opt for such apartments. I would have a fixed income then. If for a month or two I don’t have client, still the loss is not for the whole year as in farming. In the next scheme I see a scope for equal partnership.

My daughter is married and gone to her family. Our times were different. I studied only up to 5th grade. My son is a graduate. He wants to do a building business. Future generation is into construction businesses.
Figure 55: Fields sketch 3, Sus village, Pune
Source: made by author

Figure 56: (left), Owners bungalow built on part of the fields. Ground storey structure. (right), Multistoried surrounding developments

Figure 57: Mapping dynamics from the bottom-up, land transformation illustration 3
Source: mapping by author on google earth image as base
5.1.4 Nanasaheb Sasar

My previous three generations that I know have been farming in Sus village. We have a wada here. Our family of three brothers lived together in the wada. In 1982-83 we shifted to current location. We had a smaller bungalow here. This new and modern house is built in 2006. We cultivated around 4-5 acres (18211 sq. mt.) of land. Rice, jowar, wheat, vegetables were grown. 2 wells provided the water for the crops. My father passed away a year back. The farming passed on with him. My generation and the next one aren’t farmers any more. Both my brothers have business. One of them owns a brick kiln and runs an earth movers business. The eldest brother has a dairy. I also owned one. I discontinued the dairy business since 1995-96. We had large parcels of land. Now, there is no labour available around to sow the fields. Farming demanded hardship. It depends on unpredictable weather. The water is scarce. The field in between all the tall buildings was very awkward. Vast urbanization around made it difficult to continue agriculture. What would a farmer do? I had an interest in construction. It’s been four years now. I develop my lands. My first scheme I developed with a builder here. The land is mine. I have 1BHK (bed room, hall, kitchen) and 2BHK flats designed. It’s a single tower with 24 flats. Another scheme of mine is an 11 floor residential building. Including me, three partners are involved in it. First I started with construction works. Only now I do developing schemes. During this I have felt that the legal framework is very long. I think the zoning that happens only in 20 years must happen every 10 years. It takes more than 30-45 days to clear a land title for development. Illegal things will stop if the government co-operates. We follow all the rules prescribed by the government. What I understand is might it be Shivajinagar (urban center), Narayan Peth (urban center) or Sus (village) the development is all the same everywhere. The land rates in the city area just abutting my land are higher by 200 INR per square feet. I have no formal education in construction. I cleared up to 7th grade. Life experience and surrounding developments have taught a lot. Land is our asset now!
5.1.5 Ghule Brothers

I am Mrs Ghule. I married into a farmer’s family. My husband has three brothers. Two of them live next to us. One has moved to Hadapsar (close-by urban area). He owns a flat there. Once, they all lived in mud houses at the old city limits. Only in 1998, they shifted to this bungalow where we stand today to speak this story. My husband tells me; not more than few years back, here it only used to be fields. Now the city has come to us. Mahadev wadi gaon (village) is now known only as Mohamadwadi. It used to be governed by the Town Planning authority. Only recently, it is inside the Pune Municipal Corporation (PMC). Today, we pay more taxes and do not get incentives of farmers. The basic services of electricity, water, sewage and garbage are all taken care of by PMC. However, the garbage take-away truck frequency is not consistent. So we walk by ourselves to dump it nearby. For many general purposes we travel to the city. It is close to us. The bus services are there. But it is faster with our two wheelers. My father in law gave us our share of one acre (4046.9 sq. mt.) land. As a farmer, we cultivated cereals and vegetables in it. To retain the soil quality we alternated the crops. In spite of all efforts, it did not fetch us enough income for living. So we also had a dairy. The cow dung fertilized our fields. The dairy business has grown well for us. We no more do farming for living. We only grow corn for our cows in the parcel. If you ask today, my children might not know anything of farming. My daughter is graduating to be an engineer. My son is in an English medium school. I can anticipate that, they would develop their career in the service sector.
5.1.6 Bhintade

We are a family of five brothers. We all are farmers. We lived in the core of the village which is just half a kilometre away from here. There was no facility of proper toilets and our families were growing. Our father possessed this parcel of agricultural land. Only recently, about 5-6 years back we all shifted to this farm land. Here we got separate homes built for each brother. My house was built by a team of architect and contractor. In this new house lives my family of 11 people. I have my share of 1 acre (4046.9 sq. mt.) land. I grow corn and wheat on it. My son is educated to 10th grade and presently unemployed. He takes only small jobs at intervals in the nearby locality. His earnings cannot be said to be consistent. The food for the family comes all from the agriculture produce on my own land. We are not rich people. We own only two wheelers. We don’t have a car. My generation never got education. The importance of education came only now. I know only farming. And it is a very strenuous job. I worked hard when I was young. I had to. Now I am old and I am mostly just at home. I am habituated to having a large glass of milk freshly drawn from my own cow. So, I bring two cows from my native village here. It’s healthy to have your own dairy products. It’s comfortable to have them at home so as to ensure quality along with enough quantity. My nephew is driving the water tanks. There isn’t enough water in our two wells, so we fill water from a near-by well, and sell/supply it to those who need it. It is a private business. With the current urbanization speed we can anticipate that the land prices would only increase in the coming days. We want to retain our land parcels for a little longer. For now, we can afford to send our children to English medium schools. Hadapsar is close by. For any general purpose if needed, we travel back and forth quite easily. Work is close by, the city is close by. I cannot tell what and how things would work to be in future. Today we cultivate our parcels collectively and prefer to live here. Living together is our strength. How much ever yield we get from our lands is sufficient for our living and the cycle continues. Tomorrow, you never know, it may so happen that we become developers of our own land and discontinue agriculture completely.
### 5.1.7 INFERENCES

<table>
<thead>
<tr>
<th>generation</th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>social structure</td>
<td>locals, homogeneous large collective living</td>
<td>locals, homogeneous large collective single family living</td>
<td>locals + immigrants heterogeneous, nuclear living</td>
</tr>
<tr>
<td>age between</td>
<td>70-80</td>
<td>40-50</td>
<td>20-35</td>
</tr>
<tr>
<td>education</td>
<td>nil</td>
<td>4th grade</td>
<td>graduation, 12+3</td>
</tr>
<tr>
<td>building typology</td>
<td>kacha houses, thatched houses</td>
<td>concrete homes</td>
<td>condominiums</td>
</tr>
<tr>
<td>primary economic source</td>
<td>farming</td>
<td>brick kiln, earth movers, poultry, dairy, garage</td>
<td>developers</td>
</tr>
<tr>
<td>secondary economic source</td>
<td>poultry, dairy</td>
<td>farming</td>
<td>service oriented jobs</td>
</tr>
<tr>
<td>modern facilities</td>
<td>nil</td>
<td>television, fridge, computer, aqua guard</td>
<td>television, fridge, computer, aqua guard, internet</td>
</tr>
<tr>
<td>private commute equipment</td>
<td>on foot, bicycle</td>
<td>two number of two-wheelers per family, one car per family</td>
<td>two number of two-wheelers per family, one car per family</td>
</tr>
</tbody>
</table>

Figure 65: Bottom-up dynamics study. Conducted in 2014 for Sus village, Pune

Source: by author
WHERE ARE WE GOING?
5.2 VALUES AND TRENDS

Existing high densities and high land prices together with scarcity of land availability for new construction within the current city limits, the low density fringe regions come to be positive features. Therefore, in general the IT industries of Pune established their base in fringe lands. The impact on other sectors in terms of location is that people who work in these industries prefer to live close to their workplaces. In addition, with the exponential growth in population, from 2001 to 2011 the annual demand for homes has increased from 20000 units to close to 46000 units. Therefore, now a major portion of green fields in fringe lands have transformed to residential land use.

5.2.1 SOCIO – SPATIAL TRENDS
(IT industry’s impact on social life – emerging hierarchies)

Moreover, the IT wage standards have increased the incomes of many households. Coupled with the ready availability of home loans, the residences that were previously beyond the reach of middle income group buyers are now easily affordable. The changing population structure (inflow of immigrants in abundance) and social dynamics (traditional society transforming to cosmopolitan society) has had a significant impact on the demand for real estate, both in terms of sizes and types of homes. Families now desire a large flat with ultra-modern amenities and on locations which offer access to the city’s IT hubs.

Therefore, with the IT boom Pune’s real estate sector saw great opportunities. The private real estate developers build residential communities where they promote a world class lifestyle. These gated neighbourhoods bring new hierarchies. The traditional housing typologies were single storey individual houses modelled in a collective setting. Families lived together and remained interdependent for the cultivation of large agriculture plots and the production economy. The new western models of multi-storeyed condominiums of globalized architecture abutting the traditional housing typologies generate social divide at subtle levels. These with time are becoming very evident bringing in a strong divide in communities and social groups. The local culture is fading and in general the gap in society is widening.

5.2.2 MORPHOLOGICAL TRENDS
(Spatial transformation of Pune’s fringe lands after the IT industries boom)

The following pages illustrate the spatial transformation of fringe lands mainly the chronicles of four large scale residential developments in recent years.

- An originally small rural locale in the fringe lands (northwest quadrant) of Pune, Hinjewadi is now the location of Rajiv Gandhi Infotech Park, a project undertaken by Maharashtra Industrial Development Corporation (MIDC) to promote the IT sector in Pune. It is known as home for the top IT Companies in India and is expected to have an area of about 2800 acres (11.33 sq. km.), thus developing as an IT village of Pune. Only with the completion of two phases the urbanization of the adjoining areas is accelerating. Thereafter, the Common Wealth Games
hosted at Balewadi Sports Complex located in the area brought in improvised infrastructure facilities and green spaces along with widespread popularity for the locale. Currently the area has transformed itself into a destination for residential development. The area has witnessed tremendous growth in the social and physical infrastructure in the recent years.

- With the IT boom and the development in Hinjewadi and its surrounding areas the trend of gated communities spread widely especially in Pune’s fringe lands. During this came Magarpatta, a residential township and a corporate community in the erstwhile village of Hadapsar. Refer figure 67a. Formerly several farming plots owned by a community, the Magar clan and their immediate neighbours comprising of 123 families pooled 400 acres (1.61 sq. km.) of these lands together to eventually develop a private township plan for the parcels.

- Followed the Amanora Park Township project, wherein 70 farmers pool land for a digitised township and its own 100 MW power plant railway station. Refer figure 67c. This 22 storey residential township that spreads on 400 acres (1.61 sq. km.) of land developed under the special township policy brought out by the State Government.

- Furthermore, Nanded City, refer figure 67b, began as a modest dream of 235 farmer families. With a total area of 700 acres (2.83 sq. km.), Nanded City is the epitome of Green Designing home to 1/2/2.5/3 BHK (bed room hall kitchen) apartments, two schools and several recreational facilities. The commercial district will comprise of major Corporate Houses and Business Centres. The project reserves 230 acres of land for greenery, and promises a pollution free environment, eco-friendly features and self-sustainable systems. Moreover, it assures a life that is truly in tune with nature.

Note in figure 66 - the size of the gated communities, in most cases the size is comparable to that of the Pune city’s historic core while in some other cases it is larger than the core. Such large scale spatial settings inevitably initiate trends, both from top-down and bottom-up, that adversely influence surrounding urban developments.
Figure 66: Map shows IT industries and gated communities in fringe lands of Pune city that have come up between the years 2001 to 2011.

Source: illustration by author

Figure 67: from left to right, master plan of Magarpatta, Nanded city and Amanora park township

Source: google images
Figure 68a: Current state of urban fringes - locals, green fields, porous grounds, farming activity, scenic nature around.

Source: illustration by author, photos author’s archive
Figure 68b: Scenario 0 - immigrants, residential constructions, paved grounds, building industry, declining nature.

Source: illustration by author, photos author’s archive
CHAPTER 6

CTC approach to urban design
6.1 CASE OF SUS VILLAGE, PUNE

Sus is located in the northwest quadrant of Pune region. The village core is known as the *gaothan* area. Agriculture remains the main economic activity. Land is seeded once a year, which primarily depends on natural rains, or on pumped water from wells. However, the hilly terrain and uncertainty of rains reduce the agricultural value of these lands. The family culture is that of living collectively, with more than 10 members in a single household. Several locals from the village commute to a nearby urban center for clerical jobs.
Figure 71: Sus and surroundings - existing diversities of landscapes.

Source: map by author, data used from ESR report, PMC, Town Planning and Valuation Department, Pune and Google maps.

Legend

- 1. Oxford Golf and Country Club
- 2. Symbiosis Institute of Technology
- 3. High Energy Materials Research Laboratory
- 4. Defense Research and Development Organization

1. Oxford Golf and Country Club
2. Symbiosis Institute of Technology
3. High Energy Materials Research Laboratory
4. Defense Research and Development Organization
Figure 72: Sus and surroundings - existing spatial spread.

Source: map by author, data used from PMC, Town Planning and Valuation Department, Pune and Google maps.
Figure 73: Sus and surroundings - existing road network.

Source: map by author, data used from PMC, Town Planning and Valuation Department, Pune and Google maps.
Figure 74: Sus and surroundings - existing vegetation and landscapes.

Source: map by author, data used from ESR report, PMC, Town Planning and Valuation Department, Pune and Google maps.
Figure 75: Sus and surroundings - existing water structure.

Source: map by author, data used from ESR report, PMC, Town Planning and Valuation Department, Pune and Google maps.
6.2 THREE LOCATIONS

For the study of site dynamics, the territory of Sus village was divided into a grid of 1x1 kilometer square. For detailed analysis three case locations were chosen. At first, the selections were arbitrarily made on the axis where spatial development has occurred. These were,

1. Location 1 - The village core
2. Location 2 - The quarry site
3. Location 3 - The abandoned school building

Next step was to map the site dynamics. A local scale look at the site aids to map relevant details like commonly used streets and existing hierarchy that is followed in them, regularly used foot ways, significant topographical edges, cultural corners that have potential to develop as social anchors of neighbourhood, abandoned buildings, underused land parcels, ecologically valued corridors and other contextual details. Also are mapped urban structures and typologies, which have proved to be adaptable in the changing socio-economic processes. A step further, is to prepare a structure map for the site. Herein, vital edges are identified. For a regional scale and territorial view point, urban and natural systems are mapped. At this stage, local site is read in relation to its larger scales.
Figure 78: CTC approach to mapping main structure of Sus

Source: illustration by author
Figure 79: CTC approach to mapping contextual dynamics of Sus

Source: illustration by author
Figure 80: Sus village - existing structure.

Source: map by author, data used from PMC, Town Planning and Valuation Department, Pune and Google maps.

Legend
- existing residential development
- up-coming residential development
- existing commercial development
- village core spatial spread
- cultivable lands
- existing education institutes
- primary road
- Sus administration boundary (2011)
- parcels
- sloping terrain
Figure 81: For Sus village.

Source: map by author, data used from PMC, Town Planning and Valuation Department, Pune and Google maps.
Figure 82: For Sus village - suitability mapping.

Source: map by author, data used from PMC, Town Planning and Valuation Department, Pune and Google maps.
Suitability Map

SETTLEMENT AREA (Village Sus)
Village core is of double story structures. Most housing units are bungalows and are owned by occupying families. Remaining are flats, chawls or semidetached or row type houses. Predominantly, building materials are brick walls and concrete slab, walls covered with cement screed, asbestos cement or tin sheets for roofing [49%] and tiles for flooring [80%].

WATER LINES
Rain water and surface runoff lines
Small feeder lines to the stream

MAJOR ROAD
Connects to nearby urban center and further to main city
Tar road

PERENNIAL STREAM
May or may not run all year round depending on the rainfall

FARM LANDS
Land suitable for farming

POTENTIAL AFFORESTATION AREA
Slope better for afforestation than farming,
Environmental enhancement, micro climate maintenance

HERITAGE SITES IN SUS VILALGE
Bhairavnath Temple, (Gaothan area 70 sq.mts. each), 22x10 m
An original old temple built in stone with tiled roof and conical tower at the rear was later extended towards the front side with modern construction. Inside, there is a stone Shivlinga.

Plain, rectangular Maruti Temple, 15x5m
Separated by Zilla Parishad School.

Vittal Rukmini Temple, images of Vitthal and Rakhumai
WHERE DO WE WANT TO BE?
<table>
<thead>
<tr>
<th>Problem Field</th>
<th>Goals</th>
<th>Qualities</th>
<th>Strategy</th>
<th>Proposals / Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incoherent development</td>
<td>Coherent growth</td>
<td>Unique, Contextual</td>
<td>Integration</td>
<td>Culture center</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Weekly fresh vegetable markets</td>
</tr>
<tr>
<td>Neighborhoods, socio-spatial-cultural</td>
<td>existing and new</td>
<td>healthy living</td>
<td>Eco guides</td>
<td>Green residential areas</td>
</tr>
<tr>
<td>incoherence</td>
<td></td>
<td>ease of accessibility</td>
<td></td>
<td>Pedestrian friendly streets, neighborhoods</td>
</tr>
<tr>
<td>Growing metropolis, regional priorities</td>
<td>local and regional</td>
<td>walkability</td>
<td>Mixite</td>
<td>Leisure facilities (gardens, eating joints, nature zones)</td>
</tr>
<tr>
<td>over local</td>
<td></td>
<td>living with nature</td>
<td>Educity</td>
<td>Community gardens</td>
</tr>
<tr>
<td>Territorial incoherence,</td>
<td>urban and natural</td>
<td>social anchors</td>
<td>Proxemics</td>
<td>Multifunctional green areas (productive landscape, community gardens, minor forest produce, branded food products, eco-tourism, medical tourism boost, grazing lands, afforestation areas)</td>
</tr>
<tr>
<td>imbalanced relationship between man-</td>
<td></td>
<td>green practices and</td>
<td></td>
<td>Bicycle tracks</td>
</tr>
<tr>
<td>made and its larger habitat</td>
<td></td>
<td>ecological infrastructure</td>
<td></td>
<td>Recycle under used parcels/buildings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>productive landscape</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>organic emergence</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 83: For Sus village - design analysis.
Source: authors’
HOW DO WE GET THERE?
6.3 THE STRATEGY

Driven by the contextual potentials of the site, the strategy has several components. The social, cultural and spatial components identify the village cores, existing developments and their spatial characteristics. It suggests the village core to integrate to the surroundings such that the core continues to serve as the community's gathering place and evolve to be a vibrant place. The environmental components recognize the heterogeneous landscape and reveal a unique character of Sus. It suggests preventive and ameliorative measures to minimize the ill-effect of human activity and takes corrective measures for restoring and improving the existing natural elements. Together these components propose a coherent structure for new developments consisting of cultural heritage sites and environmentally attractive natural sites. Two main projects are essentially catered to in the proposal made below.

One is the village core proposed to develop as a culture center,

The village core is an important local center and foundation of Sus's social vitality. To avoid it to get completely eradicated by the Pune metropolitan expansions, the derived objective for the core is to preserve it by means of spatial transformation guidelines that promote a series of incremental changes within the core and around. The general scheme introduces an ordered transition from the core to the cultivable lands. Conditions are created to engender spatial relationships and avoid fragmentation. To integrate the core to surrounding new developments, it is proposed that the area of the core develops as a culture center of the village. It is pedestrianized. Any new infill development follows existing architectural style and also preserves existing trees and vegetation. Temple as secondary support focuses on teaching social values. It takes ownership and protects trees in the vicinity. It also helps surrounding developments to learn and follow urban agriculture practices. New buildings are residential purpose or mixed-use, low rise and low density developments.

Second is the abandoned school building and the quarry site to develop as a learning center,

A vocational school is to be established for forestry, farming and construction. In the school, the inhabitants will get acquainted with the right practices for forest planting; agriculture practices and construction techniques using local materials. The quarry site is proposed to develop as a neighborhood garden with a water pond. Other green and open spaces vary in size and quality. Several urban agricultural plots provide income and fresh vegetables for the residents. The hill slopes are afforested to avoid further air pollution and soil erosion. The road pattern is designed to adapt to the terrain of Sus, pattern of existing walk ways of the fields and enhance the quality of heterogeneous landscape of Sus. Thus, it is proposed to utilize the local natural resources optimally.
CULTURE CENTER
6.3.1 CULTURE CENTER

Location 1 is the village’s first settlements – the *gaothan* area. It is the core of Sus village. Largely the area encompasses residential use. The main street is to south of the core along which aligns few non-residential functions and is frequently visited by locals for every day utilities.
The core contains many of its original houses and a historic temple. It is this area that expresses the village's fundamental character and its identity. In the presence of narrow alleys and building height of two storeys the built form addresses the human scale. However in the current urbanization pace these potentials are not recognized. The core is gradually losing its sense of place.

Figure 84b: Shows point location from where photos are taken.
Source: Google maps
Figure 85: Top-view map of 1x1km area for location 1, Sus village.
Source: Google maps

Figure 86: For location 1, Sus village.
Source: map by author, data used from PMC, Town Planning and Valuation Department, Pune and Google maps.
Figure 87 – (a) Parcels as in town planning documents, (b) Parcels as mapped from Google earth image for case of Sus village.

Source – Figure 87a mapped by author on land divisions’ map of Sus village as base, data from Town Planning and Valuation Department, Pune. Figure 87b mapped by author on Google earth image of Sus village as base.
... in the site

Figure 88: CTC approach to mapping main structure of location 1, Sus.

Source: illustration by author
Figure 89: CTC approach to mapping contextual dynamics of location 1, Sus.

Source: illustration by author
Figure 90: Location 1 proposals
Source: by author
Figure 91: (left), Proposed culture center

Figure 92: (right), Proposed trees avenue,
(below), avenue pencil sketch

Source: by author
Figure 93: (left), Proposed low density low rise residential zones.

Figure 94: (right), Proposed slow mobility lanes alongside the water streams.

Source: by author
(a) Existing
Figure 95: Culture center, temple area and surrounding village core as social anchor of community

Source: illustration by author

(b) Proposed
(a) Existing
(b) Proposed

Figure 96: Plazas, pedestrianized markets, social cohesion, functional mixite

Source: illustration by author
(a) Existing
(b) Proposed

Figure 97: Weekly vegetable markets, social cohesion
Source: illustration by author
(a) Existing
Figure 98: Safe and quiet neighborhoods, pedestrianized streets, human scale alleys.

(b') Proposed

Source: illustration by author
6.3.2 LEARNING CENTER FOR CONSTRUCTION, AFFORESTATION AND URBAN AGRICULTURE PRACTICES

Location 2 is an abandoned quarry site. During summers the site is dry and used more as a dump yard. While in rainy season the site is filled with water. Location 3 is a vacant school.
building situated at the foothills in the south-west of Sus. The terrain is steep, covered with basalt outcrops and sparse green spaces. Majority of land parcels at this location has soil category 4, which is not fertile. The ground water availability is also low. Cattles are taken up to the hills for grazing purpose as there are no more grass lands available in and around the village.
Figure 100: Top-view map of 1x1km area for location 2 and 3, Sus village.

Source: Google maps

Figure 101: For location 2 and 3, Sus village.

Source: map by author, data used from PMC, Town Planning and Valuation Department, Pune and Google maps.
Figure 102 – (a) Parcels as in town planning documents, (b) Parcels as mapped from Google earth image for case of Sus village.

Source – Figure 102a mapped by author on land divisions’ map of Sus village as base, data from Town Planning and Valuation Department, Pune. Figure 102b mapped by author on Google earth image of Sus village as base.
... in the site

Figure 103: CTC approach to mapping main structure of location 2 and 3, Sus.

Source: illustration by author
Figure 103: CTC approach to mapping contextual dynamics of location 2 and 3, Sus.

Source: illustration by author
Figure 104: Location 2 and 3 proposals

Source: by author
Figure 105: (left), Proposed vocational school,

Figure 106: (center), Proposed park,

Figure 107: (right), Potential plots for urban agriculture practice.

Source: by author
Figure 108: Proposed multi-functional green areas.

Source: by author
Figure 109: Proposed areas for afforestation.

Source: by author
Figure 110: Leisure facilities, gardens, eating joints, new residences, nature living

Source: illustration by author
(a) Existing
Figure 111: Conserve biodiversity, bicycle tracks, recycle under used parcels.
Source: illustration by author

(b) Proposed
(a) Existing
Figure 112: Green residential areas, community gardens, grazing lands.

Source: illustration by author
CHAPTER 7

Reflections and recommendations
Figure 113: Conceptual diagram showing vocational schools and how they will stimulate the city.

Source: illustration by author
7.1 REFLECTIONS

The thesis began with the aim to explore an alternate planning approach for Pune based on theory; in particular Complexity Theories and Complexity Theories of Cities. It also aimed to examine urban fringe lands and their micro dynamics so as to reframe the planning and design strategies for contemporary Pune. Finally, it aimed to suggest ways to achieve socially, spatially, culturally and environmentally coherent urban conditions for not only new developments at urban fringes but the whole of Pune region.

This chapter reflects on the research process and provides with recommendations for further study. Besides, it summarizes the difficulties for predictions that are intrinsic of CTC approach to cities and their planning.

The CTC approach is an attempt to include contextual qualities of site to urban design proposals and planning process. The attempt is to incorporate a socio-cultural context that has evolved through time. In broad sense include historic context. Also, the attempt is to incorporate geographical context of site, both by means of local and regional scales and by means of urban and natural systems. Therefore, the CTC approach recognizes the city region to be a coherent entity from the very beginning of the design analysis process. The approach interprets city’s spatial systems as a whole. Although the approach examines the city at multiple scales it advocates the design process to begin with contextual analyses, for which a biography of the case region is useful. However the approach faces difficulties for predictions. The CTC approach collects first-hand information from the locals. The methodology for which if not defined, the data collected may become large enough to interpret. Additionally, the interpretation of the collected information may vary as per the interpreter or the team of designer. For this study the parcels at site were taken as a basic unit to begin design work with. However, it is arguable.

7.2 RECOMMENDATIONS

There are several topics that align with this research but were beyond the scope of this thesis; these could be explored in further studies.

Firstly, this thesis takes the case of Pune region that is located in a developing nation, India. Herein, large section of the society is struggling for their basic necessities of food, clothing and shelter. Moreover, the society is largely religious and gender biased. Therefore, to explore the dynamics from the bottom-up in a city located in a developed nation may result entirely different possibilities and probabilities. Secondly, this thesis focuses heavily on Sus village and its immediate surroundings. It would be interesting to investigate other villages by means of CTC approach to make a comparative analyses study. Wider implications - the case of Pune city is located in Maharashtra state. However, the project proposals made for Pune region’s expansion hold potential for other Indian cities. Speaking broadly, planning systems around the world are attempting to incorporate flexibility in their approaches. This single example of Pune provides a broad framework for coherent urban conditions and could be inspirational for other growing cities.
This page is blank on purpose
This page is blank on purpose
APPENDIX
A.1

In the following pages the research on Pune city’s urban fringe lands conducted from 2014 to 2015 for the graduation project is summarised in a concept paper titled Urbanizing fringe lands – The case of Pune region, India.

The paper begins with an introduction to the case city Pune and narrates the transformation of urban fringes and associated territorial urban issues in the following section. It further examines the current planning approach and recognizes its limitations. The next section incorporates a theoretical perspective. It describes theoretical context on complexity theories and complexity theories of cities in particular. The subsequent sections clarify what kind of governance model would be appropriate for countries with weak public institutions. The paper concludes with the reflections on the proposed research methodology and design framework and the difficulties for prediction that are intrinsic to this new view of cities and their planning.

Some parts are results of and drawn as it is from the preceding graduation report. Although unfinished at this stage the concept paper is an attempt to build comprehensive material to reach to the larger audience.

A.2 ABSTRACT

After Mumbai, Pune is the second largest city in the state of Maharashtra. With the city’s growing popularity its urban population is expected to double in coming 20 years; while the area governed by Pune planning authorities will double in the next five years. The current planning approach is based on differentiated land use which focuses on territorial scales and long term goals. In this planning approach, everyday processes tend to be ignored. This causes problems which are most prominent in the urban fringes. Fringe areas are vital in the growth and prosperity of the region as a whole. Due to its weak institutional situation the fringe lands urbanize in an unpremeditated manner and the potential of its diverse environments degrade by the time the area begins to develop fully. We address this issue with a focus on complexity theories of cities (CTC). Herein, the city is viewed as a complex system characterised by the interaction of dynamics from the bottom-up and top-down forces. With this insight the proposed complexity approach explores local dynamics and investigates how they can be taken into account to include contextual qualities. This is done by using micro-stories that describe the day-to-day life of families, including previous generations and their socio-spatial context. This information helps interpret the territory in a manner so as to build plausible visions. From this approach we attempt to outline - how a weak institutional environment in the current planning system may be strengthened towards a more inclusive process of urbanization.

A.3 INTRODUCTION

Worldwide, fringe lands are observed as available lands to accommodate city’s urban growth. For its mere location, amongst all the fringe lands those that adjoin the city’s administrative limits are under a tremendous influence of development. For this paper, we term them as urban fringes or urban fringe lands. The definition of urban fringe shifts depending on the global
location. For this research, we follow T.L. Smiths’ discussion of the urban fringe around Louisiana in 1937, “the built-up area just outside the corporate limits of the city” (Pryor, December, 1968, T.L. Smith, 1937). Likewise, for this research urban fringe lands are regions adjoining the city and are located beyond the city’s current administrative limits. (The term ‘current administrative limit’ implies that the urban fringe lands shift over time as cities expand outward.)

Present day rapidly growing Indian cities seek towards the urban fringes so does the research case city Pune. It is growing through the process of taking in lands at the periphery and more villages as need arise. So, the 8th century agriculture settlement known as Punnaka has developed to become the mono-centric city of Pune which today encloses an administrative area of 243.84 km2. Along with the urban living comforts and fundamental necessities like access to health care facilities and services for water, sanitation and relatively less important although desirable leisure and entertainment centres, Pune brings wide-ranging choices from job opportunities in varied sectors to education options for different age groups. At the moment, it is one of the most preferred destinations not only for the people from Maharashtra state but also from other states of India. Besides with the support of Information Technology (IT) policies for the state of Maharashtra, the IT sector has grown from INR 25 million to INR 650 million (Kshirsagar, 2010). With the city’s popularity and the IT boom in merely a decade Pune urban population has increased from 2,538,473 inhabitants to 3,115,431 in 2011. By 2031, it is projected that the population will reach 5,657 million (Census India, 2011). As the urban population grows, the needs for housing and supporting facilities increase so also the bid for urban land. Within the city limits, existing densities are already high. Current statistical reviews show 618 persons per hectare and estimate a rise up to 908 persons per hectare (PMC, 2007). With the shortage of available land inside the city for new construction, adjoining low density fringes come under the purview of being annexed.

A.4 URBANIZING PUNE’S FRINGE LANDS

In the times of rapid urbanization it is interesting to note the spatial transformation of the urban fringes and its influence on the Pune region as a whole. Large scale migration at fast pace is rapidly restyling socio-spatial values and culture in the fringe lands. With the flourishing IT industries the wage standards and incomes of many households have increased. Coupled with ready availability of home loans, the residences that were previously beyond the reach of middle income group buyers are now easily affordable. In the state of affairs, real estate sector saw great opportunities. Apparently to meet the needs of extreme population growth, in the recent past construction activities in bulk have been completed. Most constructions have been of gated communities where world class lifestyle is being promoted. The trend may be perceived as a threat as the process leads to selection and enclosure. These gated neighbourhoods bring new hierarchies. The traditional housing typologies were single storey individual houses modelled in a collective setting. Families lived together and remained interdependent for large agriculture plots cultivation and production economy. The new construction in the form of western models of multi-storeyed condominiums and generic architecture abutting the traditional housing typologies generate social divide at subtle levels. These with time are becoming very evident bringing in strong divide in communities and social groups. The local culture is fading and in general
Figure A1: Regional context of Pune

Source: map by author based on google maps
the gap in society is widening.

Moreover, gated communities have displaced many traditional households and affected life of locals adversely. Unaware of the plausible potentials of their lands, several farm owners and other locals sell all their fields to real estate developers at a meagre price. For this study is the latest response, in which several farmers are themselves becoming developers as they join hands together with existing small/big local contractors in the area around, is a matter of great concern. Of these most are uneducated and unaware of the long term impacts of their actions. Also, large parts of the hills are being developed to be residential schemes. Only elite groups can afford homes in these schemes and therefore access to these premises. A common resource – the hill – is restricted to serve only a part of the society.

So far the sporadic state of the built environment in the recent extensions of Pune can be considered a result of the top-down planning system which lacks to read and incorporate contextual qualities. The Pune city and its fringe lands are characterized by – a declining agro economy, substandard and generic spatial forms, degrading environment, air pollution, unjust socio-spatial hierarchies and low quality of life which are becoming urgent problems. The challenge is to find an approach to integrated solutions for the region as a whole which considers the city and its urban fringes together at various scales from local to regional and builds upon a balance between urban and natural systems.

A.5 CURRENT PLANNING APPROACH

A.5.1 BACKGROUND

In 1950 Pune Municipality was raised to a status of a Corporation. The first Master Plan for Pune (Greater Poona then) in 1952, laid planning norms for the city which included zoning and reservation of lands for public use. Proposed development had to follow building bye-laws. It suggested preparing a Development Plan (DP) for Pune which would include possibilities for widening of roads and streamlining traffic, improve supply of water and slum conditions. The DP was operative only after a decade in 1966. It dealt Pune old core separately from its adjoining villages and charted a hierarchical system of plans, programmes and town planning schemes that made it overly rigid. Only by mid-19th century, contextual considerations rose and it was understood that planning must consider town and the hinterlands together. Therefore, in the following years the State Government established an area known as Poona Metropolitan Region (PMR) and set up a Planning Authority Board that prepared the first Regional Plan (RP) by 1970 for PMR which was sanctioned in 1976. Constituted in 1967, PMR today spreads over an area of 1605 sq. km. The region includes Pune Municipal Corporation (PMC), three cantonment boards of Pune, Kirkee, Dehu Road, three Municipal Towns of Talegaon Dabhade, Pimpri – Chinchwad and Alandi, and 127 villages. The current planning approach for the development of PMR is primarily top-down where in a three tier planning process is envisaged. In it, the Regional Planning Board (RPB) prepares the long term perspective plan for PMR and ensures a balanced and multi-sectorial growth in the region. The Regional Plan (RP) at the top lays down broad policies and directions of growth for all the lands in the region. The Development Plan (DP) for the Municipal towns in the region forms the middle tier. It makes more detailed proposals for the towns.
A.5.2 URBAN FRINGE LAND’S GOVERNANCE TODAY

Urban fringe lands fall under RPB and prior to its merger are merely divided into broad zones of residential, public and semi-public, agriculture and no-development, green belt and forest or hill top slopes. Refer figure 2. On its union with the city the PMC, along with consultants and a steering committee monitors to guide the plan making process and prepares a DP for the fringe villages. Statutory procedure as laid by the MRTP ACT of 1966 is followed to prepare and publish the DP in which existing land use (ELU) survey is done. In addition to ELU, other surveys include socio-economic aspects of the present population of the plan area, industrial survey, traffic and transportation survey. A draft DP is published for objections and suggestions for a period of two months. Once the DP is approved the new development follows the norms and policies as recommended for the city.

A.6 THEORETICAL CONTEXT

In brief, complex systems are systems that can be described by the following characteristics.

1. Complex systems are *open systems*: they are continuously interacting with their environment, by exchanging energy, matter and/or information.
2. Complex systems are in a *far from equilibrium state*. Although a complex system might seem stable over some time, it’s important to realize, that this seemingly steady state condition does not equal an equilibrium.
3. Complex systems have *emerging properties*: out of the local interaction of different parts new global properties might emerge which cannot be explained by studying the parts in isolation.
4. Complex systems are characterized by an interaction between *bottom-up and top-down forces*. These top-down forces might be imposed on the system, or might be the results of a process of bottom-up emergence.

5. Complex systems exhibit *non-linear behaviour*. This means that a small act of an individual actor might have a big effect on the system as a whole, and the other way around: a large scale intervention by a planning body might have limited effect on the system as a whole.

6. Complex systems are *path-dependent*. Because complex systems change over time, previous states have an impact on the current states. Complex systems have a ‘memory’: they are the accumulation of previous interventions.

7. Complex systems are *unpredictable* in nature. This unpredictability is *ontological*, which means that it cannot be made predictable by including more data and information.

**A.7 LIMITATIONS OF THE CURRENT PLANNING SYSTEM**

The application of complexity theories in the domain of urban design and planning, has led to a family of Complexity Theories of Cities (CTC). For an overview and discussion, see Portugali et al (2012). If we consider the case of Pune from this perspective, we can have a new understanding of urban planning issues. We summarize these findings in four main points,

a. The Pune planning system is strongly driven by large scale (in both space and time) predictions, which are primarily top-down in nature [4].

b. The Pune planning system disregards how the local environmental qualities of the fringe lands contribute to the region as a whole [3], and how local initiatives within these fringe lands might have a strong effect on the global whole [5].

c. The Pune region should be seen within the context of its historical development as well as its geographical hinterland (reference). It is a path-dependent [6] and open system [1].
d. From a planning point of view, the ‘far from equilibrium state’ [2] of the fringe lands is not taken into account, and the inherent unpredictability of the development is ignored [7].

From the theoretical findings we learn, that within the weak institutional context, there’s a need for a more ‘prediction-free’ approach to planning (reference). This might be achieved by including the bottom-up dynamics as part of the planning system. This can be done by taking into account both, the local environmental qualities and socio-economic situation of inhabitants into account. From a planning point of view, this implies a re-distribution of control by including local inhabitants as drivers of change, while respecting the local environmental qualities. The complexity approach that we explore in this paper builds upon these insights.

A.8 COMPLEXITY APPROACH

Complexity approach recognizes the city region to be a coherent entity in the first place. It interprets how city’s various spatial systems function as a whole. Once the blur of networks and processes is identified and the unique character of the site is surfaced the potentials from the site are used as a tool for future spatial growth. Although the approach examines the city at multiple scales it advocates the design process to begin with contextual analyses. For which a biography of the case region in hand is generated by means of micro-stories.

A.8.1 MICRO STORIES

Following family portraits illustrate everyday use of urban fringe lands and the involved processes at family unit scale.

**Family portrait 1.** Located close to rural areas and is further away from the main city. Of their knowledge last three generations have lived at this location and the main source of income is from cultivation on ancestrally owned lands. Although the land parcels are divided amongst the individual families, the farms are cultivated collectively in turns. Mostly, the females take responsibility of farming. As earnings from the fields are insufficient allied activities of poultry and dairy are common. For this particular family, as they are located next to the road, over a period a small garage has developed as secondary source of income.

**Family portrait 2.** Located in the cultivable lands of the village. Farming has been the main occupation of the family. However, with the unpredictable weather conditions and declining water tables the farm produce is often irregular. Cattle herds are commonly taken up to the hills for the purpose of grazing. Most agriculture lands in the vicinity have transformed to tall apartment schemes. Previously, the families lived in mud houses. A local contractor was hired to construct a new house for their own living. New structure of two storeys was a basic square plan of which walls were in bricks and slabs in concrete.

**Family portrait 3.** Located on the primary road connecting the village core to the nearest urban center. The family owns few parcels of land inherited from their ancestors which are scattered around in the village. On one of the plots a residence is developed in the form of a bungalow,
again for their own living. Backyards that once groomed cattle’s today serve as parking space for a car and a bike. Part of the plot is sold to adjacent owner who expands an existing industry. Along with a local builder another plot is developed as a four storey residential tower. They intend to rent this out so as to secure a fixed income. Their young generation shows interest in building and construction industry.

**Family portrait 4, Located in the village core.** A traditional bungalow was demolished completely and recently a new modern house has been built at this location. The surroundings have urbanized. Locals and many farmers have been displaced. Labor is no more available to cultivate the large fields. Plots that lay between several tall buildings make an awkward living experience. In general the interest in agriculture has declined. In the spur of the development in adjoining areas the land remains to be an asset. However, the purpose of it as a commodity has changed. Plots that are owned by the family are being developed one after the other, individually or in collaboration with other locals. For lack of formal education in building industry the development remains to be of low standards.

**Family portrait 5, Located close to the city’s edge.** The city has grown so much that it has extended into the fields of the urban fringes. Once governed by the town planning department today these parcels are merged with the city and are in the phase of transition. With the change in status the residents now pay the taxes to the city and no more enjoy the farmers’ incentives. Farming is not practiced for subsistence. Only some fields are cultivated to produce fodder for cattle. New generation wants to develop their careers in service sector in future.

**Family portrait 6, Located in the existing, low density and dispersed development of the village.** Farmlands once owned by the forefathers are today a place of modern bungalows built for individual families of five brothers who choose to live together. Yields from the fields are only for their own family. With the current urbanization pattern one can certainly anticipate that the land title may change from agriculture to residential use. So also the land prices may increase.

---

**Figure A4 – Mapping dynamics from the bottom-up, land transformation illustrations I, II, III.**

Source – made by author, Google earth image history as base.
in coming days. Tomorrow they might want to be developers of their lands and discontinue agriculture completely.

A.8.2 COMPLEXITY APPROACH METHODOLOGY

While exploring into this alternate approach to urban planning the study maps ‘family portraits’ by means of micro stories. Micro-stories maps processes. Numbers of families from different villages are opted for interviews. Discreetly, few families located close to the city’s edge were picked and few others, that were further away towards the rural lands. Some were located in the core of the sample village while some others were on the primary road connecting the village core to the nearest urban center. Other families were located in the cultivable lands of the village. Besides the individual household’s everyday facts, the portraits include photographs, site sketches and maps, detailed transformation of the farm lands and the site modification that has occurred in past twenty, forty and in some cases over more than sixty years. These can be read as the ‘biography of the region’ where the identity and strength of the villages are visible through three generations and also through time. The inferences drawn from mapping urban processes bring rich insights that can be used to set new frameworks for urban planning.

For micro scale analyses, one village which is under relatively high influence of urbanization and in purview of being merged with the city limits is selected. While the study made here reflects upon the conditions particular to the example village, it is possible that conclusions drawn and design strategies proposed here may be applicable to similar situations elsewhere. The village spreads over an area of approximately 25 kilometres square. To assess the site dynamics, this fringe territory is divided into a grid of 1 kilometre x 1 kilometre squares. For detailed analysis three case locations are then taken. At first, the selection is intuitively made on the axis where spatial development has occurred.

Next step is to map the site dynamics. A local scale look at the site aids to map relevant details like commonly used streets and existing hierarchy that is followed in them, regularly used foot ways, significant topographical edges, cultural corners that have potential to develop as social anchors of neighbourhood, abandoned buildings, underused land parcels, ecologically valued corridors and other contextual details. Also are mapped urban structures and typologies, which have proved to be adaptable in the changing socio-economic processes. A step further, is to prepare a structure map for the site. Herein, vital edges are identified. For a regional scale and territorial viewpoint, urban and natural systems are mapped. At this stage, local site is read in relation to its larger scales.
Image credits

All images are of the authors with the following exceptions;

pp 011. (bottom), courtesy of Koshish Dhoot.

pp 058. (from left to right), http://www.slideshare.net/avinash15/old-pune-2, last accessed on 20-11-2014.

Bibliography


Christopher, A. (1965). A City is Not a Tree.


